

Scott River Tributary Out-migrant Trapping

Prepared for California Dept. of Fish and Games contract # P0410533

**Performed by Siskiyou RCD
Report prepared by Erich Yokel
December 31st, 2006**

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Abstract:

Four tributaries of the Scott River were sampled for out-migrating juvenile coho salmon (*Oncorhynchus kisutch*) in the period of October 2005 to June 2006. Out-migrant trapping allows for investigations into the timing of emigration, fish condition, and population of a target species. Above average precipitation created several incidences of high flow that precluded trapping operations in the winter of 2005 – 2006. These high flows exacerbated the ability to capture and mark a sufficient number of coho salmon to perform population estimates.

Juvenile coho salmon were captured on all four sampled tributaries: French, Shackleford, and Sugar Creeks, and the East Fork Scott River. These efforts yielded information about the timing of emigration of juvenile coho and rainbow trout (*O. mykiss*) from individual tributaries. The biological parameters of length and weight were measured for most captured target species. The captured coho salmon emigrating from the tributaries were significantly smaller than coho smolts captured in previous studies in the lower Scott River.

Young of the year coho were captured in spring 2006 in French Creek and the East Fork, but not in Shackleford Creek. This is noteworthy because adult coho spawning was documented in Shackleford Creek during the winter of 2005-2006. In addition, adult Chinook spawning was documented in Shackleford Creek but no young of the year Chinook were trapped the subsequent spring. Based on the spawning ground survey data above trap data and direct observational dives completed in the summer of 2006, it is hypothesized that stream bed altering flows scoured the majority of coho and Chinook redds in Shackleford Creek during the winter of 2005 – 2006.

Background:

An understanding of the habitat requirements and survival for all life stages of juvenile coho salmon is essential in understanding the factors that limit smolt production in freshwater. Coho salmon in the Northern California Southern Oregon ESU are listed as “threatened” by the federal and state Endangered Species Acts. In response to the state listing of coho, the Scott River Watershed Council developed a “Limiting Factors Analysis” for coho smolt production in the Scott River basin. In this process we identified potential limiting factors in all life stages of coho salmon’s freshwater rearing and spawning. A major goal of this process was to identify key data gaps about the population, distribution, and habitat requirements of juvenile coho salmon in the Scott River throughout their full year of rearing.

The scientific literature often cites the period of winter rearing as the limiting factor for coho smolt production in freshwater basins in the Pacific Northwest (Nickelson, 1998). Little is known about the survival, distribution, and habitat availability of juvenile coho salmon in the Scott River during the period of winter and early spring. This period is characterized by periods of low flows of extremely cold water interspersed with periods of high flow and flood. Juvenile coho have been found to prefer habitats offering velocity refuge during these high water events (Bell, 2001).

It has been found that large amounts of juvenile coho salmon are utilizing the tributaries of the Scott River during the low flow months of late summer (Yokel, 2005). Out-migrant smolt trapping efforts in the lower Scott from 2000 – 2006, have shown that the majority of yearling coho smolt emigrate in March and April with significant amounts of smolts emigrating through May (Chesney, 2004). We wanted to study the juvenile coho’s distribution between late summer rearing and emigration from the Scott River. This winter rearing period is difficult to study because of high flows and cold water.

Through this study, we wanted to document when the coho emigrate from the tributaries, their condition at emigration, and the population of emigrating juvenile fish from different tributaries of the Scott River. It was hypothesized that this study would allow for the determination of when juvenile coho enter the main stem Scott River prior to their emigration from the Scott River. This information would be useful to fill in the gap of our knowledge regarding the distribution of juvenile coho salmon in the months of winter and spring in the Scott River.

Managers of the Scott River are also interested in habitat requirements, the distribution of desired habitat and survival during the period of winter rearing. These questions regarding juvenile coho habitat utilization during the winter months remain to be addressed.

Introduction:

An out-migrant trapping program was performed from late October 2005 through Mid-June 2006 on four tributaries of the Scott River. See Frame nets connected to holding boxes were used to capture emigrating juvenile salmon and trout. Unfortunately, an above average amount of precipitation created high flows that precluded efforts to capture fish over several “long” intervals during this trapping season. Precipitation of 10.89 inches was measured in Fort Jones in December 2005 (262% of the 70 year average) and 12.84 inches of precipitation was measured in Callahan during December 2005 (350% of the 62 year average) (CDEC, 2006).

Adult spawning surveys and juvenile direct observation surveys have shown that coho salmon utilize the French Creek and Shackleford Creek watershed's at some of the highest densities in the Scott River (Quigley, 2005). Other tributaries of the Scott River have been shown to be important to spawning and rearing coho salmon. The East Fork of the Scott River and Sugar Creek were selected for this study, because these streams represent different types (size and geomorphology) of the streams utilized by coho salmon in the Scott River. The East Fork is a large tributary with over ten miles of suspected juvenile rearing habitat that has not been well studied. Sugar Creek is a small tributary with several miles of well studied juvenile rearing habitat. **Map #2 Redd Distribution 2004/2005**, illustrates the distribution of adult coho spawning in the winter of 2004-2005.

In the two key tributaries: French Creek and Shackleford Creek, effort was made to trap 5 days out of each week. Sugar Creek and the East Fork were trapped intermittently with a goal of trapping once a week. All fish captured were identified by species and counted. Target species; coho salmon (*Oncorhynchus kisutch*) and rainbow trout (*Oncorhynchus mykiss*), were measured and weighed. A portion of the juvenile coho salmon and rainbow trout captured in French and Shackleford Creek were marked and released upstream. These “Mark and Recapture” trials are used to calculate trap efficiency and develop population estimates.

Objectives:

The primary objective of this project was to monitor out-migrating salmonids (especially coho salmon) in selected tributaries of the Scott River utilizing capture by frame traps. Frame trapping was intended to allow for the determination of salmonids' emigration timing from the tributary and fish condition at emigration from the tributary. Utilization of mark and recapture protocol on tributaries trapped five days a week was intended to allow the determination of trapping efficiencies and estimation of the total number of fish emigrating from the tributary.

Specific questions:

- 1) What is the timing of emigration from the tributary for juvenile coho salmon and steelhead trout?
- 2) How many salmon and steelhead emigrate from the tributaries?

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- 3) What is the condition of juvenile coho salmon and steelhead trout upon emigration from the tributary?
- 4) What is the trapping efficiency of each week's effort?

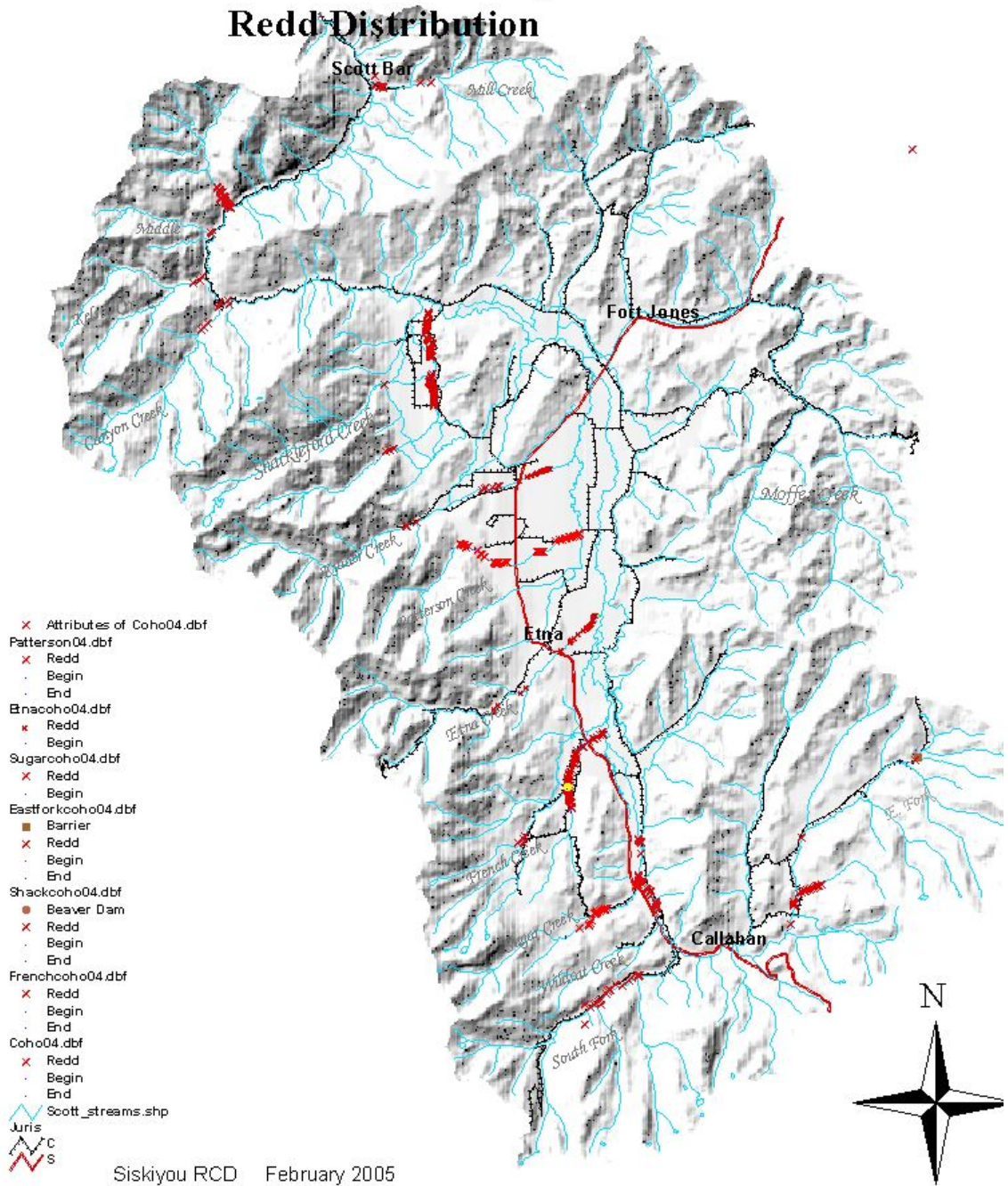
Measurable objectives:

- 1) Total daily catch of all aquatic species.
- 2) Biological parameters (forklength and weight) on captured trout and coho salmon.
- 3) Total number of target fish marked and recaptured.
- 4) Continuously monitored physical water quality parameters – stream discharge and temperature.

Map # 2

Scott River Adult Coho Survey 2004-2005

Redd Distribution



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Location

This project took place in the Scott River Watershed, a tributary to the Klamath River, Siskiyou County, California (**Map 1. Location Map.**). Out-migrant trapping took place in the lower reaches of French Creek, Shackleford Creek, Sugar Creek and the East Fork Scott River.

Geographic coordinates of each trapping location:

French Creek:	N41°24.923	W 122°50.902
Shackleford-Mill	N41°38.069	W 122°57.810
Sugar Creek	N41°20.515	W 122°49.446
East Fork Scott River	N41°18.441	W 122°47.796

Positions were captured using a handheld Garmin 12 GPS Receiver. WGS84 was the Datum used during data collection.

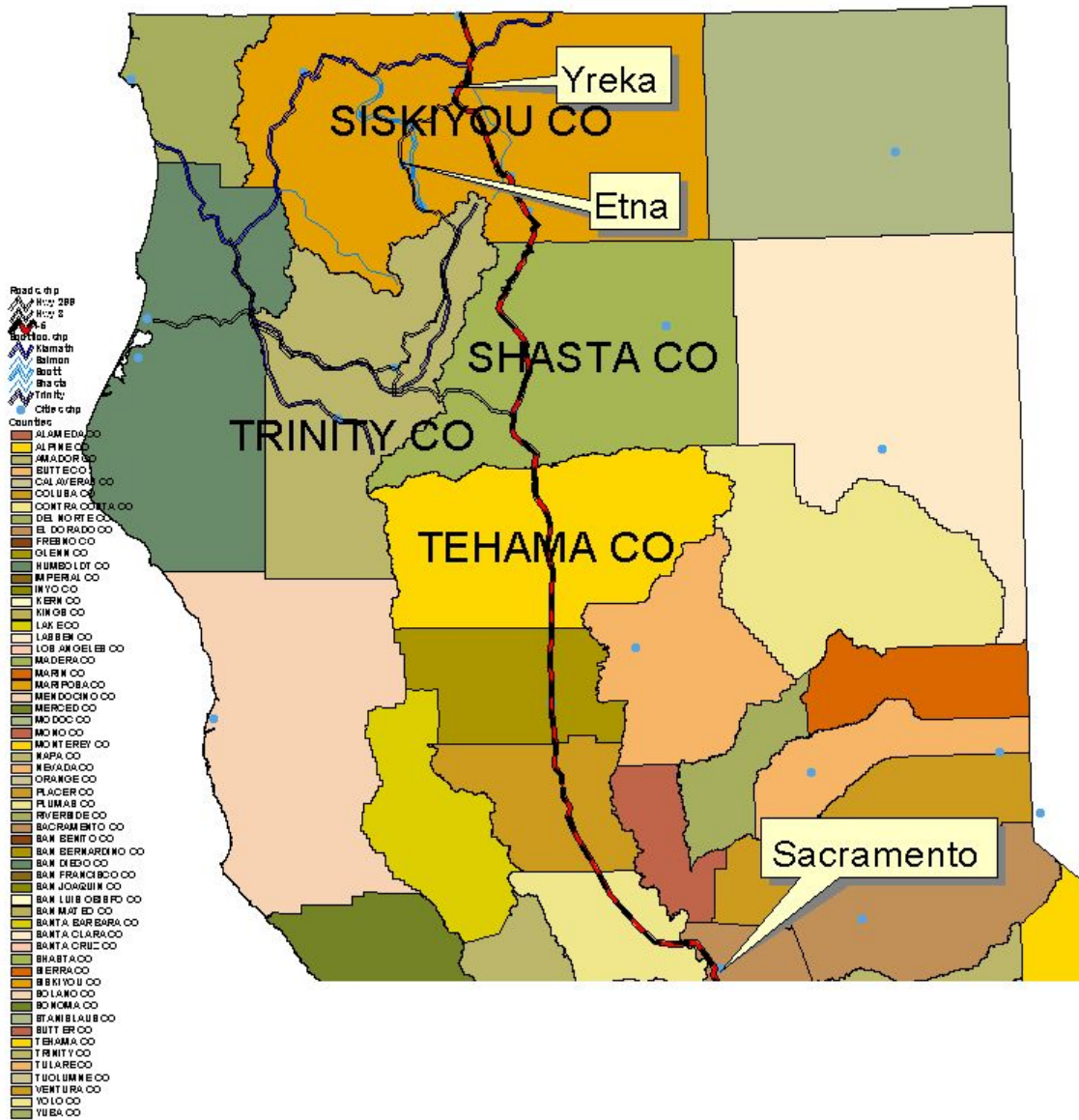
Site Access

French Creek Trap site:

From the town of Etna take Hwy 3 south approximately 5 miles to French Creek. On Hwy 3, cross over French Creek and pull off to the left at a gate into the field to the south of French Creek. Enter the gate, turn north following the fence to the corner, turn right (east) and follow the fence 500 yards. The path turns left and crosses through the riparian and into the creek at the trap site (site is approx 50 yards upstream from a vortex weir).

Landowner: Beverly Tobias
P.O. Box 307
Tres Pinos, CA. 95075

Map # 1 Vicinity Map



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Shackleford Creek Trap Site:

From Etna take Hwy 3 north to Fort Jones. In Fort Jones, turn left (west) onto the Scott River Road and drive approximately 10 miles to the Quartz Valley Road. Turn left (south) onto the Quartz Valley Road and cross over the Scott River. Cross over Shackleford Creek and pull off immediately to the left and park at the gate. Go ¼ mile upstream and enter the creek at the trap site.

Landowner: Don Gutleben
15432 Quartz Valley Road
Fort Jones, CA 96032

Sugar Creek Trap Site:

From Etna take Hwy 3 south approximately 11 miles, and cross over Sugar Creek. Take the first left and pull into the parking area on the south side of the creek. From the parking area a short trail drops down into Sugar Creek (approx. 10 yards downstream of bridge). The trap site is just downstream (20 - 50 yards) from the trail.

Landowner: Mike Kalpine
9926 S. Hwy 3
Callahan, CA. 96014

East Fork Trap Site:

From Etna take Hwy 3 south approximately 12 miles to the town of Callahan. Go through town and enter the USFS - Callahan Guard Station located just south of Callahan on Hwy 3. At the back of the Guard station property there is an old stone fence with a metal gate. Go through the gate and the trap site is right there.

