State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2003-2004 SEASON

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Northern California – North Coast Region
601 Locust Street
Redding, CA 96001

June 2005

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June 2005

Foreward

This is the sixteenth annual report to the United States Bureau of Reclamation (USBOR). This year's activities were conducted under terms of Cooperative Agreement Number 02FG200027, and cover the period October 1, 2003 through September 30, 2004 (FFY 2004). The field work was conducted by personnel of the California Department of Fish and Game's (CDFG) Klamath-Trinity Program. Cooperators of CDFG field studies include the Hoopa Valley Tribe (HVT) fisheries department, Yurok Tribe (YT) fisheries department, U.S. Fish and Wildlife Service (USFWS) fisheries department and U.S. Forest Service (USFS) fisheries department. The HVT, YT, and USFWS were contracted separately by the USBOR for cooperative and singular work performed during FFY 2003. Please refer to the respective agency/tribal fisheries departments or USBOR for information regarding cooperative or other projects/studies.

This year's CDFG work was comprised of five separate projects (**Tasks)** performed on the lower Klamath River, mainstem Trinity River, and at Trinity River Hatchery. The necessity for performing our Klamath-Trinity basin monitoring activities have been outlined in several Acts of Congress including Public Law 386 (69 Stat. 719), August 12, 1955; Public Law 98-541, October 24, 1984; "Trinity River Basin Fish and Wildlife Management Reauthorization Act" of 1995; and Trinity River "Record of Decision", 2000.

Acknowledgements

The following CDFG technicians made possible our field work for the season: Cliff Carrington, Ron Smith, Mike and Linda Allen, Craig Imamoto, Linda Battin, Kelly Breen, Nick Bauer, Charlie Wehrlie, Burt Blank, and Tom Barnes. We also wish to thank the Hoopa tribal technicians, Clyde Matilton, Craig Reese and Timothy Melony and Yurok tribal technicians Hank Alemeda, Robert Hunsucker Jr., Leroy Silvia, Seth Naman and biologists Aaron Martin Ryan Benson and Tim Hayden, USFWS project staff of Charlie Chamberlin, Mike Reichmuth, Eric Moberly, Jane Sartori, Tom Cambell, Pat McNeil, Celia Cambell, Mike Cunanan, Mijanou Brown and Steve Fortney, and Loren Everest, USFS biologist who worked on cooperative field projects.

We also appreciate the cooperation of the CDFG Trinity River Hatchery staff during processing of returning salmonids and the following landowners for granting us access through/on their properties: Fred and Doris Chase, Tom Ogorman, the Bureau of Land Management and U.S. Forest Service.

The CDFG monitoring program was approved by the Trinity Management Council (TMC) and funded through the Trinity River Restoration Program (TRRP) office in Weaverville, CA. We thank Doug Schleusner and his TRRP staff for their input and effort administering our contract.

Trinity River Basin Salmon and Steelhead Project
2003 - 2004 Season

Table of Contents

List of Tables

Task 1. Annual Run-size, Harvest, and Spawner Escapement Estimates for Trinity River Basin Chinook and Coho Salmon and Steelhead.

List of Tables (continued)

List of Tables (continued)

Task 2. Survival and Contributions to the In-river Sport Fisheries and Spawner Escapements Made by Spring- and Fall-run Chinook Salmon Produced at Trinity River Hatchery

Task 3. Survival and Contributions to the to the In-river Sport Fisheries and Spawner Escapements Made by Coho Salmon Produced at Trinity River Hatchery

List of Tables (continued)

Task 4. Salmon Spawner Surveys in the Upper Trinity River

Task 5. Angler Creel Surveys in the Lower Klamath River

List of Tables (continued)

Trinity River Basin Salmon and Steelhead Project
2003 - 2004 Season

List of Figures

Task 1. Annual Run-size, Harvest, and Spawner Escapement Estimates for Trinity River Basin Chinook and Coho Salmon and Steelhead.

List of Figures (continued)

Task 4. Salmon Spawner Surveys in the Upper Trinity River

Task 5. Angler Creel Surveys in the Lower Klamath River

List of Figures (continued)

Trinity River Basin Salmon and Steelhead Project
2003 - 2004 Season

List of Appendices

Task 1. Annual Run-size, Harvest, and Spawner Escapement Estimates for Trinity River Basin Chinook and Coho Salmon and Steelhead.

List of Appendices (continued)

Task 3. Survival and Contributions to the to the In-river Sport Fisheries and Spawner Escapements Made by Coho Salmon Produced at Trinity River Hatchery

List of Appendices (continued)

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2003-04 SEASON

TASK 1
ANNUAL RUN-SIZE, HARVEST, AND SPAWNER ESCAPEMENT ESTIMATES FOR TRINITY RIVER BASIN CHINOOK AND COHO SALMON AND STEELHEAD

by

Wade Sinnen and Morgan Knechtle

ABSTRACT

The California Department of Fish and Game's Trinity River Project conducted tagging and recapture operations from June 2003 through March 2004 to obtain spring and fall run Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and adult fall run steelhead (*O. mykiss*) run-size, angler harvest, and spawner escapement estimates in the Trinity River basin. The project was conducted by the California Department of Fish and Game with cooperation from the Hoopa Valley Tribal Fisheries Department. We placed weirs in the Trinity River near the towns of Junction City and Willow Creek, and trapped 2,576 Chinook salmon, 250 coho salmon, 963 fall steelhead and 170 brown trout (*Salmo trutta*).

Based on tagged fish recovered at Trinity River Hatchery and on the return of reward tags by anglers, we estimated that 47,795 spring Chinook salmon migrated into the Trinity River basin upstream of Junction City Weir this season. We estimate that 2,033 of these were caught by anglers, leaving 45,762 fish as potential spawners. We estimated 64,362 fall Chinook salmon migrated past Willow Creek Weir and that 2,022 of these were caught by anglers, leaving 62,340 potential spawners.

The coho salmon run in the Trinity River basin, upstream of Willow Creek Weir, was estimated to be 28,152 fish. No coho salmon were estimated to be harvested, thus we assume all coho were potential spawners.

An estimated 23,192 (3,948 naturally produced and 19,245 hatchery produced) adult fall run steelhead entered the Trinity River basin upstream of Willow Creek Weir. Anglers harvested an estimated 414 of the adult fall steelhead that migrated past Willow Creek Weir, leaving 22,778 fish as potential spawners.

JOB OBJECTIVES

1. To determine the size, composition, distribution and timing of adult Chinook and coho salmon, and steelhead runs in the Trinity River basin.

2. To determine the in-river angler harvest and spawner escapements of Trinity River Chinook and coho salmon, and steelhead.

INTRODUCTION

The California Department of Fish and Game's (CDFG) Trinity River Project (TRP), in cooperation with the Hoopa Valley Tribe (HVT) conducts annual tagging and recapture operations for Chinook and coho salmon, and fall adult steelhead in the mainstem Trinity River. This effort determines the composition (race and proportion of hatchery-marked[1/] or Project-tagged[2/] fish), distribution, and timing of Chinook and coho salmon, and fall steelhead runs in the Trinity River basin. Recaptures of hatchery-marked or Project-tagged fish are used to develop run-size, angler harvest, and spawner escapement estimates for Chinook and coho salmon, and steelhead runs. Additionally, we initiated tagging studies of brown trout this season to determine angler harvest and growth rates.

This is a continuation of studies that began in 1977 with the trapping, tagging, and recapture of fall-run Chinook salmon (fall Chinook), coho salmon (coho), and fall steelhead (steelhead) in the Trinity River in order to determine run-size and angler harvest rates. In 1978, similar studies were added to include spring-run Chinook salmon (spring Chinook). Steelhead were dropped from the program in 1985 through 1989 and reinstated in 1990. Results of these studies are available from California Department of Fish and Game (Heubach 1984a, 1984b; Heubach and Hubbell 1980; Heubach et al. 1992a, 1992b; Lau et al. 1994; Zuspan et al. 1985; Zuspan et al. 1995; Zuspan and Sinnen 1995, Zuspan 1996, Zuspan 1997, Lau and Sinnen 1998, Lau and Sinnen 2000, Sinnen et al. 2000, Reese, 2001 and Reese and Sinnen, 2004.