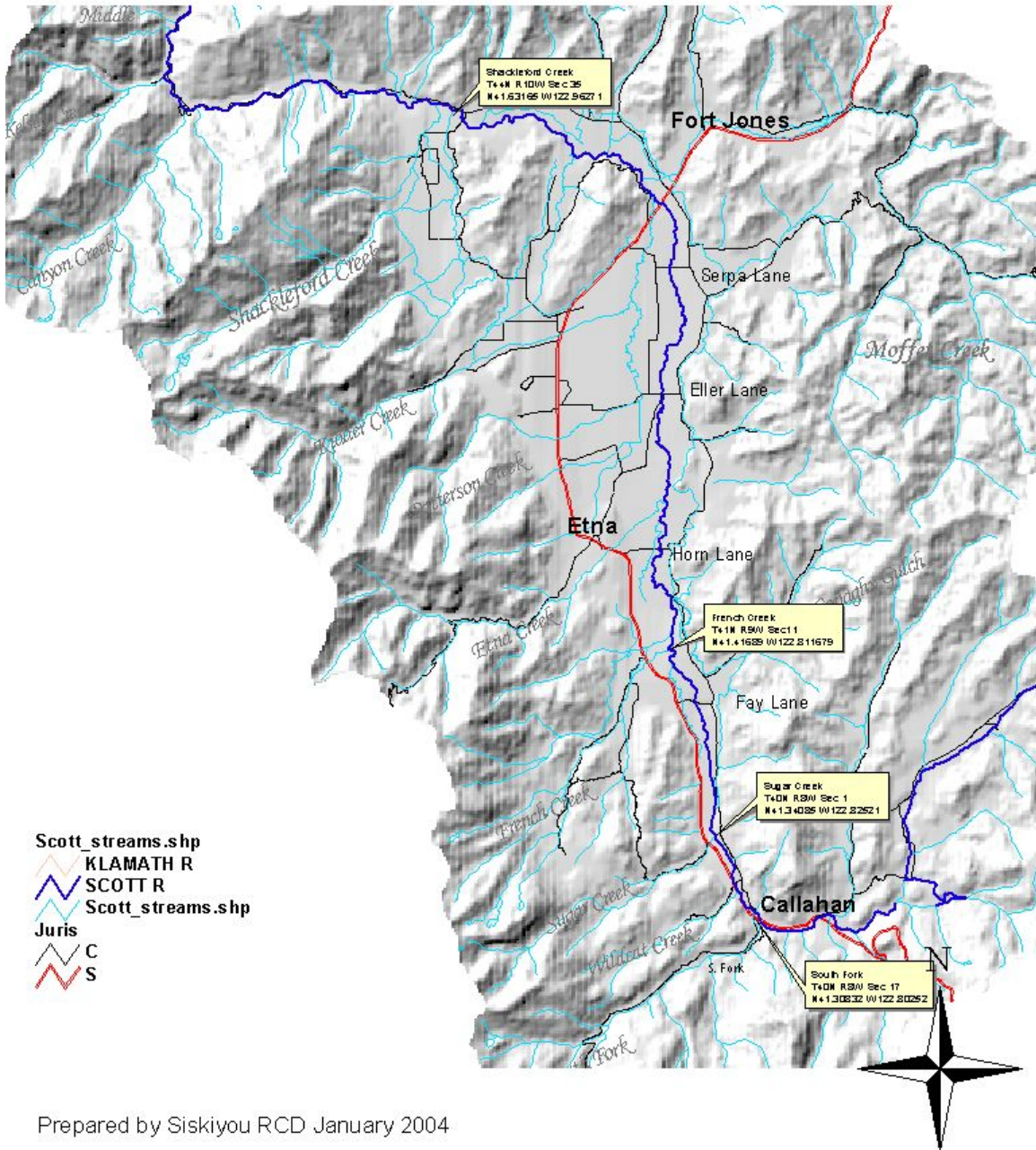
Landowner: John Owens
8008 Island Rd.
Fort Jones, CA. 96032

See **Map # 3** for trap locations.

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Map # 3

Scott River Tributary Out-Migrant Trapping
Proposed outmigrant trap locations



Prepared by Siskiyou RCD January 2004

Materials and Methods:

Traps:

Two types of traps were used:

- 1) 'fyke' nets or frame traps
- 2) handmade 'pipe' traps.

Fyke traps consist of a tapered net attached to a metal frame at the top and holding boxes at the bottom (**Picture 1**). A pair of holding boxes equipped with baffles was utilized, to allow for the maximum assurance that there will be a velocity refuge for any captured fish. A three (3) foot by four (4) foot wide frame trap was utilized on French Creek. In Shackleford Creek both a six (6) by eight (8) foot wide, and 3' by 4' diameter frame trap were used. A ten (10) foot in length section of 8" PVC was placed between the net and holding boxes on the Shackleford Creek 4' trap.



Picture 1. Fyke trap on French Creek.

A handmade pipe trap was predominantly used on Sugar Creek. This trap had a two (2) foot tall by three (3) foot wide diameter frame attached to a short tapered net that entered a 10 foot long piece of 8 inch PVC. The pipe entered a mesh and PVC holding pen that was equipped with a baffle.

An identical pipe trap was used on the East Fork, but the holding pen was found to be stolen on 2/6/06. After the loss of the pipe trap's holding pen trapping was resumed on 2/10/06 utilizing a four foot and eight foot frame trap to trap the East Fork Scott River. Sugar Creek's live car was stolen on 5/15/06. The eight foot frame trap was used for a period from May 23rd to June 13th, 2006 on Sugar Creek in an attempt to document the presence of young of the year coho in 2006.

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Fish processing:

Fish are removed from the traps as expediently as possible with small nets. The fish are transferred to fresh river water in buckets and held for a minimal amount of time for measurement of biological parameters. Non-target species were identified by species, counted, and released. An occasional non-target species was measured and weighed. Target species (coho salmon and steelhead trout) were anaesthetized in a water bath infused with gaseous carbon dioxide. Proper anaesthetization and handling insures minimal stress on the captured specimens.

The fork lengths (within 1 mm) and weights (within a .1 g) of all target species were measured, when possible. Fork length is defined as the length of the fish from the snout to the fork of the caudal fin. Weights were measured with a Ohaus Scout Pro digital scale (.1g precision). High winds and battery failure sometimes precluded the collection of weight data. Fish that were not to be marked were immediately placed in fresh stream water in a bucket for recovery after collection of the biological data.

A scale sample was removed from a small sub-sample of captured coho salmon and rainbow trout. All captured mortalities (coho salmon and rainbow trout) were collected and frozen. The scale samples and mortalities were delivered to Bill Chesney (California Department of Fish and Game, Yreka) for scale and otolith analysis.

Marking methods:

Two methods were used to mark target species captured during the course of the project. Initially, a histological dye (Bismarck Brown) was used to “stain” the rainbow trout and coho salmon in large batches (**Picture 2.**). This method was suspended when the California Department of Fish and Game (CDFG) started their trapping operation in the main stem Scott River in early February, 2006. CDFG has historically used Bismarck Brown to mark YOY salmonids, so it was necessary to change the marking method in this project to avoid confusion and pollution to CDFG’s trapping project.



Picture 2. Coho “recapture” - marked with Bismarck Brown – French Creek 12/9/05.

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The marking method was switched to a 'Madrejet' type 'dental inoculator' loaded with the histological pigment Alcyon Blue. With this device a "blue line" was injected into the upper or lower lobe of the caudal fin of the fish. The two marks (upper caudal and lower caudal) were alternated on a weekly basis. Rainbow trout were not marked after the contract manager (CA. Dept. of Fish and Game Biologist Mark Zuspan) stated there was no 'biologically valid' reason to mark the YOY trout. This was welcomed by the crews due to the difficulty of marking the usually small trout and the high incidence of tail damage with the smallest salmonids caused by this marking method.

After the mark is applied the fish are recovered in a bucket of fresh river water. After recovery the fish are carried upstream past several habitat units and held in a pen that is situated in the stream. The fish are left for several hours and then released. Dead or weak fish are recorded upon release. Captured fish with previously applied marks (recaptures) are recorded.

Flow measurements:

Flow measurements were taken at the beginning and ending of trap sets. A Swoffer Model 2100 was used. Several evenly spaced points across the frame (four for the 4 footer and seven for the 8 footer) were selected and discharge measurements were taken at each point by measuring water height and velocity. The summation of the individual cell discharges (q) yields the discharge (Q) sampled by the trap – represented in units of cubic feet per second (cfs).

Temperature monitoring:

Ambient stream temperatures were monitored on all four tributaries using Onset Optic Stoway temperature data loggers. Several gaps exist in the collected data due to sensor failure or equipment loss.

Results:

Total daily catch – coho salmon:



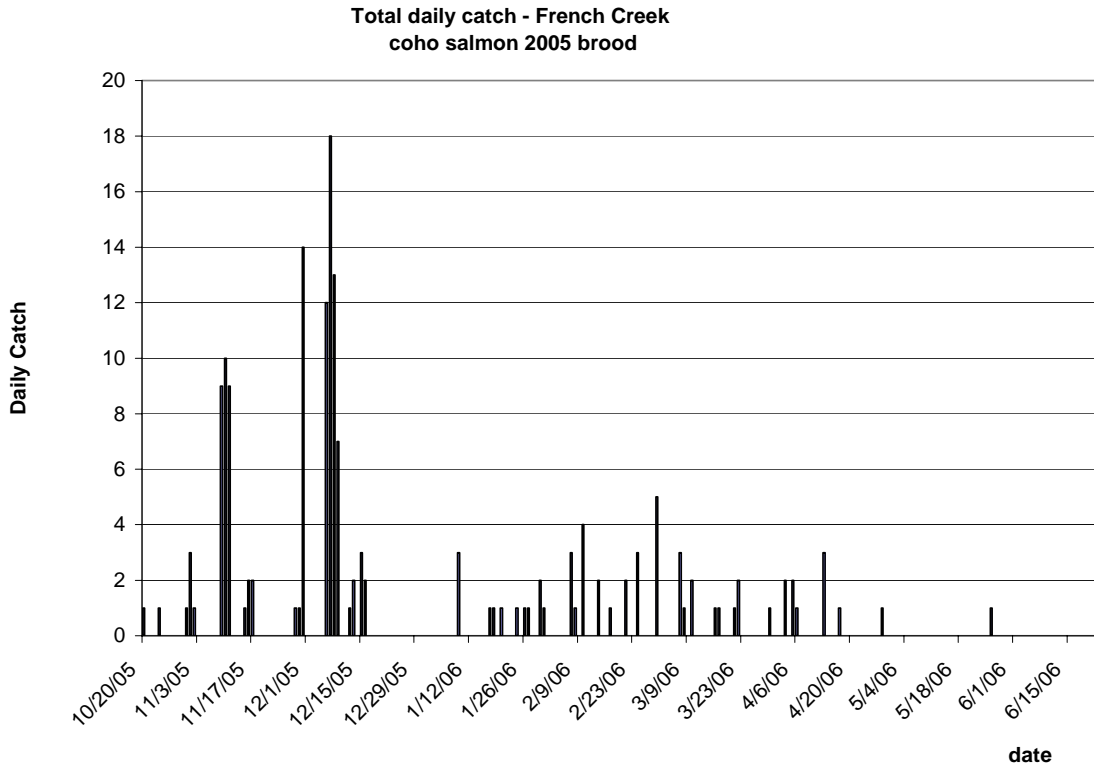
Picture 3. Juvenile coho salmon captured on Shackleford Creek 11/30/05 - 88mm 6.5g

French Creek

Graph 1 and **Table 1** display the total daily coho salmon catch in French Creek during the period of the trapping program (October 20th, 2005 – June 22nd, 2006). The daily juvenile coho catch was relatively high (often five to fifteen coho captured daily) as the flows of French Creek increased in November and early December of 2005. It is important to note that this period was characterized by several intervals in which high flows (**Graph 9** French Creek stage data) disrupted and prohibited trapping. High magnitudes of precipitation created flows that prohibited trapping after December 16th, 2005. Flows increased until peaking in a “flood event” on 12/31/05. Trapping operations were not resumed until January 9th, 2006. This period can be readily observed in **Graph 1**.

After this high water event, daily total catch of juvenile coho salmon on French Creek was low (zero to five coho captured per day). During the trapping period from Mid-January until the trapping effort was ceased in Mid-June; juvenile coho were (mostly) captured from Mid - January until late April, 2006. Only two coho were captured in May, 2006.

Graph 1. Total daily coho salmon catch, French Creek



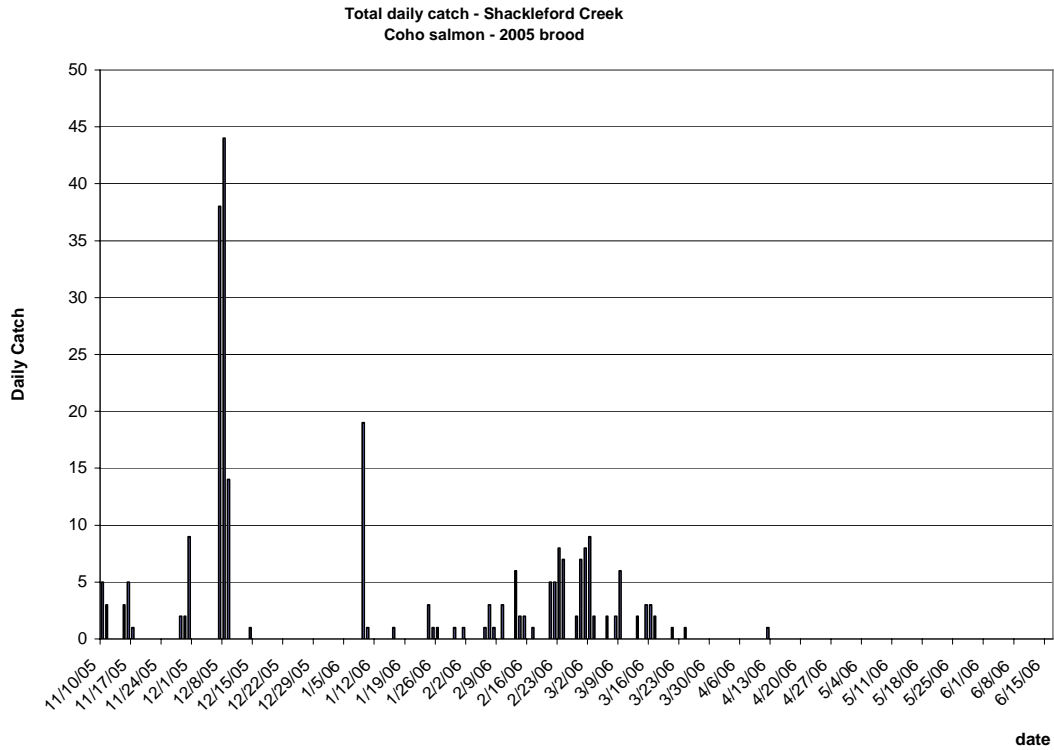
Shackleford Creek

The total daily juvenile coho catch for Shackleford Creek is presented in **Graph 2** and **Table 2**. Effort to capture out-migrating salmon on Shackleford Creek extended from November 11th, 2005 until June 16th, 2006. The trends observed in the daily catch in Shackleford Creek are similar to those observed in French Creek – increasing catch as the flows increase in early winter, a relatively long interval in which trapping was suspended, and lower daily catches of juvenile coho after the high water event.

The flood event on 12/31/05 was more severe on Shackleford Creek, relative to French Creek. Shackleford Creek underwent extensive channel alteration with areas degrading (up to approximately 3 feet) and aggrading. It is important to note that significant numbers of juvenile coho salmon were captured emigrating from Shackleford Creek after this damaging local flood event. A total of 126 juvenile coho salmon were captured in 2006 on Shackleford Creek.

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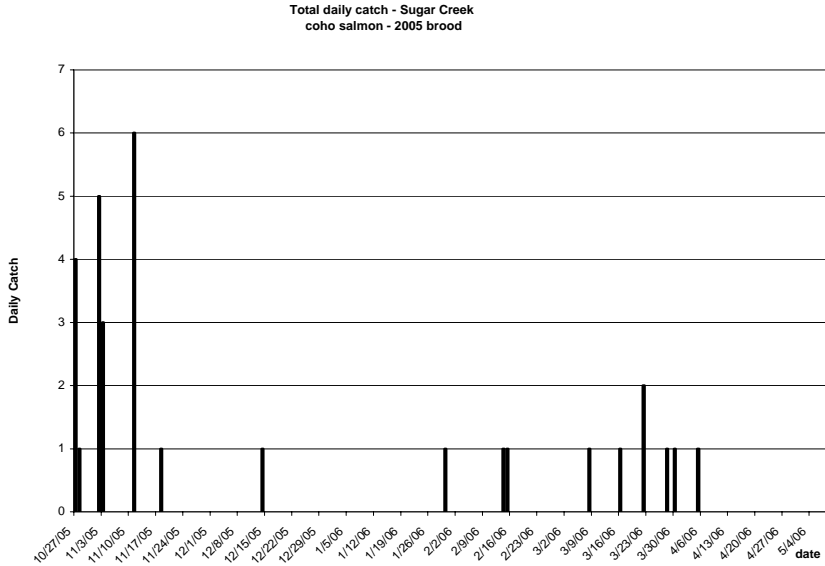
Graph 2. Shackleford total daily coho catch



Sugar Creek:

The daily coho catch on Sugar Creek is presented in **Graph 3** and **Table 3**. Sugar Creek was not trapped five days a week, but more intermittently from October 21st, 2005 until June 13th, 2006. For a period from March through early June, Sugar Creek was trapped almost five days a week in attempts to increase the occurrence of target species capture. The less intense effort in the early season yielded less instances of target species capture, though increased trapping effort did not offer many captures of coho salmon in the later part of the season. The smaller sample of captured coho salmon does not allow for as robust of an analysis of the timing of juvenile coho emigration from Sugar Creek.

Scott River Tributary Outmigrant Trapping

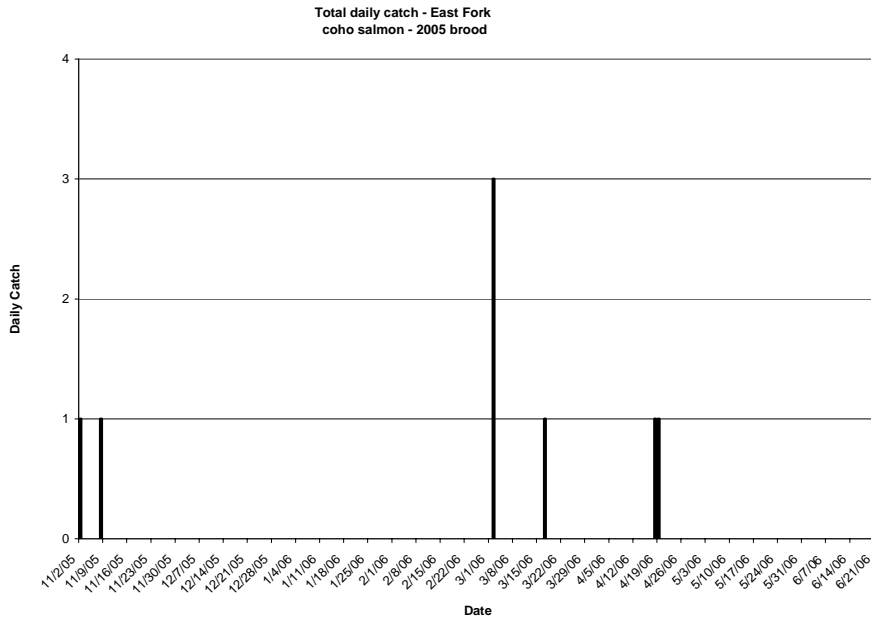


Graph 3. Sugar Creek total daily coho catch.

East Fork

Very few juvenile coho salmon were captured on the East Fork Scott River, **Graph 4** and **Table 4**. A total of eight juvenile coho salmon from the 2005 brood were captured on the East Fork during the entire season. The East Fork was trapped intermittently from October 27th, 2005 until June 22nd, 2006.

Graph 4 - East Fork total daily coho catch.



Total Catch : Young of the Year (YOY) coho salmon – 2006 brood

In addition to juvenile coho salmon from the 2005 brood, young of the year (YOY) coho that emerged in the spring of 2006 were captured on French Creek and the East Fork Scott River.



Picture 4) YOY coho captured in East Fork Scott River on June 15th, 2006. (44mm, .8g)

A total of twelve YOY coho were captured on French Creek in 2006. The first juvenile coho of this brood was captured on April 27th, 2006 in French Creek. Eight juvenile coho were captured on this day with an meanage forklength of 32mm and an meanage weight of 0.4g. Five YOY coho were captured in the East Fork in 2006.

No YOY coho were captured in Sugar Creek in 2006, in spite of extensive trapping effort in April through June of 2006. Significant numbers of juvenile coho salmon – thirty to fifty coho in habitats with good cover elements - were observed in Sugar Creek during direct observation dives in August, though no YOY coho were observed in Sugar Cr. during direct observation surveys performed on June 8th, 2006.

No YOY coho were captured in Shackleford Creek in 2006. Adult coho were observed spawning in Shackleford Creek in December of 2005, but the extensive stream alteration could hmean scoured out the majority of the coho eggs. Very small numbers of juvenile coho – three to five coho in habitat units with exceptional habitat elements - were observed during direct observation surveys in Shackleford Creek on August 2006.

YOY Chinook salmon – Shackleford Creek

Adult Chinook salmon were observed spawning directly above the trapping location in Shackleford Creek in November of 2005. Shackleford Creek has historically been a significant tributary for adult Chinook spawning, but discontinuity of the mouth has usually prevented adult access during the Chinook spawning season. A large precipitation event connected Shackleford Creek to the main stem Scott River on November 6th, 2005. Chinook were observed spawning and Chinook carcasses were recovered in Shackleford Creek in the winter of 2005.

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No YOY Chinook salmon were captured during the trapping operation in Shackleford Creek. This corroborates the above stated hypothesis that the stream altering flows experienced by Shackleford Creek caused significant redd scour and egg loss. This loss of “most” of the potential juvenile Chinook salmon in Shackleford Creek demonstrates the ability of a single event to destroy a geographically defined sub-population of the fishery.

Total daily catch - rainbow trout



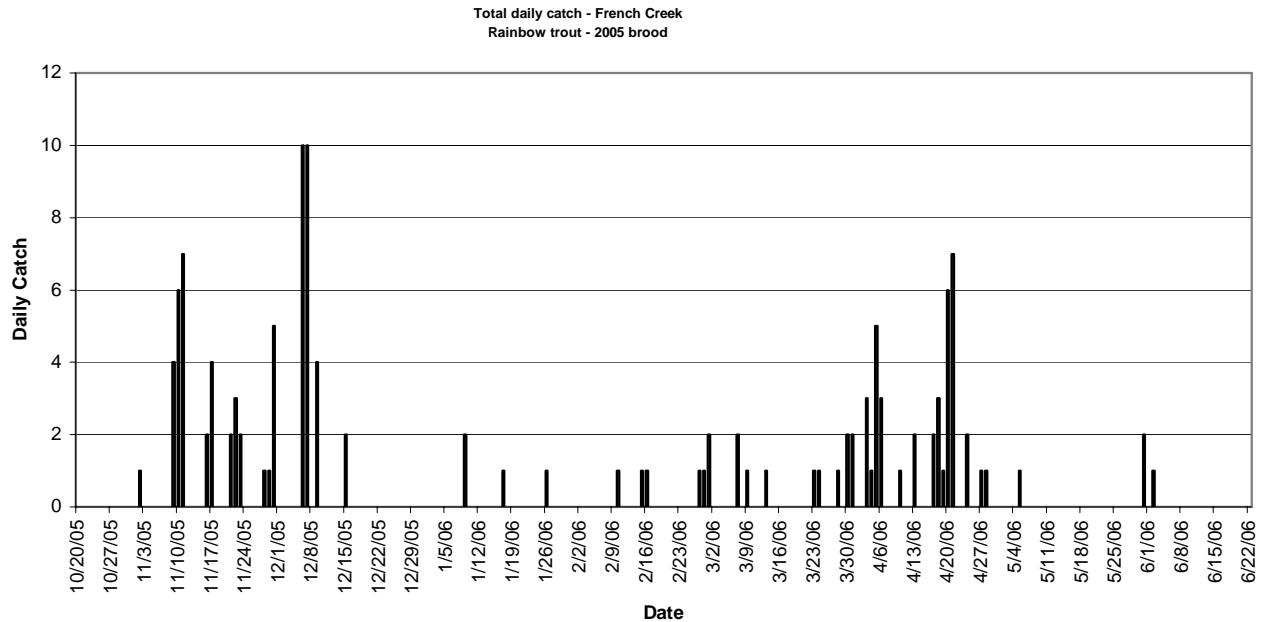
Picture 6) Rainbow trout (*O. mykiss*) captured on East Fork Scott 11/08/05 – (65mm, 2.5g)

French Creek

Graph 5 illustrates the total daily rainbow trout catch on French Creek for the period of the project. The highest daily catch (daily total catch equals ten juvenile trout) occurred in the period of rising flows of early December. A period in late March and through April also had relatively high (several days with total catch of three to seven juvenile trout) and consistent catches of juvenile rainbow trout in French Creek.

Graph 5. Total daily catch of rainbow trout of French Creek

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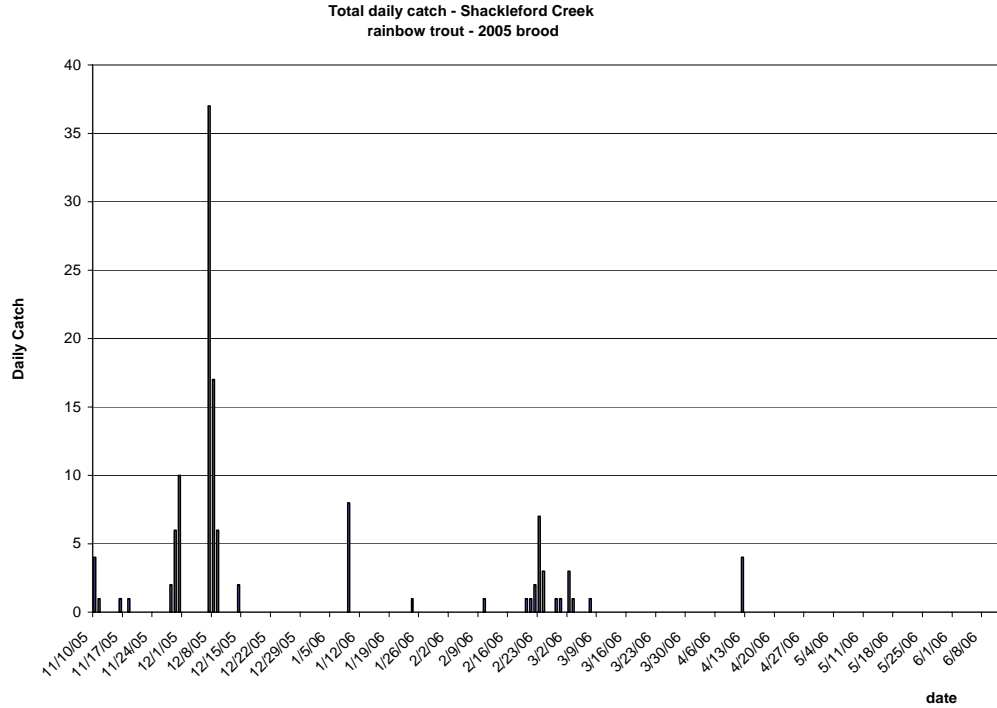


Shackleford Creek

Graph 6 illustrates the total daily catch of rainbow trout on Shackleford Creek. The highest daily catches were recorded in early December, similar to French Creek. In contrast to French Creek, the highest daily catch exceeded thirty five juvenile rainbow trout. Relatively few rainbow trout were captured in Shackleford in the spring of 2006 (total catch = 35), compared to French Creek (total catch = 64). The lack of rainbow trout capture in late March and early April could be due to trap malfunction caused by the trap being “clogged” by the large amount of algae growth in Shackleford Creek. Efforts were made in this period to compensate for the large amounts of algae clogging the trap, including cleaning the trap more frequently, switching to a smaller trap, attaching ten feet of 8” PVC to traps between the net and holding boxes, and ultimately moving trap to a side channel with less flow.

Graph 6. Shackleford daily rainbow trout catch.

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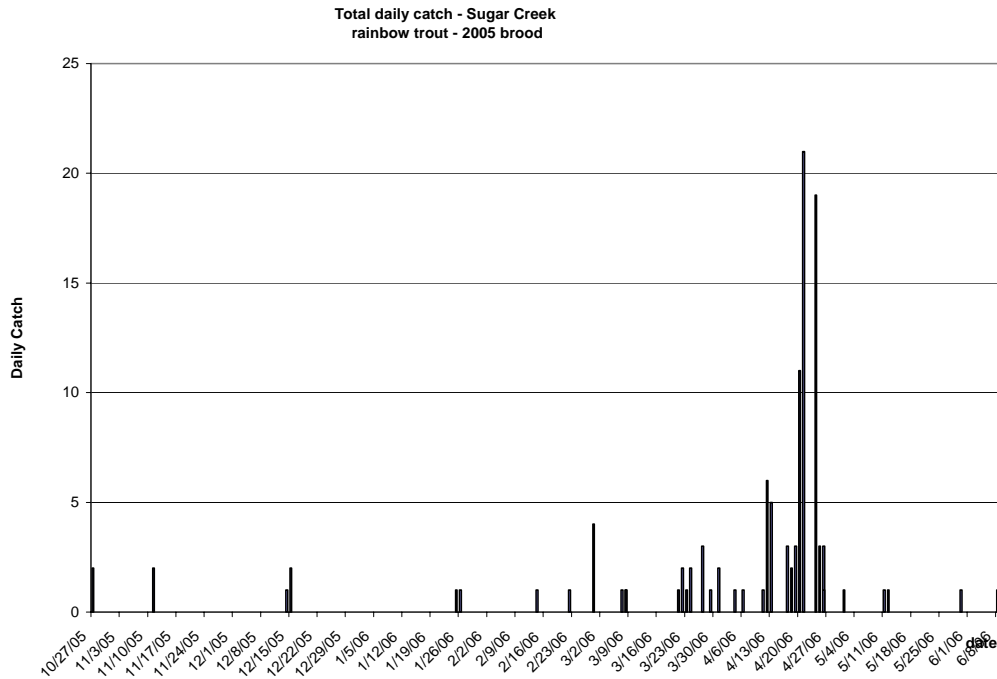


Sugar Creek

Graph 7 illustrates the total daily catch of rainbow trout on Sugar Creek. Unlike French and Shackleford, the highest daily catches were recorded in April, 2006. As discussed above, the Sugar Creek trapping operation was run almost five days a week from March until June of 2006. This period yielded many captures of rainbow trout, peaking around late April. It is important to consider that few juvenile coho salmon were captured during this period.

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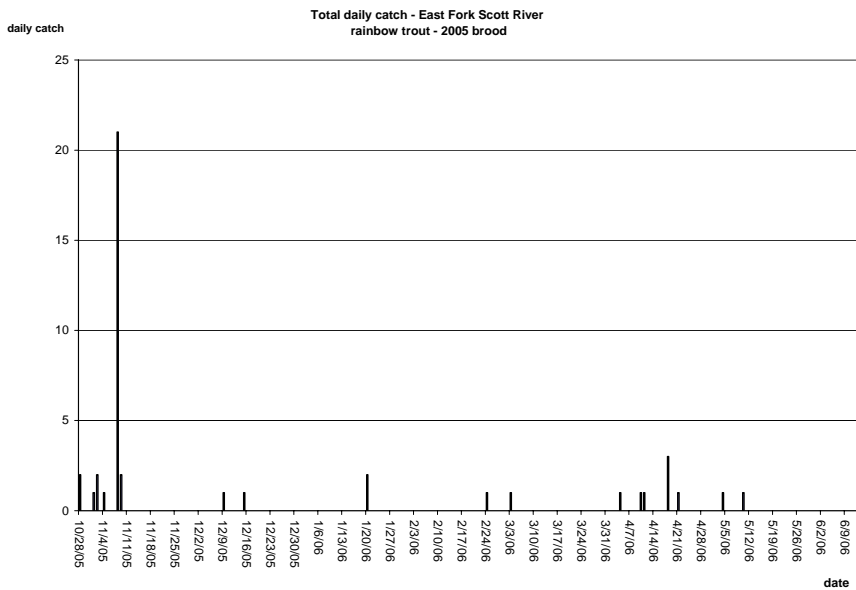
Graph 7. Sugar Creek daily rainbow trout catch.



East Fork

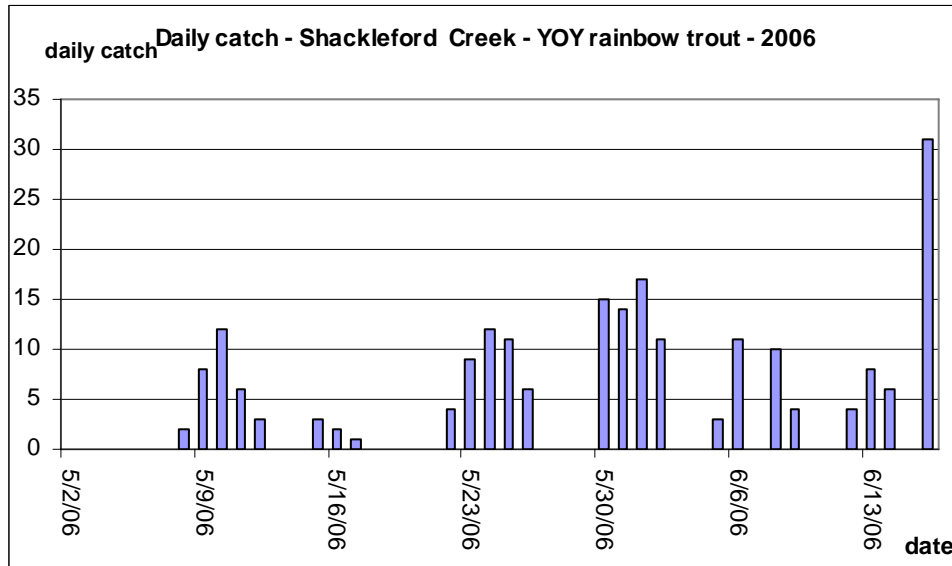
Graph 8 shows the total catch of rainbow trout on the East Fork Scott River. Few rainbow trout were captured and very little information about timing can be gathered from the data.

Graph 8. East Fork daily rainbow trout catch.



YOY rainbow trout captured in 2006

YOY rainbow trout were captured in all tributaries except Sugar Creek. The first YOY rainbow trout captured was in Shackleford Creek on May 8th, 2006. A total of 213 YOY rainbow trout were captured on Shackleford Creek, **Graph 9**.