Earlier studies were funded by the U.S. Bureau of Reclamation (USBR), and with Anadromous Fish Act funds administered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service. The USBR has funded the program from 1 October 1989 through the present.

1/ Adipose fin-clipped and coded-wire-tagged (Ad+CWT), hatchery-produced Chinook and right-maxillary-clipped coho salmon.

2/ Spaghetti tags applied by CDFG personnel to returning sea-run fish.

Prior to the current program, all efforts to measure salmon and steelhead populations in the Trinity River basin had been restricted to portions of the upper mainstem Trinity River and several of its tributaries, including the South Fork Trinity River and some of its tributaries (Gibbs 1956; La Faunce 1965a, 1965b, 1967; Miller 1975; Moffett and Smith 1950; Rogers 1970, 1972, 1973a, 1973b, 1982; Smith 1975; Weber 1965). Earlier efforts did not include fish which used the mainstem and tributaries of the lower Trinity River or attempt to determine the proportion of hatchery fish in the runs and the rates at which various runs contributed to the fisheries. To develop a comprehensive management plan for the Trinity River basin, all salmon stocks utilizing the basin must be considered.

METHODS

Trapping and Tagging

Trapping Locations and Periods

Trapping and tagging operations were conducted by TRP and HVT personnel from June through mid November 2003 at temporary weir sites near the towns of Willow Creek and Junction City in the mainstem Trinity River. The downstream site, Willow Creek Weir (WCW), was located 4.5 km downstream from the town of Willow Creek, 36.5 km upstream from the Trinity River's confluence with the Klamath River, and 143.5 km downstream from Trinity River Hatchery (TRH) (Figure 1). The upstream site, Junction City Weir (JCW), was located 5.4 km upstream from the town of Junction City, 132.7 km upstream from the Klamath River confluence, and 47.1 km downstream from TRH (Figure 1). Prior to 1995, JCW was operated from May through November. Currently, JCW is operated from late June through September. WCW is generally operated from mid-August through November. Most fall Chinook salmon spawning occurs upstream of WCW, while the majority of spring Chinook spawning occurs upstream of JCW.

We operated the WCW from September 18 through November 14, 2003 and the JCW from July 21 through October 7, 2003. At JCW there was a three week period between August 22 and September18 when no trapping occurred. The weir was removed due to “fall fishery” flows released from Lewiston Dam. The flows peaked at 1,820 cfs and were released to provide migrational cues to Trinity River fall Chinook in the lower Klamath River. This was done to alleviate crowding in the lower Klamath River, which was one factor identified as contributing to a fish kill in September of 2002 (DFG, 2003).

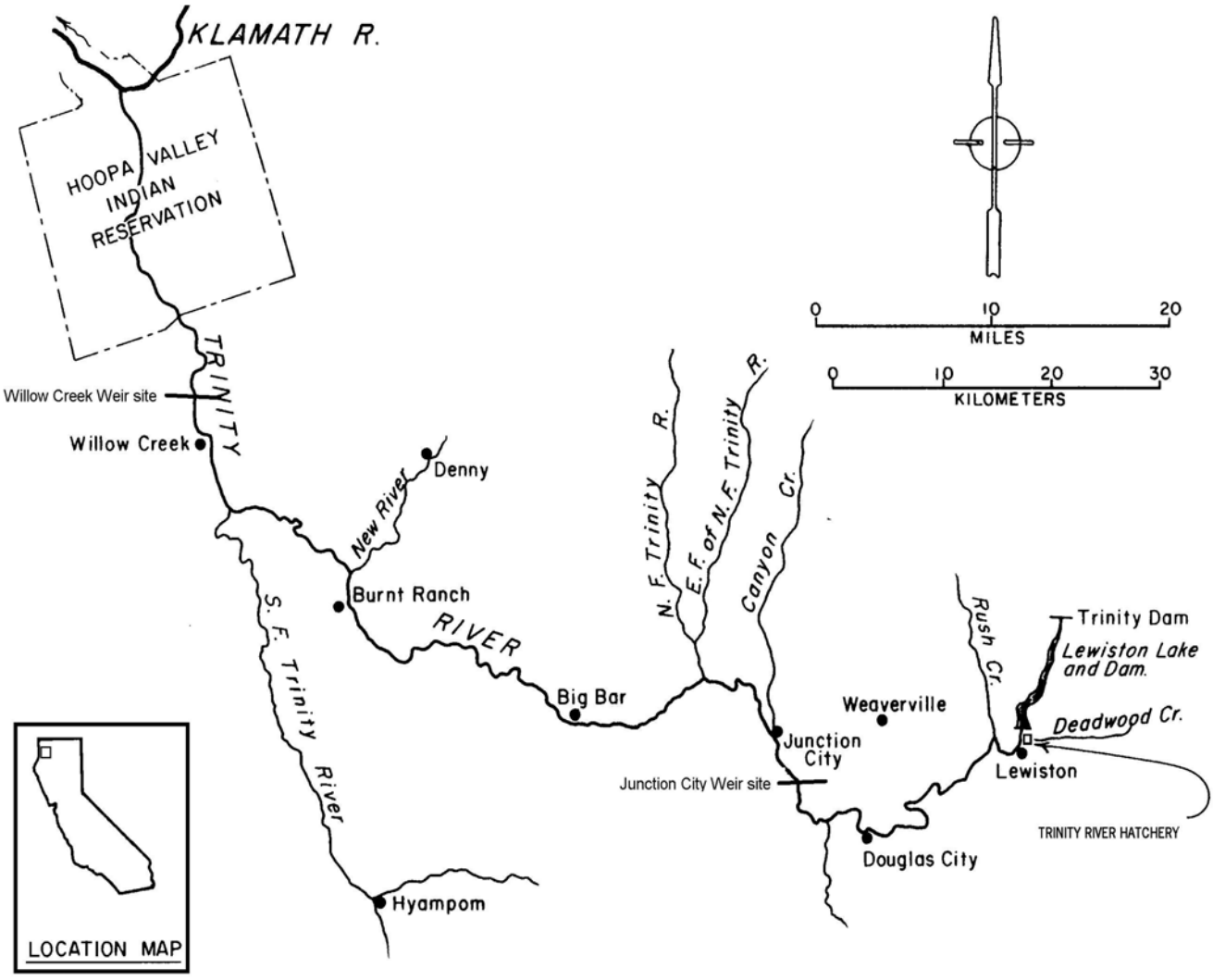


Figure 1. Location of trapping and tagging weirs for anadromous salmonids near Willow Creek and Junction City in the mainstem Trinity River, 2003-04 season.

At both weir sites, we attempted to trap during a five day period beginning late-afternoon on Sunday and ending mid-afternoon on Friday. We opened the weir each trapping day for approximately four hours allowing fish to pass unimpeded. Occasionally, trapping schedules were modified to allow for holidays or high flows which prevented trapping in a safe manner. Trapping and tagging were not conducted if stream temperatures exceeded 22 degrees Celsius.

Weir and Trap Design

Since 1989, we have used the Bertoni (Alaskan) weir design at both sites (Figures 2-4). The weir was supported by wooden tripods set 2.5 m apart. Weir panels consisted of 3.0-m X 1.9-cm (10-ft X ¾-in) electrical conduit spaced 5.1 cm apart on center, leaving a gap of 3.2 cm between conduits. Conduits were supported by three pieces of aluminum channel arranged 0.92 m apart, that connected to the supporting tripods. We anchored the tripods with cable attached to 1.8-m stakes driven into the stream bottom. The weir panels were angled, with the top of the weir standing 1.8 m above the river bottom.