Graph 9. Daily catch YOY rainbow trout; Shackleford Creek 2006.

Eleven YOY rainbow trout were captured on French Creek. The first captured rainbow trout was captured on May 25th in French Creek. Forty two YOY rainbow trout were captured in the East Fork Scott River.

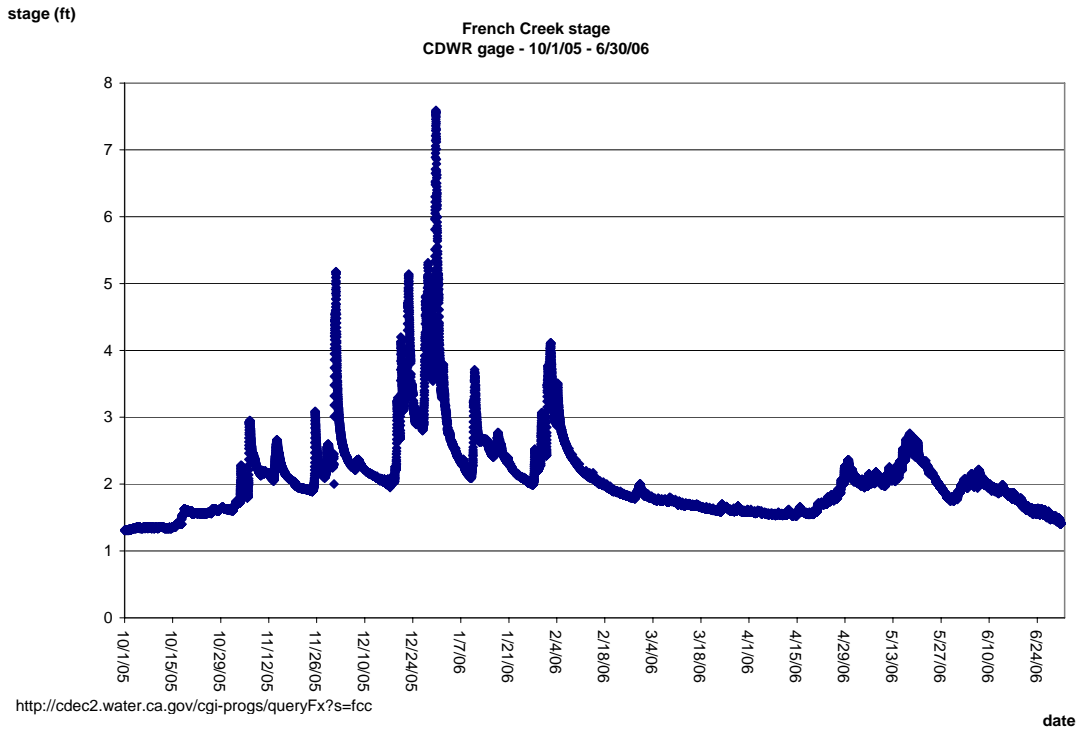
Stream Discharge

The stream stage heights are gauged in the lower reaches of French and Shackleford Creeks year round. The California Department of Water Resources (DWR) operates these gages that measure water height at 15 minute intervals. The stage data (**Graphs 9 & 10**) of French and Shackleford Creeks was retrieved from the California Data Exchange Center (CDEC) (www.cdec.water.ca.gov). Many stages can be converted to cubic feet per second (cfs) when a suitable “rating curve” is available (contact John Clements; CA. Dept of Water Resources. Email clements@water.ca.gov).

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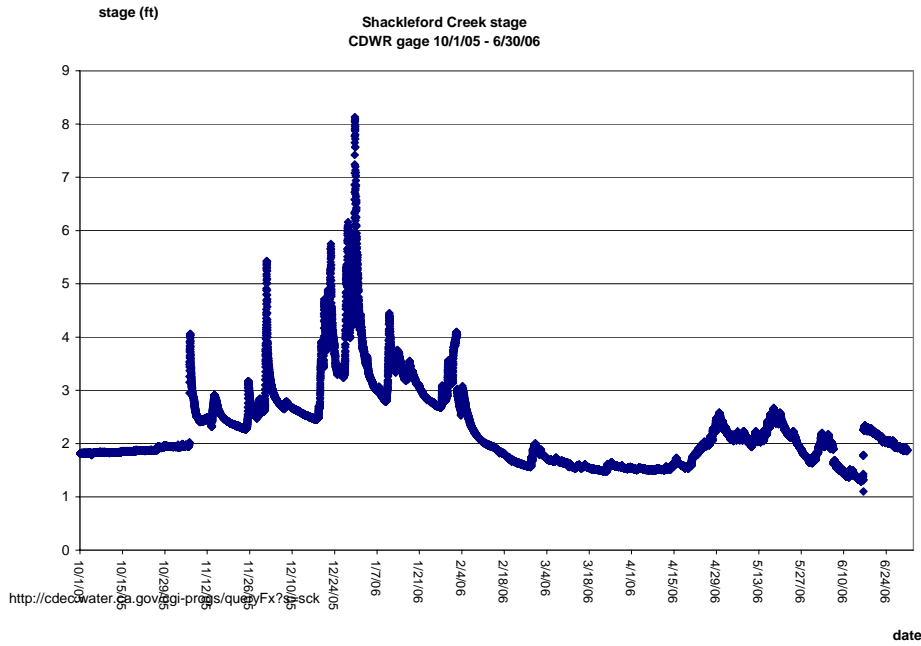
Graph 10. French Creek Stage

retrieved from www.cdec.water.ca.gov - November 30th, 2006.

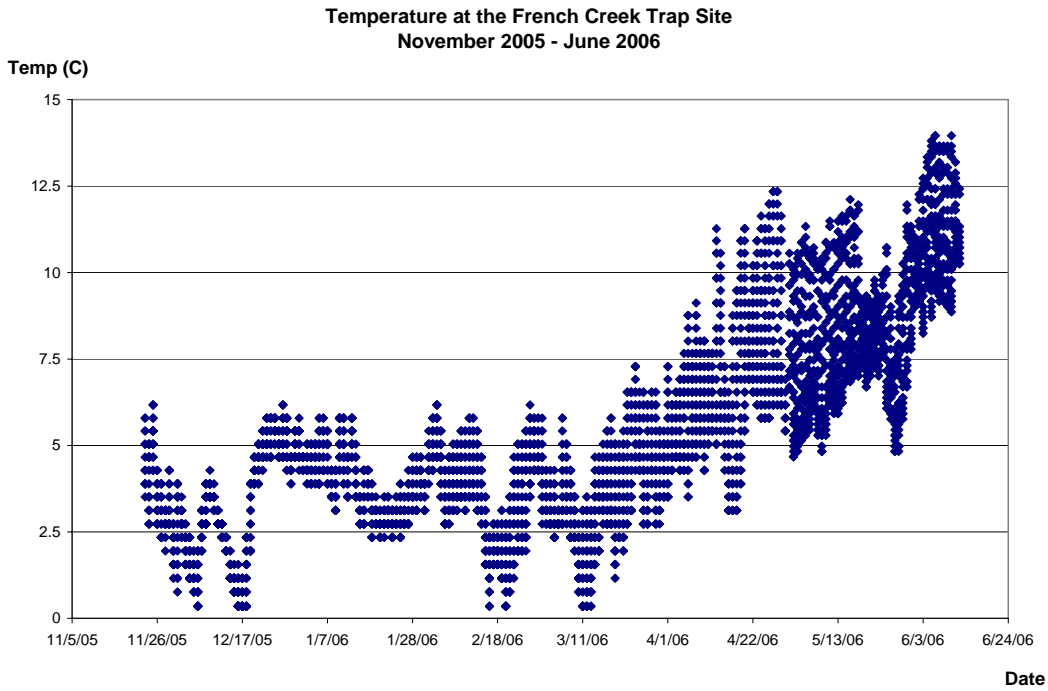


Graph 11. Shackleford Creek Stage Data

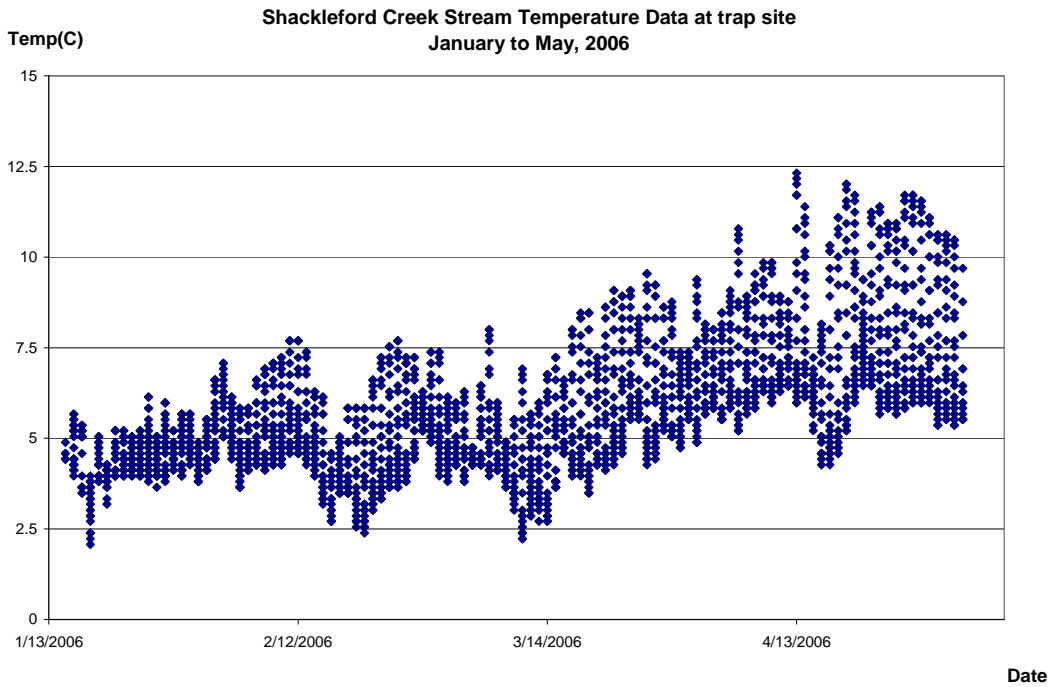
Retrieved from www.cdec.water.ca.gov - November 30th, 2006.



Stream temperatures in surveyed tributaries:



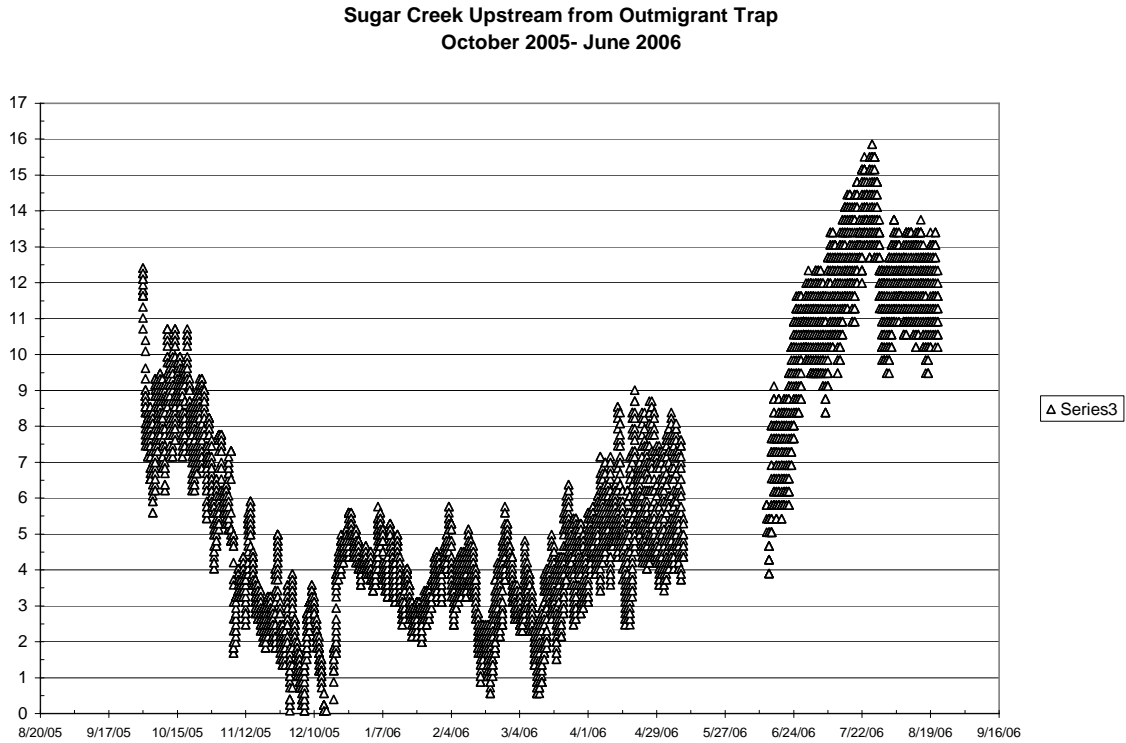
Graph 12. French Creek stream temperatures.



Graph 13. Shackleford Creek stream temperatures.

Scott River Tributary Outmigrant Trapping

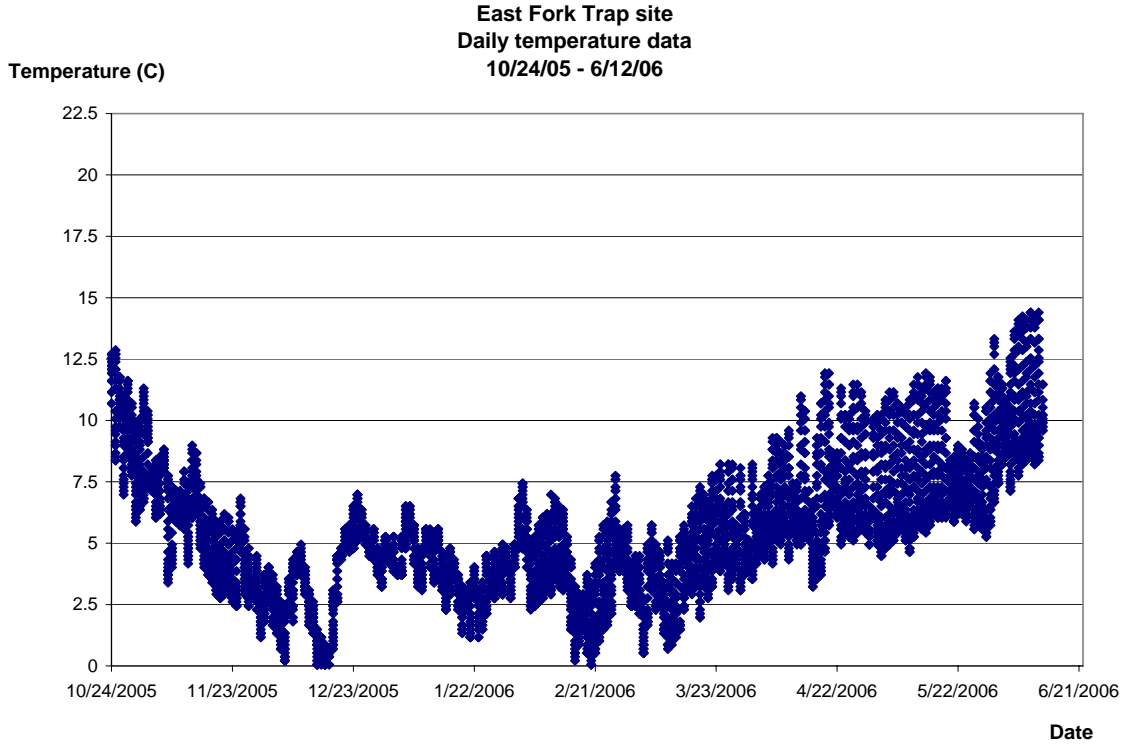
The first temperature device deployed in Shackleford was lost in the late December flood, the tree it was chained to was lost due to bank erosion. The temperature device deployed after May was apparently stolen.



Graph 14. Sugar Creek stream temperature data.

A data gap on Sugar Creek between early May and mid-June 2006, exists due to equipment failure.

Scott River Tributary Outmigrant Trapping



Graph 15. East Fork stream temperatures.

Mark and Recapture

Mark and recapture trials were performed on coho salmon and rainbow trout in French and Shackleford Creeks. For the majority of weeks too few target species were captured to produce a significant pool of marked fish and any recaptures. In a very few weeks (two weeks on both French and Shackleford Creek) we successfully recaptured marked fish. Below is the daily capture data from a successful week on both tributaries.

End Date of Operation End Date and Time	Daily Catch - French Creek				rainbow trout			
	coho salmon (<i>O. kisutch</i>)		recapped	total catch	rainbow trout (<i>O. mykiss</i>)		recapped	total catch
	unmarked	marked			unmarked	marked		
12/6/2005		12			10		10	
12/7/2005		18	4		10	5	10	
12/8/2005	1	12	3			2	0	
12/9/2005	7		1		4		4	
Tot:	8	42	8	50	4	20	7	24

During this week of trapping on French Creek a total of eight coho salmon were recaptured out of a potential pool of forty two marked fish. This generates a trapping efficiency of approximately 19% for coho salmon. In the same week, seven marked rainbow trout were recaptured out of a potential pool of 20 marked fish - yielding a trapping efficiency estimate of approximately 35% for juvenile rainbow trout.

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End Date of Operation End Date and Time	Daily Catch Shackleford Creek coho salmon (<i>O. kisutch</i>)				rainbow trout (<i>O. mykiss</i>)			
	unmarked	marked	recapped	total catch	unmarked	marked	recapped	total catch
	12/7/2005	1	37		38		37	
12/8/2005		44	6	44		17	4	17
12/9/2005	14		3	14	6		1	6
Total	15	81	9	96	6	54	5	60

During this week of trapping on Shackleford Creek a total nine juvenile coho were recaptured out of a pool of eighty-one marked coho – yielding an efficiency estimate of approximately 11%. In the same week, five out of fifty-four marked rainbow trout were recaptured – yielding efficiency estimates of approximately 9%.

Daily catch - French Creek

End Date of Operation End Date and Time	coho salmon (<i>O. kisutch</i>)			
	unmarked	marked	recapped	total catch
11/9/2005		9		9
11/10/2005		10	1	10
11/11/2005	9			9
Totals	9	19	1	28

In this week of trapping on French Creek one juvenile coho out of a population of nineteen marked fish was recaptured – yielding an approximate estimated efficiency of 5% for coho salmon during this week.

Shackleford Cr. - Daily Catch

End Date of Operation End Date and Time	coho salmon (<i>O. kisutch</i>)			
	unmarked	marked	recapped	total catch
3/20/2006				0
3/21/2006		1		1
3/22/2006			1	0
3/23/2006				0
3/24/2006	1			1
Totals	1	1	1	2

This week of trapping on Shackleford Creek (the final week with an observed recapture) demonstrates problems resulting from the marking of a very small (n=1) number of target species. In this week, one coho salmon out of a pool consisting of one marked coho salmon was recaptured. No efficiency estimates are appropriate with this data.

The inability to successfully recapture marked fish prohibited the determination of trapping efficiencies for the majority of the period of trap operation. This inability to determine trapping efficiencies precludes the use of this data to generate population estimates for the individual tributaries. What remains to be tested is if this study design could produce in a normal water year more successful mark and recapture trials and approach a population estimate for individual tributaries.

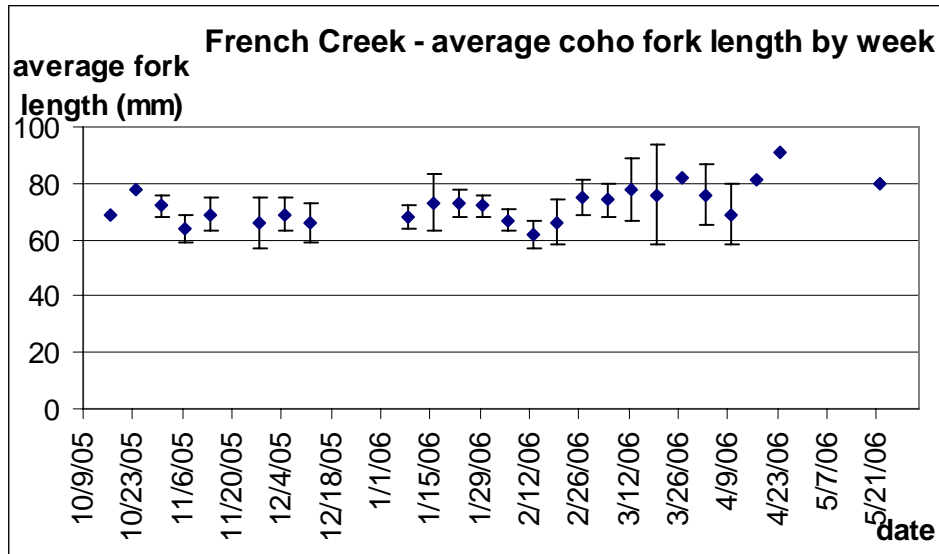
Forklength

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Fish fork length is a biologic parameter often measured and used to illustrate the “sizes” of the sampled fish. Fork lengths were measured on almost all captured coho salmon and rainbow trout.

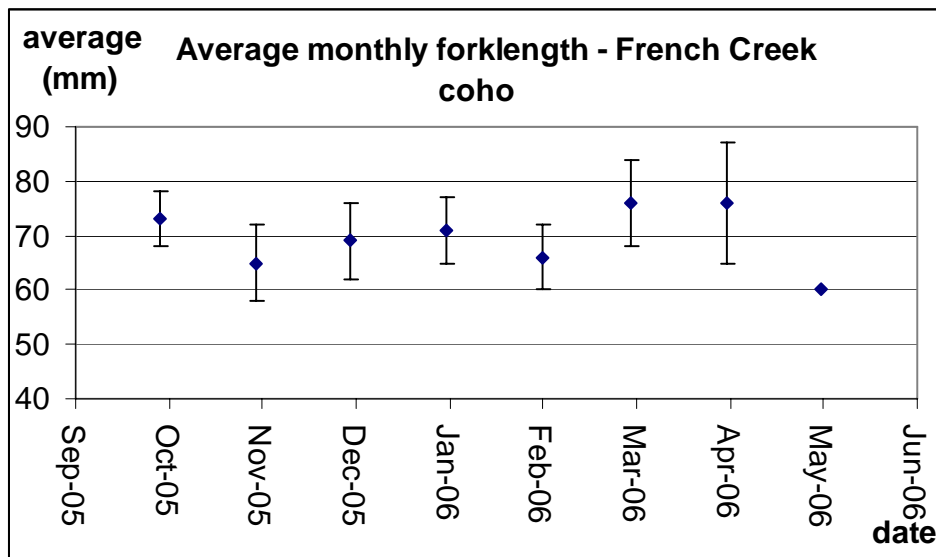
French Creek coho salmon fork length frequencies:

The weekly mean fork length for the juvenile coho salmon captured on French Creek throughout the extent of this project is illustrated in **Graph 16**.



Graph 16. French Creek mean weekly fork length

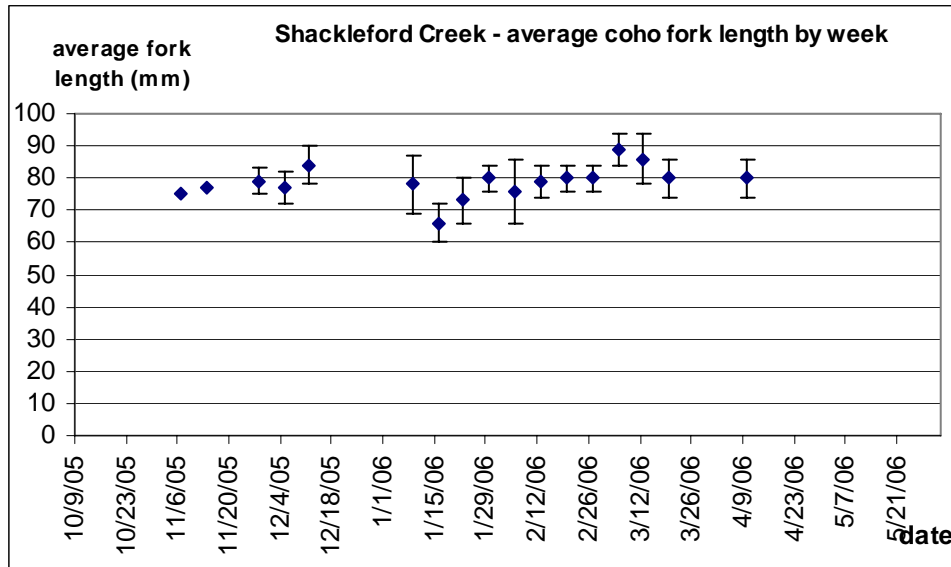
Grouping the fork lengths into mean monthly length shows that there is a small increase of growth from January to April, but the increase is almost insignificant (**Graph 17**).



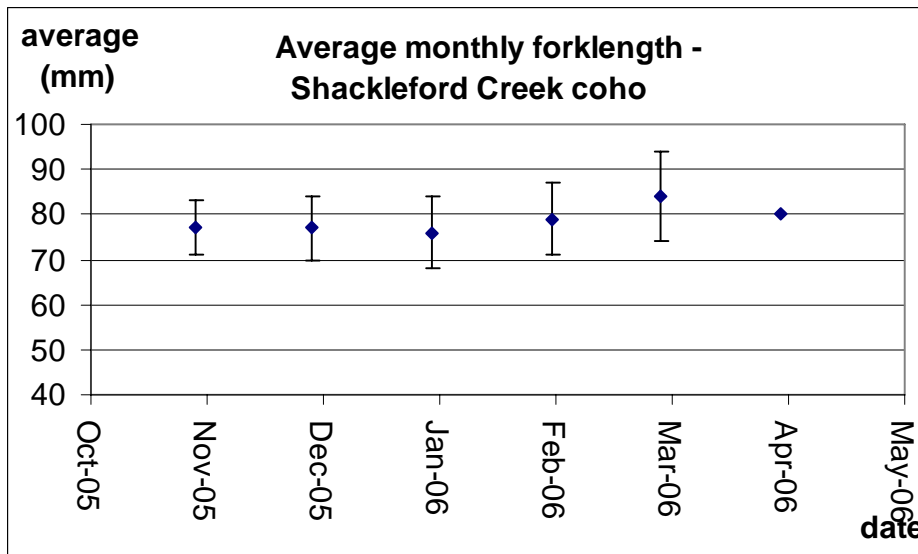
Graph 17. French Creek coho. Mean fork length by month with standard deviation

Shackleford Creek coho salmon fork length frequencies:

The weekly mean fork length for the juvenile coho salmon captured on Shackleford Creek throughout the extent of this project is illustrated in **Graph 18**



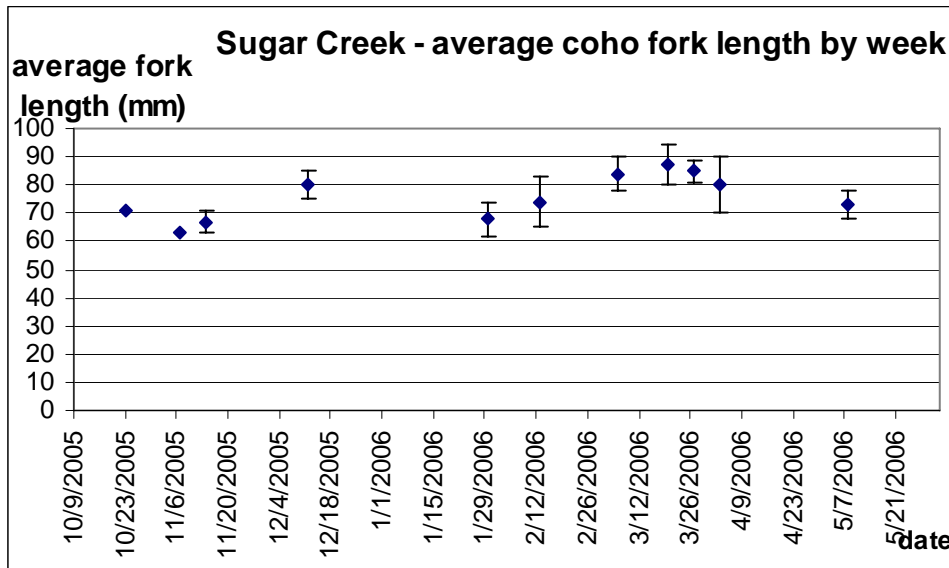
Graph 18. Shackleford Creek coho weekly mean fork length



Graph 19. Mean fork length by month w/ stnd deviation; Shackleford Creek coho.

Sugar Creek coho salmon fork length frequencies:

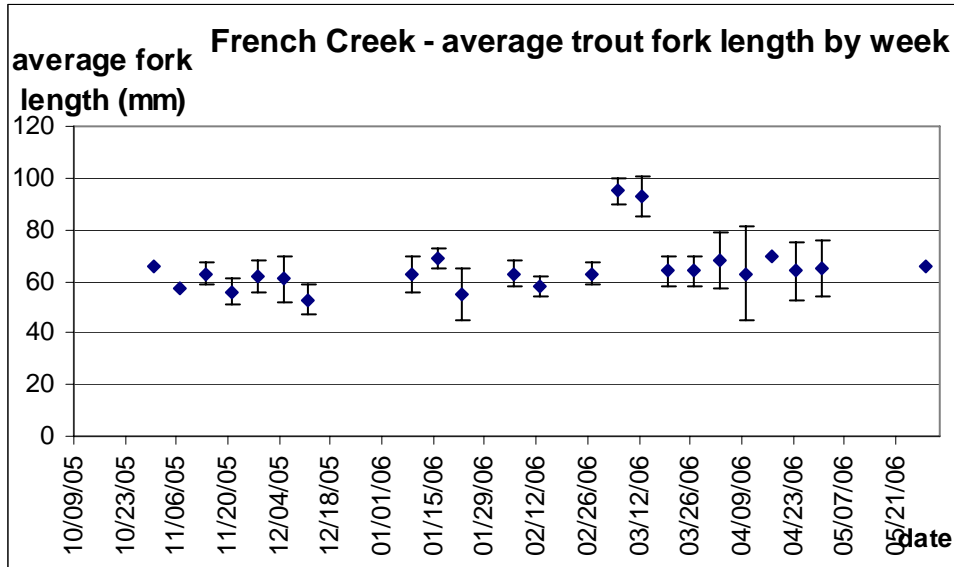
The weekly mean fork length for the juvenile coho salmon captured on Shackleford Creek throughout the extent of this project is illustrated in **Graph 20**.



Graph 20. Sugar Creek Coho weekly average fork length

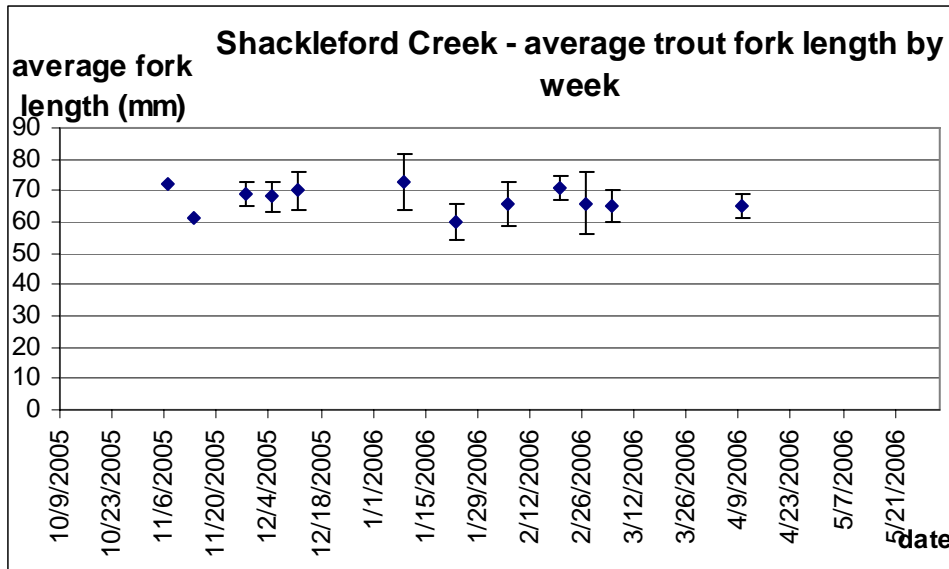
French Creek rainbow trout fork length frequencies:

The weekly mean fork length for the juvenile trout captured on French Creek throughout the extent of this project is illustrated in **Graph 21**.



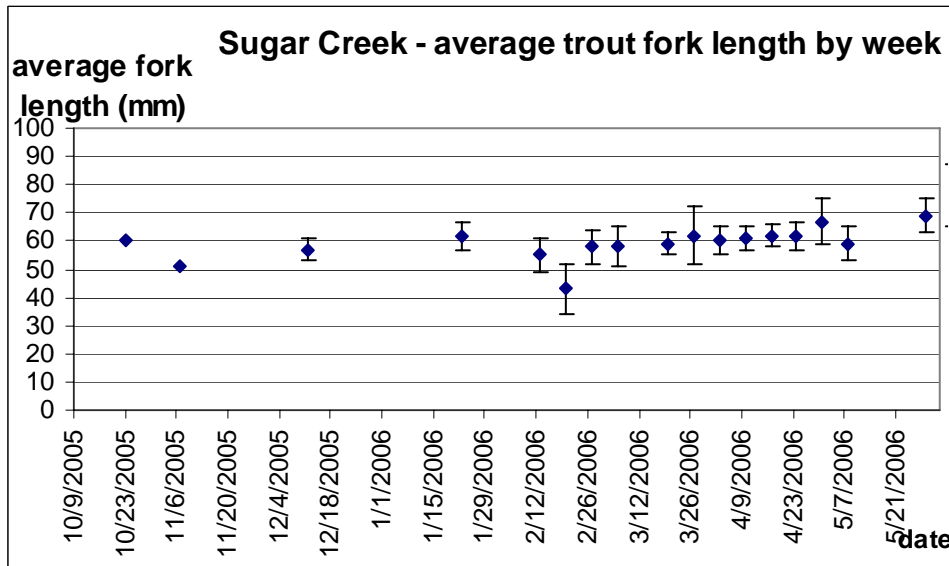
Graph 21. French Creek rainbow trout weekly mean fork length

Shackleford Creek rainbow trout fork length frequencies:



Graph 22. Shackleford Creek rainbow trout weekly mean fork length

Sugar Creek rainbow trout fork length frequencies:



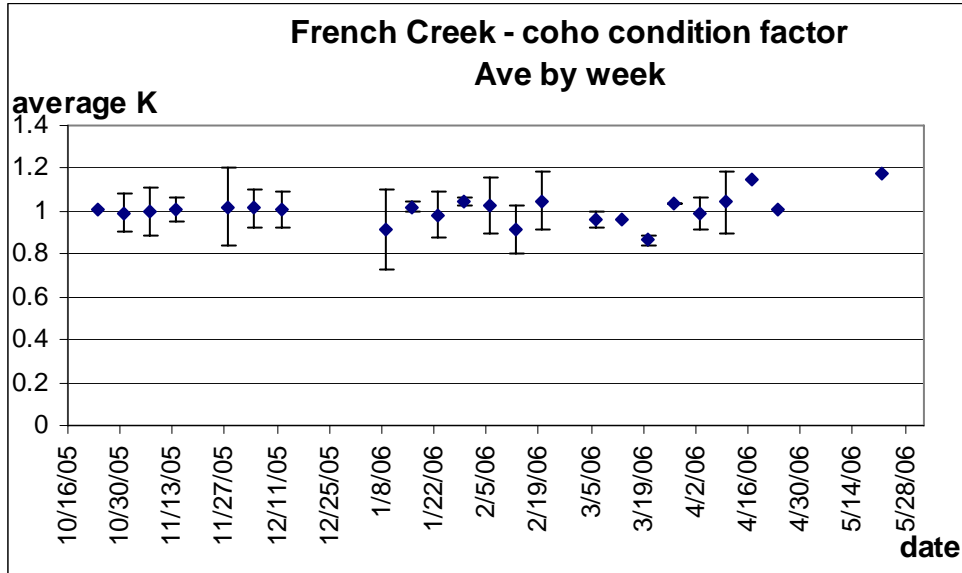
Graph 23. Sugar Creek rainbow trout weekly mean fork length

Condition factor

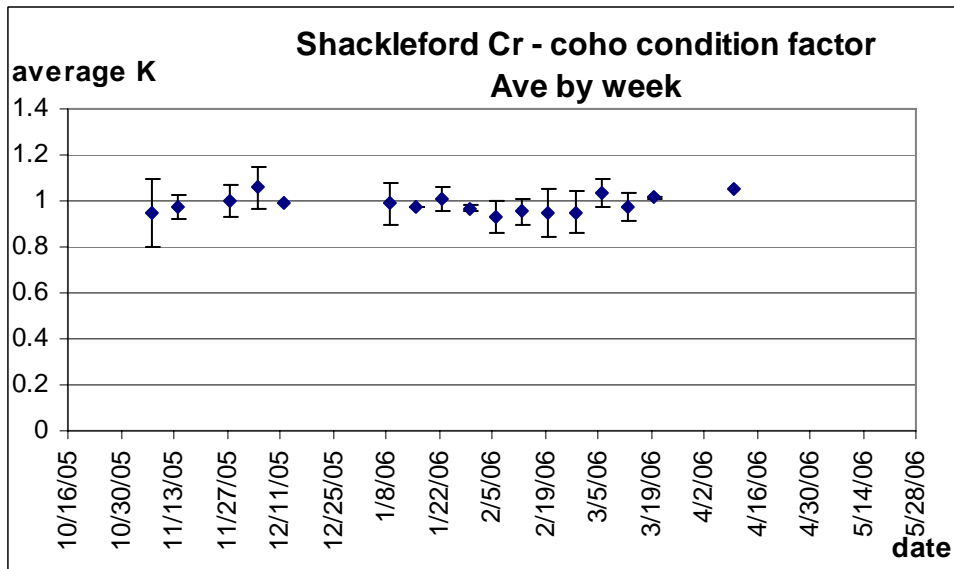
The weights of coho salmon and rainbow trout were also collected when possible to allow for the calculation of the ‘condition factor’ of the fishery. Condition factor is a relationship of the forklengths and weights of the measured sample. Condition factor (K) is calculated with the equation $K = w/L^3$, in which (w) represent weight and (L) forklength. Mean condition factors are displayed in **Tables 5-8**. A fish with a condition

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factor of 1.0 is considered to be in mean good health. Below are fish condition factor (K) by week. (Graphs 24 -30).

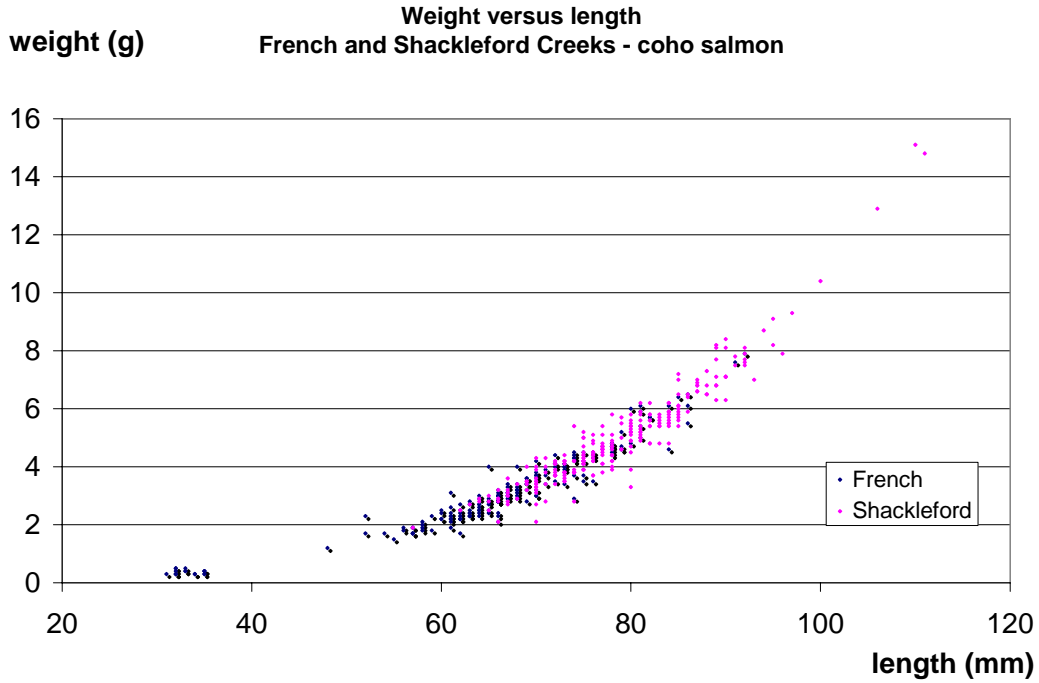


Graph 24. Condition Factor by week, French Creek coho salmon.



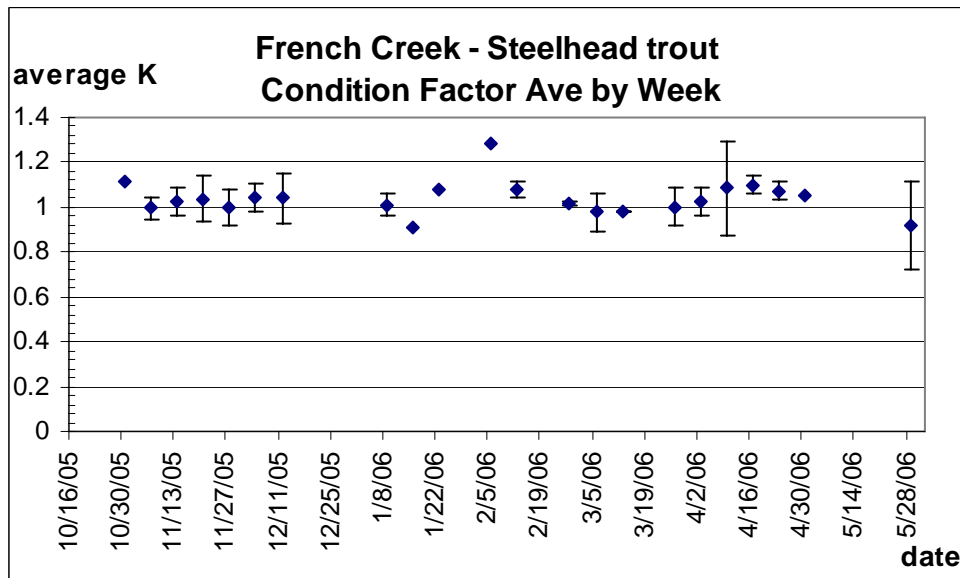
Graph 25. Condition Factor (K) of Shackleford Creek coho salmon.

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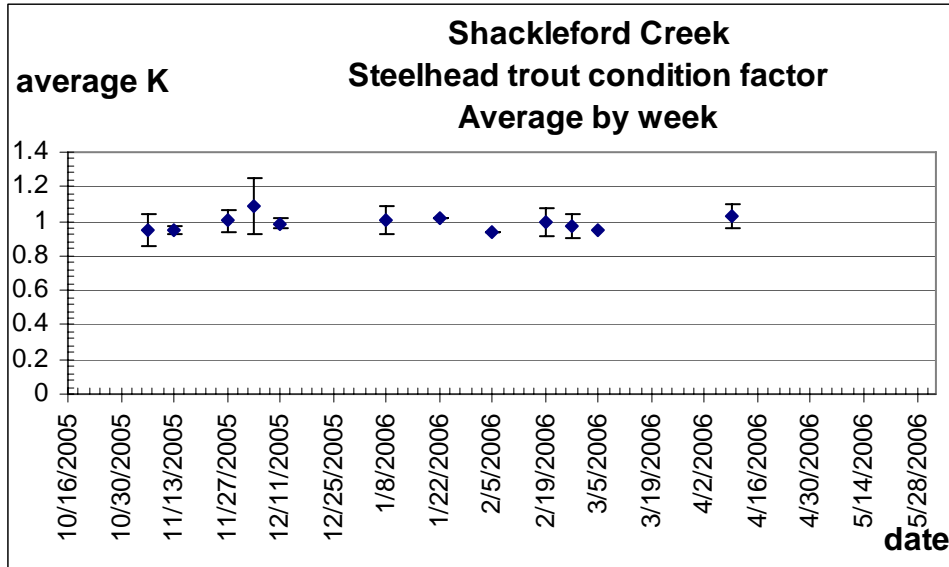


Graph 26. weight versus length; French and Shackleford Creeks.

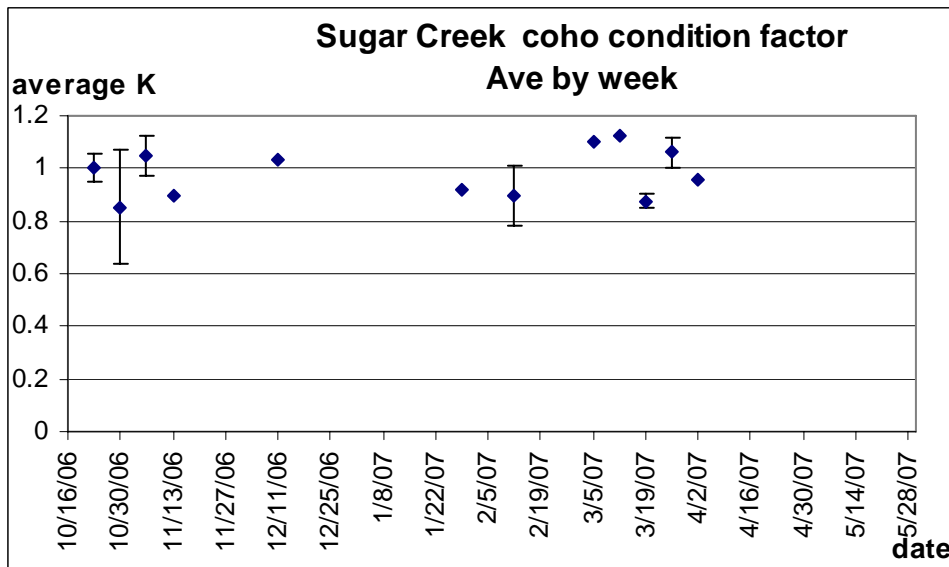
Graph 26 illustrates the production of larger fish (on mean) in Shackleford Creek versus French Creek. The largest coho salmon captured (> 100mm and 10g) in the sampled tributaries of the Scott River were trapped in Shackleford Creek.



Graph 27. Mean Condition Factor (K) of French Creek rainbow trout.

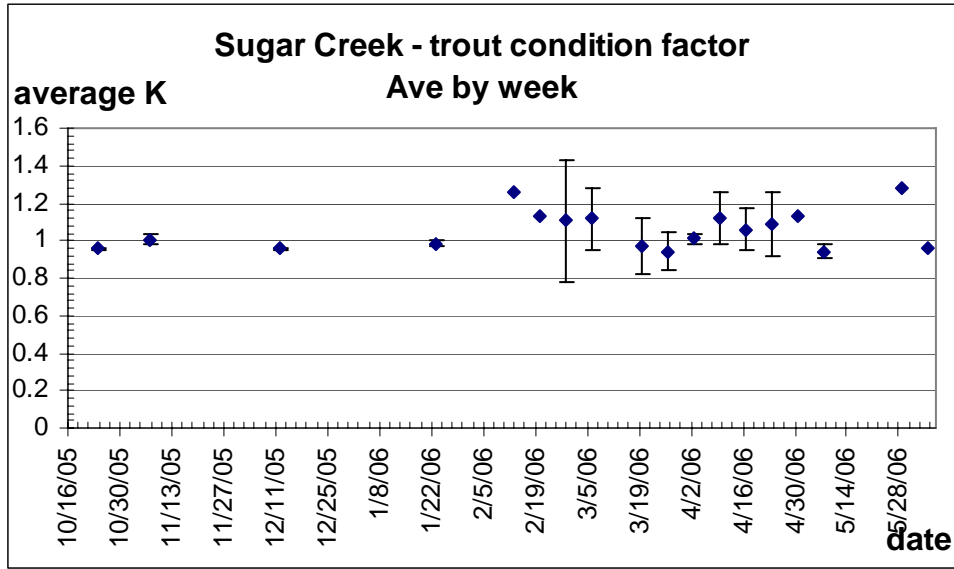


Graph 28. Mean Condition Factor (K) of Shackleford Creek rainbow trout.



Graph 29. Mean Condition Factor (K) of Sugar Creek coho salmon

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Graph 30 Condition Factor (K) Sugar Creek trout.

By catch:

Several non-anadromous aquatic species were captured during trapping operation.

French Creek by catch

Brook Stickleback	312
speckled dace	76
lamprey ammocete	358
sculpin	114
pacific giant salamander	2

Shackleford Creek by catch

speckled dace	27
lamprey ammocoete	25
marbled sculpin	5
pacific giant salamander	6
brook stickleback	23

Sugar Creek by catch

lamprey ammocoete	73
speckled dace	8
marbled sculpin	12
pacific giant salamander	2

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East Fork Scott River by catch

sucker	8
speckled dace	2
lamprey ammocoete	4

Conclusion:

Trapping efforts captured coho salmon in all of the tributaries surveyed. An extended period of above average precipitation created high flows that interrupted the ability to trap for several intervals. Increased catches of coho salmon were associated with the increasing flow regimes observed in November and early December. In both French and Shackleford Creeks the highest daily catches of coho salmon occurred during this period. The increasing flows culminated in a flood on December 31st, 2005. The emigration and distribution of the fishery during this long period of high water is unknown.

Juvenile coho salmon were captured in all tributaries after the high water event, even Shackleford Creek which underwent extensive channel alteration. After the peak flows of late December and early January, the majority of emigrating coho were captured from February to April, 2006. Peak juvenile emigration occurred in early March in both Shackleford and French Creeks in 2006. In addition, in 2006, young of the year (YOY) coho salmon were captured in French Creek and the East Fork, but not in Shackleford Creek. All three tributaries had documented adult coho spawning in November and December 2005. Trapping operations failed to capture YOY Chinook salmon in Shackleford Creek, even though adult spawning above the trap site was observed in 2005. This lack of captured YOY coho and Chinook salmon on Shackleford Creek indicates a loss of salmonid eggs during redd scour in the peak flows.

Mark and recapture trials were performed on French and Shackleford Creeks to determine trap efficiency. The inability to consistently capture sufficient numbers of the target species prohibited the introduction of sufficient numbers of marked fish to insure the incidence of recapture. Very few marked fish were captured, precluding the ability to determine trapping efficiencies for the majority of the season. The failure of the mark and recapture trials prohibits the determination of a population estimate. The feasibility of this aspect of the study in an average water year remains to be studied.

Analysis of captured fish fork lengths shows few fish that have achieved the sizes observed in trapping operations in the lower Scott River. Analysis of mean fork length by month indicates that there is little increase in size of the emigrating fish from November 2005 through April 2006. One could hypothesize that as the fish grow larger they require a larger niche that is not available (or scarce) in the tributaries. This would require a period of juvenile rearing in the waters of the Scott River and/or Klamath River before the coho reach the full size of a successful smolt.

Discussion:

We wish to understand more about the survival of juvenile coho in the winter months of their freshwater residence. A trapping operation was performed to determine timing of emigration from tributaries, condition of salmonids upon emigration, and population of emigrating salmonids.

This projects goal was to determine if juvenile coho salmon rear the entire winter in tributaries prior to outmigration from the Scott, or if they rear some portion of the winter in the main Scott River. Juvenile salmonids marked in the tributaries were to be observed at the Scott Bar trap, and compared for timing. However, the small number of salmonids observed in the tributaries made marking difficult. At the time of the writing of this report, the data from the Scott River Rotary Screw Trap has not yet been processed, and is only available in raw data form. It is recommended that future efforts hmean shared trap personnel, to allow for closer communication, and real-time data sharing.

Direct Observation dives have shown that the tributaries of the Scott River support the highest densities of adult coho spawning and juvenile coho summer rearing in the Scott watershed (Yokel 2005, Maurer 2006). One of the main goals of this trapping operation was to identify the time when juvenile coho salmon left the tributaries and entered the main stem Scott River; allowing for the determination of the relative importance of the tributaries and main stem Scott River for winter rearing of juvenile coho salmon.

Juvenile coho emigration from the tributaries was observed to occur in two periods: 1) emigration coinciding with the increasing flows in November and December and 2) a group of fish that emigrated predominantly from February through May. The majority of yearling juvenile coho were observed to leave French Creek by the end of April and Shackleford Creek by the end of March. It is unknown if this pattern of emigration is dependent on the flow regime created by the abnormally wet winter of Water Year 2005. Performance of this study during the emigration of a strong brood year in an average water year would be of interest.

Future efforts to compare of the timing and condition of salmonids emigrating from the tributaries with the timing and condition of those salmonids emigrating from the Scott River into the Klamath will help elucidate the period of migration and potential rearing between the mouths of the tributaries and the mouth of the Scott River. Historic data from the Scott River Rotary Screw Trap (Chesney 2003) shows coho salmon outmigrant in May – June, in most water years. This indicates that there is a period of growth and rearing in the main stem Scott after emigration from tributaries. This would behoove managers to consider the main stem Scott River as potential winter rearing habitat.

Refinement of our knowledge of coho distribution during the winter months would allow managers to further define areas of important winter habitat. This knowledge could affectively direct restoration and protection projects developed to increase winter rearing habitat volume in essential areas.

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The first young of the year coho were captured in French Creek on April 27th, 2006. No young of the year coho were observed in Shackleford Creek, but it is hypothesized that they would emerge earlier than those observed in French Creek due to significantly warmer winter stream temperatures in Shackleford. Tributary trapping in the spring of 2008 would allow for the assessment of emergence timing of the 'strong' brood year of coho salmon in different tributaries with different winter temperature regimes. Emergence timing and survival to emergence could also be assessed utilizing "redd capping" of selected coho redds. It would be important to manage water quantity in the tributaries during this period of coho emergence and fry rearing to maximize the volume of inundated habitat required by the vulnerable coho fry (e.g. submerged terrestrial vegetation such as willow).

The apparent loss of a large portion of the Chinook and coho salmon brood in Shackleford Creek due to channel alteration from high flows behooves managers to investigate processes that are potentially altering the timing and magnitude of the flow regime in the tributaries of the Scott River.

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Tables

Scott River Tributary Outmigrant Trapping

Table 1. Daily effort and catch of target species; French Creek.

Trap Location
French Cr.

End Date of Operation End Date and Time	Daily Catch coho salmon (<i>O. kisutch</i>)				0+ coho 2006	rainbow trout (<i>O. mykiss</i>)				0+ rainbow trout
	unmarked	marked	recapped	total catch		unmarked	marked	recapped	total catch	
10/20/2005	1			1					0	
10/21/2005				0					0	
10/24/2005	1			1					0	
10/25/2005				0					0	
10/26/2005				0					0	
10/27/2005				0					0	
10/28/2005				0					0	
10/31/2005	1			1					0	
Totals	3	0	0	3		0	0	0	0	
11/1/2005	3			3					0	
11/2/2005	1			1					1	
11/3/2005				0		1			0	
11/4/2005				0					0	
11/9/2005		9		9			4		4	
11/10/2005		10	1	10			6		6	
11/11/2005	9			9		7			7	
11/14/2005				0					0	
11/15/2005		1		1					0	
11/16/2005		2		2			2		2	
11/17/2005		2		2			4		4	
11/18/2005				0					0	
11/21/2005				0					0	
11/22/2005				0		2			2	
11/23/2005				0			3		3	
11/23/2005				0		2			2	
11/28/2005		1		1			1		1	
11/29/2005		1		1			1		1	
11/30/2005				0					0	
Totals	13	40	1	53		12	26	0	38	
12/6/2005		12		12			10		10	
12/7/2005		18	4	18			10	5	10	
12/8/2005	1	12	3	13				2	0	
12/9/2005	7		1	7		4			4	
12/12/2005		1		1					0	
12/13/2005		2		2					0	
12/14/2005				0					0	
12/15/2005		3		3			2		2	
12/16/2005		2		2					0	
Totals	8	50	8	58		4	22	7	26	
1/9/2006		3		3			2		2	
1/10/2006				0					0	
1/16/2006				0					0	
1/17/2006		1		1			1		1	
1/18/2006		1		1					0	
1/19/2006				0					0	
1/20/2006	1			1					0	
1/23/2006				0					0	
1/24/2006		1		1					0	
1/25/2006				0					0	
1/26/2006		1		1			1		1	
1/27/2006	1			1					0	
1/30/2006		2		2					0	
1/31/2006	1			1					0	
Totals	3	9	0	12		0	4	0	4	

Table 1. continued..

Scott River Tributary Outmigrant Trapping

Trap Location
French Cr.

End Date of Operation End Date and Time	Daily Catch coho salmon (<i>O. kisutch</i>)				0+ coho 2006	rainbow trout (<i>O. mykiss</i>)			
	unmarked	marked	recapped	total catch		unmarked	marked	recapped	total catch
2/1/2006				0					0
2/6/2006				0					0
2/7/2006	1	2		3					0
2/8/2006		1		1					0
2/9/2006				0					0
2/10/2006	4			4		1			1
2/13/2006				0					0
2/14/2006		2		2					0
2/15/2006				0			1		1
2/16/2006				0		1			1
2/17/2006	1			1					0
2/20/2006				0					0
2/21/2006	2			2					0
2/22/2006				0					0
2/23/2006				0					0
2/24/2006	3			3					0
2/27/2006				0		1			1
2/28/2006				0		1			1
Totals	11	5	0	16		4	1	0	5
3/1/2006		5		5					2
3/2/2006				0		2			0
3/3/2006				0					0
3/6/2006				0					0
3/7/2006		3		3		1	1		2
3/8/2006		1		1					0
3/9/2006				0		1			1
3/10/2006	2			2					0
3/13/2006				0			1		1
3/14/2006				0					0
3/15/2006				0					0
3/16/2006		1		1					0
3/17/2006	1			1					0
3/20/2006				0					0
3/21/2006	1			1					0
3/22/2006	2			2					0
3/23/2006				0		1			1
3/24/2006				0		1			1
3/27/2006				0					0
3/28/2006				0		1			1
3/29/2006				0					0
3/30/2006		1		1		2			2
3/31/2006				0		2			2
Totals	6	11	0	17		11	2	0	13
4/3/2006		2		2					3
4/4/2006				0		3			1
4/5/2006	1	1		2		5			5
4/6/2006		1		1		3			3
4/7/2006				0					0
4/10/2006				0					1
4/11/2006				0		1			0
4/12/2006				0					0
4/13/2006	1	2		3					2
4/17/2006	1			1		2			2
4/18/2006				0		2			2
4/19/2006				0		3			3
4/20/2006				0		1			1
4/21/2006				0		6			6
4/21/2006				0		7			7
4/24/2006				0		2			2
4/25/2006				0					0
4/26/2006				0					0
4/27/2006				0		1			1
4/28/2006	1			1		1			1
Totals	4	6	0	10	8	38	0	0	38

Table 1. cont.

Scott River Tributary Outmigrant Trapping

Trap Location
French Cr.

End Date of Operation End Date and Time	Daily Catch coho salmon (<i>O. kisutch</i>)				0+ coho 2006	rainbow trout (<i>O. mykiss</i>)				0+ rainbow trout
	unmarked	marked	recapped	total catch		unmarked	marked	recapped	total catch	
5/1/2006				0	1				0	
5/2/2006				0	1				0	
5/3/2006				0	1				0	
5/4/2006				0	4				0	
5/5/2006				0	3	1			1	
5/8/2006				0					0	
5/9/2006				0					0	
5/10/2006				0					0	
5/11/2006				0					0	
5/12/2006				0					0	
5/15/2006				0					0	
5/17/2006				0					0	
5/18/2006				0					0	
5/19/2006				0					0	
5/23/2006				0					0	
5/24/2006				0					0	
5/25/2006				0					0	1
5/26/2006	1			1					0	
5/30/2006				0					0	
5/31/2006				0					0	
Totals	1	0	0	1	10	3	0	0	3	2
6/1/2006				0					0	2
6/2/2006				0					1	3
6/5/2006				0					0	
6/6/2006				0					0	
6/8/2006				0					0	
6/9/2006				0					0	
6/12/2006				0					0	
6/13/2006				0					0	
6/14/2006				0	2				0	
6/15/2006				0					0	
6/21/2006				0					0	2
6/22/2006				0					0	2
Totals	0	0	0	0	2	1	0	0	1	9

Table 2. Daily Catch of Target Species; Shackleford Creek

Scott River Tributary Outmigrant Trapping

Trap Location
Shackleford Cr.

End Date of Operation End Date and Time	Daily Catch coho salmon (<i>O. kisutch</i>)				rainbow trout (<i>O. mykiss</i>)				0+ rainbow
	unmarked	marked	recapped	total catch	unmarked	marked	recapped	total catch	
11/10/2005		5		5		4		4	
11/11/2005	3			3	1			1	
11/15/2005		3		3				0	
11/16/2005		5		5	1	1		2	
11/17/2005		1		1				0	
11/18/2005				0	1			1	
11/21/2005				0				0	
11/22/2005				0				0	
11/23/2005				0				0	
11/28/2005		2		2		2		2	
11/29/2005		2		2		6		6	
11/30/2005		9		9		10		10	
Totals	3	27	0	30	3	23	0	26	
12/7/2005	1	37		38		37		37	
12/8/2005		44	6	44		17	4	17	
12/9/2005	14		3	14	6		1	6	
12/12/2005				0				0	
12/13/2005				0				0	
12/14/2005		1		1		2		2	
12/15/2005				0				0	
12/16/2005				0				0	
Totals	15	82	9	97	6	56	5	62	
1/9/2006	1	18		19		8		8	
1/10/2006	1			1				0	
1/16/2006		1		1				0	
1/17/2006				0				0	
1/18/2006				0				0	
1/19/2006				0				0	
1/20/2006				0				0	
1/23/2006				0				0	
1/24/2006		3		3		1		1	
1/25/2006		1		1				0	
1/26/2006		1		1				0	
1/27/2006				0				0	
1/30/2006		1		1				0	
1/31/2006				0				0	
Totals	2	25	0	27	0	9	0	9	
2/1/2006	1			1				0	
2/2/2006				0				0	
2/3/2006				0				0	
2/6/2006		1		1				0	
2/7/2006		3		3				0	
2/8/2006		1		1				0	
2/10/2006	3			3	1			1	
2/13/2006		6		6				0	
2/14/2006		2		2				0	
2/15/2006		2		2				0	
2/16/2006				0				0	
2/17/2006	1			1				0	
2/20/2006				0				1	
2/21/2006		5		5		1		1	
2/22/2006		5		5		2		2	
2/23/2006		8		8				7	
2/24/2006	7			7				3	
2/27/2006		2		2				1	
2/28/2006		7		7				1	
Totals	12	42	0	54	14	3	0	17	

Table 2. continued

Scott River Tributary Outmigrant Trapping

Trap Location
Shackleford Cr.

End Date of Operation End Date and Time	Daily Catch coho salmon (<i>O. kisutch</i>)				rainbow trout (<i>O. mykiss</i>)				0+ rainbow
	unmarked	marked	recapped	total catch	unmarked	marked	recapped	total catch	
3/1/2006		8		8				0	
3/2/2006		9		9	3			3	
3/3/2006	2			2	1			1	
3/6/2006		2		2				0	
3/7/2006				0	1			1	
3/8/2006		2		2				0	
3/9/2006	1	5		6				0	
3/10/2006				0				0	
3/13/2006		2		2				0	
3/14/2006				0				0	
3/15/2006		3		3				0	
3/16/2006		3		3				0	
3/17/2006	2			2				0	
3/20/2006				0				0	
3/21/2006		1		1				0	
3/22/2006			1	0				0	
3/23/2006				0				0	
3/24/2006	1			1				0	
3/28/2006				0				0	
3/29/2006				0				0	
3/30/2006				0				0	
3/31/2006				0				0	
Totals	6	35	1	41	5	0	0	5	
4/3/2006				0				0	
4/4/2006				0				0	
4/5/2006				0				0	
4/6/2006				0				0	
4/7/2006				0				0	
4/10/2006				0				0	
4/11/2006				0				0	
4/12/2006		1		1	4			4	
4/13/2006				0				0	
4/18/2006				0				0	
4/19/2006				0				0	
4/20/2006				0				0	
4/21/2006				0				0	
4/25/2006				0				0	
4/26/2006				0				0	
4/27/2006				0				0	
4/28/2006				0				0	
Totals	0	1	0	1	4	0	0	4	
5/2/2006				0				0	2
5/3/2006				0				0	8
5/4/2006				0				0	12
5/5/2006				0				0	6
5/8/2006				0				0	3
5/9/2006				0				0	3
5/10/2006				0				0	2
5/11/2006				0				0	1
5/12/2006				0				0	
5/15/2006				0				0	4
5/16/2006				0				0	9
5/17/2006				0				0	12
5/18/2006				0				0	11
5/22/2006				0				0	6
5/23/2006				0				0	15
5/24/2006				0				0	14
5/25/2006				0				0	
5/26/2006				0				0	
5/30/2006				0				0	
5/31/2006				0				0	
Totals	0	0	0	0	0	0	0	0	108

Table 2. continued.

Scott River Tributary Outmigrant Trapping

Trap Location
Shackleford Cr.

End Date of Operation End Date and Time	Daily Catch coho salmon (<i>O. kisutch</i>)				rainbow trout (<i>O. mykiss</i>)				0+ rainbow
	unmarked	marked	recapped	total catch	unmarked	marked	recapped	total catch	
6/1/2006				0				0	17
6/2/2006				0				0	11
6/5/2006				0				0	3
6/6/2006				0				0	11
6/8/2006				0				0	10
6/9/2006				0				0	4
6/12/2006				0				0	4
6/13/2006				0				0	8
6/14/2006				0				0	6
6/16/2006				0				0	31
Totals	0	0	0	0	0	0	0	0	105
	38	212	10	250	32	91	5	123	213

Scott River Tributary Outmigrant Trapping

Table 3. Daily Catch of Target Species; Sugar Creek

Trap Location
Sugar Creek

End Date of Operation	Daily Catch	
	coho salmon (<i>O. kisutch</i>)	rainbow trout (<i>O. mykiss</i>)
10/21/2005		
10/26/2005		
10/27/2005	4	2
10/28/2005	1	
Totals	5	2
11/2/2005	5	
11/3/2005	4	
11/4/2005		
11/11/2005	6	2
11/16/2005		
11/17/2005		
11/18/2005	1	
11/21/2005		
11/22/2005		
11/23/2005		
11/30/2005		
Totals	16	2
12/9/2005		
12/14/2005	1	1
12/15/2005		2
12/16/2005		
Totals	1	3
1/17/2006		
1/18/2006		
1/19/2006		
1/20/2006		
1/24/2006		
1/25/2006		1
1/26/2006		1
1/27/2006		
1/30/2006	1	
1/31/2006		
Totals	1	2
2/1/2006		
2/7/2006		
2/8/2006		
2/9/2006		
2/14/2006	1	1
2/15/2006	1	
2/21/2006		
2/22/2006		1
2/28/2006		4
Totals	2	6

Scott River Tributary Outmigrant Trapping

Trap Location
Sugar Creek

End Date of Operation	Daily Catch	
	coho salmon (<i>O. kisutch</i>)	rainbow trout (<i>O. mykiss</i>)
3/1/2006		
3/7/2006		1
3/8/2006	1	2
3/14/2006		
3/15/2006		
3/16/2006	1	
3/17/2006		
3/21/2006		1
3/22/2006	2	2
3/23/2006		1
3/24/2006		2
3/27/2006		3
3/28/2006	1	
3/29/2006		1
3/30/2006	1	
3/31/2006		2
Totals	6	15

4/3/2006		1
4/4/2006		
4/5/2006	1	
4/6/2006		1
4/7/2006		
4/11/2006		1
4/12/2006		6
4/13/2006		5
4/17/2006		3
4/18/2006		2
4/19/2006		3
4/20/2006		11
4/21/2006		21
4/24/2006		19
4/25/2006		3
4/26/2006		4
4/27/2006		
4/28/2006		
Totals	1	80

5/1/2006		1
5/2/2006		
5/3/2006		
5/4/2006		
5/5/2006		
5/8/2006		
5/9/2006	1	
5/10/2006		
5/11/2006		1
5/12/2006		1
5/15/2006		
5/16/2006		
5/23/2006		
5/24/2006		
5/25/2006		
5/26/2006		
5/30/2006		1
5/31/2006		
Totals	1	4

6/1/2006		
6/2/2006		
6/5/2006		
6/6/2006		
6/8/2006		1
6/9/2006		
6/12/2006		
6/13/2006		
Totals	0	1

Table 4. Data effort and catch of target species; East Fork Scott River

Scott River Tributary Outmigrant Trapping

Trap Location
East Fork Scott River

End Date of Operation	Daily Catch	
	coho salmon (<i>O. kisutch</i>)	rainbow trout (<i>O. mykiss</i>)
10/27/2005		
10/28/2005		2
10/31/2005		
Totals	0	2
11/1/2005		1
11/2/2005	1	2
11/3/2005		
11/4/2005		1
11/8/2005	1	21
11/9/2005		
Totals	2	25
12/9/2005		1
12/15/2005		1
Totals	0	2
1/20/2006		2
1/24/2006		
1/25/2006		
1/26/2006		
1/27/2006		
Totals	0	2
2/1/2006		
2/3/2006		
2/10/2006		
2/16/2006		
2/17/2006		
2/23/2006		
2/24/2006		1
Totals	0	1
3/2/2006	3	
3/3/2006		1
3/9/2006		
3/10/2006		
3/14/2006		
3/15/2006		
3/16/2006		
3/17/2006	1	
3/20/2006		
3/21/2006		
3/22/2006		
3/23/2006		
3/24/2006		
3/28/2006		
3/29/2006		
3/31/2006		
Totals	4	1

Scott River Tributary Outmigrant Trapping

Table 4. cont.

Trap Location
East Fork Scott River

End Date of Operation	Daily Catch		2006 brood year	
	coho salmon (<i>O. kisutch</i>)	rainbow trout (<i>O. mykiss</i>)	coho salmon (<i>O. kisutch</i>)	rainbow trout (<i>O. mykiss</i>)
4/4/2006		1		
4/5/2006				
4/6/2006				
4/7/2006				
4/10/2006		1		
4/11/2006		1		
4/12/2006				
4/18/2006	1	3		
4/19/2006	1			
4/20/2006				
4/21/2006		1		
4/24/2006				
4/25/2006				
Totals	2	7		
5/4/2006		1		
5/5/2006				
5/8/2006				
5/9/2006				
5/10/2006		1		
5/11/2006				
5/12/2006				
5/16/2006				
Totals	0	2		
6/14/2006				2
6/15/2006			4	1
6/21/2006			1	14
6/22/2006				25
Totals	0	0	5	42

Table 5. Biologic parameters and condition factor by month; French Cr.

Scott River Tributary Outmigrant Trapping

coho salmon (*O. kisutch*)

10/20/05 - 10/31/05

	length(mm)	weight(g)	condition factor (K)
average	73	4.4	1.01
standard dev.	5	0.6	0.01
n=	3	2	2
min	69	3.9	1
max	78	4.8	1.01

11/01/05 - 11/30/05

	length(mm)	weight(g)	condition factor (K)
average	65	2.9	1.00
standard dev.	7	0.9	0.13
n=	53	53	53
min	52	1.7	0.72
max	84	6.1	1.64

12/06/05 - 12/16/05

	length(mm)	weight(g)	condition factor (K)
average	69	3.4	1.02
standard dev.	7	1	0.09
n=	66	62	62
min	54	1.7	0.71
max	86	6.5	1.18

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor (K)
average	71	3.7	0.99
standard dev.	5.9	1.1	0.1
n=	11	11	11
min	65	2.1	0.73
max	85	6.4	1.1

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor (K)
average	66	3	1.02
standard dev.	5.8	0.8	0.12
n=	16	16	16
min	56	1.8	0.8
max	79	4.7	1.22

3/01/06 - 3/31/06

	length(mm)	weight(g)	condition factor (K)
average	76	4.3	0.96
standard dev.	8.1	1.4	0.07
n=	20	13	13
min	55	1.5	0.83
max	86	6.1	1.05

rainbow trout (*O. mykiss*)

11/01/05 - 11/30/05

	length(mm)	weight(g)	condition factor
average	59	2.1	1.01
standard dev.	7	0.7	0.07
n=	38	38	38
min	48	1.1	0.9
max	72	3.9	1.21

12/06/05 - 12/16/05

	length(mm)	weight(g)	condition factor
average	60	2.4	1.04
standard dev.	6	0.7	0.06
n=	33	32	32
min	49	1.3	0.92
max	71	3.6	1.17

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor
average	62	2.5	1.00
standard dev.	6	0.6	0.07
n=	4	4	4
min	55	1.8	0.91
max	69	3	1.08

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor
average	58	2.2	1.09
standard dev.	6	0.8	0.11
n=	5	5	5
min	51	1.4	1.01
max	64	3.2	1.28

3/01/06 - 3/31/06

	length(mm)	weight(g)	condition factor
average	73	6.7	0.99
standard dev.	23	10	0.08
n=	15	10	10
min	54	1.5	0.88
max	150	34.6	1.11

Table 5. cont. – French Cr.

Scott River Tributary Outmigrant Trapping

4/01/06 - 4/30/06

	length(mm)	weight(g)	condition factor (K)
average	76	4.8	1.00
standard dev.	11.3	2	0.2
n=	10	10	10
min	61	2.3	0.88
max	92	7.9	1.46

5/01/06 - 5/31/06

	length(mm)	weight(g)	condition factor (K)
average	60	6	1.20
standard dev.			
n=	1	1	1
min			
max			

4/01/06 - 4/30/06

	length(mm)	weight(g)	condition factor
average	68	3.6	1.06
standard dev.	11	1.8	0.1
n=	37	37	37
min	52	1.3	0.83
max	95	8.7	1.27

5/01/06 - 5/31/06

	length(mm)	weight(g)	condition factor
average	63	3.5	1.37
standard dev.	2	0.6	0.27
n=	3	3	3
min	61	2.9	1.06
max	65	4	1.54

6/01/06 - 6/30/06

	length(mm)	weight(g)	condition factor
average	69	3.8	0.92
standard dev.	23	3.8	0.2
n=	2	2	2
min	52	1.1	0.78
max	85	6.5	1.06

coho salmon (*O. kisutch*) 2006 brood year

4/01/06 - 4/30/06

	length(mm)	weight(g)	condition factor (K)
average	32	0.4	1.09
standard dev.	0.9	0.1	0.23
n=	8	7	7
min	30	0.3	0.92
max	33	0.5	1.53

5/01/06 - 5/31/06

	length(mm)	weight(g)	condition factor (K)
average	34	0.4	0.98
standard dev.	1.2	0.1	0.29
n=	11	10	10
min	32	0.3	0.7
max	36	0.5	1.53

6/01/06 - 6/30/06

	length(mm)	weight(g)	condition factor (K)
average	50	1.5	1.15
standard dev.	2.8	0.4	0.09
n=	2	2	2
min	48	1.2	1.09
max	52	1.7	1.21

rainbow trout (*O. mykiss*) 2006 brood year

5/01/06 - 5/31/06

	length(mm)	weight(g)	condition factor
average	29	0.1	0.44
standard dev.	2	0	0.11
n=	3	3	3
min	26	0.1	0.37
max	30	0.1	0.57

6/01/06 - 6/30/06

	length(mm)	weight(g)	condition factor
average	28	0.1	0.60
standard dev.	1.1	0	0.3
n=	7	7	7
min	26	0.1	0.41
max	29	0.2	1.14

Table 6. Biologic parameters and condition factor by month; Shackleford Cr.

Scott River Tributary Outmigrant Trapping

coho salmon (*O. kisutch*)

rainbow trout (*O. mykiss*) 2005 Brood Year

11/10/05 - 11/30/05

	length(mm)	weight(g)	condition factor (K)
average	77	4.7	0.98
standard dev.	6	1.3	0.09
n=	30	30	30
min	64	2.8	0.69
max	89	8.2	1.16

11/10/05 - 11/30/05

	length(mm)	weight(g)	condition factor
average	69	3.3	0.99
standard dev.	7	1	0.07
n=	26	26	26
min	57	1.7	0.82
max	85	5.8	1.19

12/07/05 - 12/16/05

	length(mm)	weight(g)	condition factor (K)
average	77	4.9	1.06
standard dev.	7	1.4	0.09
n=	105	88	88
min	62	2.5	0.81
max	92	8.4	1.33

12/07/05 - 12/16/05

	length(mm)	weight(g)	condition factor
average	69	3.5	1.08
standard dev.	7	1	0.16
n=	67	59	59
min	56	1.8	0.83
max	87	6.9	1.82

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor (K)
average	76	4.6	0.99
standard dev.	8	1.5	0.08
n=	33	32	32
min	65	2.1	0.7
max	95	8.2	1.1

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor
average	71	3.9	1.01
standard dev.	11	1.8	0.07
n=	12	12	12
min	56	1.7	0.85
max	90	7.1	1.14

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor (K)
average	79	4.9	0.95
standard dev.	8	1.7	0.08
n=	57	57	57
min	57	1.9	0.64
max	100	10.4	1.2

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor
average	70	3.5	0.98
standard dev.	8	1.3	0.08
n=	18	18	18
min	63	2.6	0.82
max	92	7.9	1.12

3/1/06 - 3/31/06

	length(mm)	weight(g)	condition factor (K)
average	84	6.1	0.97
standard dev.	10	2.7	0.09
n=	41	41	41
min	70	2.1	0.61
max	111	15.1	1.13

3/01/06 - 3/31/06

	length(mm)	weight(g)	condition factor
average	66	2.8	0.97
standard dev.	4	0.4	0.07
n=	5	5	5
min	61	2.4	0.91
max	72	3.4	1.06

4/1/06 - 4/30/06

	length(mm)	weight(g)	condition factor (K)
average	80	5.4	1.05
standard dev.	NA	NA	NA
n=	1	1	1
min	80	5.4	1.05
max	80	5.4	1.05

4/01/06 - 4/30/06

	length(mm)	weight(g)	condition factor
average	65	2.9	1.03
standard dev.	11	1.3	0.07
n=	4	4	4
min	50	1.3	0.94
max	74	4	1.1

rainbow trout (*O. mykiss*) 2006 Brood Year

5/1/06 - 5/31/06

	length(mm)	weight(g)	condition factor (K)
average	28	0.2	0.70
standard dev.	3	0.1	0.26
n=	108	93	88
min	23	0	0.34
max	45	1.1	1.28

6/1/06 - 6/30/06

	length(mm)	weight(g)	condition factor
average	31	0.3	0.77
standard dev.	7	0.3	0.28
n=	86	72	62
min	24	0	0.37
max	47	1	1.4

Table 7. Biologic parameters and condition factor by month; Sugar Cr.

Scott River Tributary Outmigrant Trapping

coho salmon (*O. kisutch*)
10/20/06 - 10/31/06

	length(mm)	weight(g)	condition factor (K)
average	69	3.5	1.00
standard dev.	6	1.2	0.05
n=	5	5	5
min	62	2.3	0.95
max	79	5.3	1.07

11/01/05 - 11/30/05

	length(mm)	weight(g)	condition factor (K)
average	68	3.1	0.93
standard dev.	7	1.2	0.19
n=	16	16	16
min	54	1.6	0.55
max	83	6.1	1.11

12/01/05 - 12/16/05

	length(mm)	weight(g)	condition factor (K)
average	80	5.3	1.04
standard dev.			
n=	1	1	1
min			
max			

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor (K)
average	68	2.9	0.92
standard dev.			
n=	1	1	1
min			
max			

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor (K)
average	74	3.6	0.90
standard dev.	0.7	0.4	0.11
n=	2	2	2
min	73	3.3	0.81
max	74	3.8	0.98

rainbow trout (*O. mykiss*) 2005 Brood Year
10/20/06 - 10/31/06

	length(mm)	weight(g)	condition factor (K)
average	60	2.1	0.96
standard dev.	6	0.6	0.01
n=	2	2	2
min	55	1.6	0.95
max	64	2.5	0.96

11/10/05 - 11/30/05

	length(mm)	weight(g)	condition factor (K)
average	51	1.4	1.01
standard dev.	8	0.6	0.02
n=	2	2	2
min	45	0.9	0.99
max	56	1.8	1.02

12/07/05 - 12/16/05

	length(mm)	weight(g)	condition factor (K)
average	57	1.8	0.96
standard dev.	5	0.5	0.01
n=	3	3	3
min	54	1.5	0.95
max	62	2.3	0.97

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor (K)
average	62	2.4	0.98
standard dev.	7	0.8	0.02
n=	2	2	2
min	57	1.8	0.97
max	67	3	1

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor (K)
average	55	1.9	1.14
standard dev.	7	0.6	0.26
n=	6	6	6
min	43	0.9	0.93
max	64	2.5	1.59

Table 7 cont. Sugar Creek

Scott River Tributary Outmigrant Trapping

coho salmon (*O. kisutch*)

4/1/06 - 4/30/06

	length(mm)	weight(g)	condition factor (K)
average	80	4.9	0.96
standard dev.			
n=	1	1	1
min			
max			

rainbow trout (*O. mykiss*) 2005 Brood Year

4/01/06 - 4/30/06

	length(mm)	weight(g)	condition factor
average	62	2.6	1.08
standard dev.	7	0.8	0.14
n=	78	68	68
min	38	0.8	0.72
max	79	4.9	1.67

5/01/06 - 5/31/06

	length(mm)	weight(g)	condition factor
average	64	2.9	1.07
standard dev.	6	1.1	0.16
n=	4	4	4
min	57	1.7	0.92
max	69	4.2	1.28

6/01/06 - 6/31/06

	length(mm)	weight(g)	condition factor
average	76	4.2	0.96
standard dev.			
n=	1	1	1
min			
max			

Table 8. Biologic parameters and condition factor by month; East Fork Scott

Scott River Tributary Outmigrant Trapping

coho salmon (*O. kisutch*)

2005 brood year

11/01/05 - 11/30/05

	length(mm)	weight(g)	condition factor (K)
average	68	3	0.93
standard dev.	7	1.1	0.07
n=	2	2	2
min	63	2.2	0.88
max	73	3.8	0.98

3/1/06 - 3/31/06

	length(mm)	weight(g)	condition factor (K)
average	79	4.5	0.90
standard dev.	16	2.2	0.18
n=	4	4	4
min	61	2.4	0.68
max	98	6.4	1.06

rainbow trout (*O. mykiss*) 2005 Brood Year
10/20/06 - 10/31/06

	length(mm)	weight(g)	condition factor
average	75	4.4	0.97
standard dev.	17	2.8	0.01
n=	2	2	2
min	63	2.4	0.96
max	87	6.4	0.97

11/10/05 - 11/30/05

	length(mm)	weight(g)	condition factor
average	65	2.7	0.96
standard dev.	9	1	0.06
n=	27	26	26
min	48	1	0.84
max	86	5.5	1.08

12/07/05 - 12/16/05

	length(mm)	weight(g)	condition factor
average	72	3.5	0.77
standard dev.	8		
n=	2	1	1
min	66		
max	77		

1/09/06 - 1/31/06

	length(mm)	weight(g)	condition factor
average	62	2.5	1.00
standard dev.	12	1.3	0.01
n=	2	2	2
min	53	1.5	0.99
max	70	3.4	1.01

2/01/06 - 2/28/06

	length(mm)	weight(g)	condition factor
average	55	1.9	1.14
standard dev.			
n=	1	1	1
min			
max			

3/01/06 - 3/31/06

	length(mm)	weight(g)	condition factor
average	49	1.1	0.93
standard dev.			
n=	1	1	1
min			
max			

Table 8 cont. East Fork Scott River

Scott River Tributary Outmigrant Trapping

4/1/06 - 4/30/06

	length(mm)	weight(g)	condition factor (K)
average	92	7.8	0.97
standard dev.	13	3.8	0.07
n=	2	2	2
min	82	5.1	0.92
max	101	10.5	1.02

4/01/06 - 4/30/06

	length(mm)	weight(g)	condition factor
average	71	4.2	1.08
standard dev.	12	2.1	0.13
n=	6	6	6
min	59	2.4	0.92
max	89	7.7	1.31

5/01/06 - 5/31/06

	length(mm)	weight(g)	condition factor
average	66	2.7	0.94
standard dev.			
n=	1	1	1
min			
max			

coho salmon (*O. kisutch*)
6/01/06 - 6/31/06

2006 brood year

	length(mm)	weight(g)	condition factor (K)
average	46	1	0.98
standard dev.	3	0.3	0.11
n=	5	5	5
min	44	0.7	0.82
max	50	1.4	1.12

rainbow trout (*O. mykiss*) 2006 Brood Year
6/01/06 - 6/31/06

	length(mm)	weight(g)	condition factor
average	28	0.1	0.50
standard dev.	1	0	0.07
n=	25	15	15
min	26	0.1	0.37
max	30	0.1	0.57