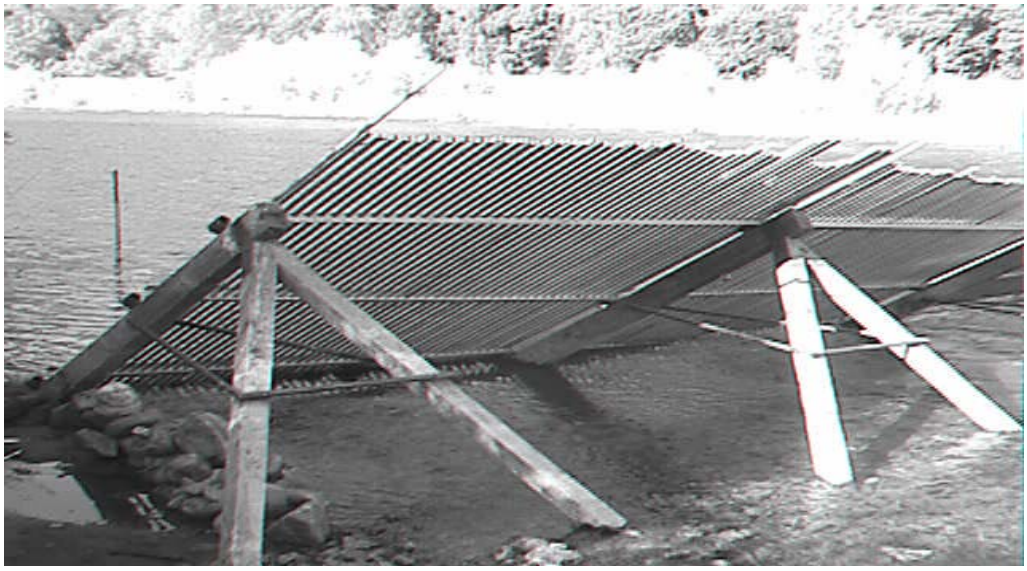


Figure 2. Photograph of Alaskan style weir tripods, support channels and conduit.

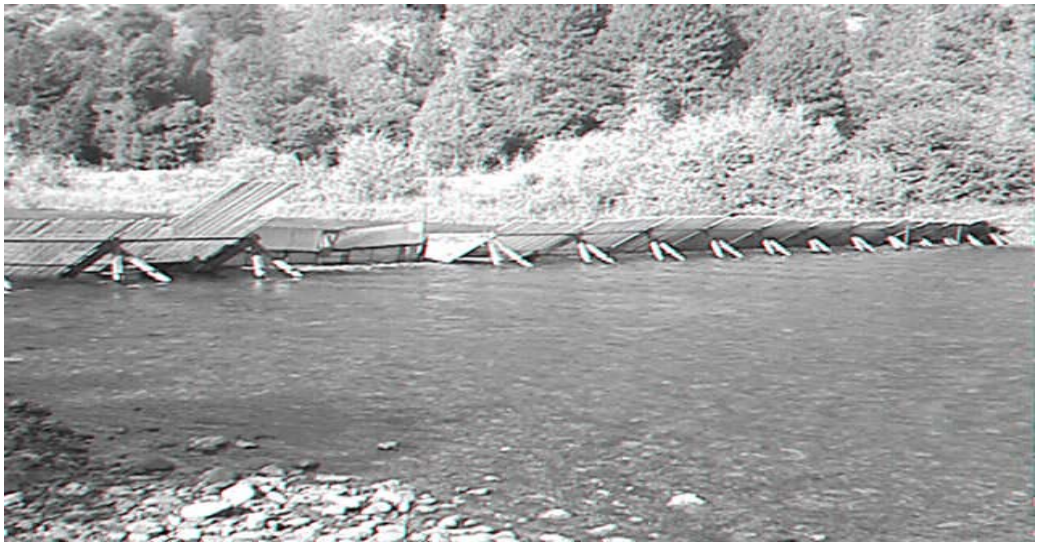


Figure 3. Photograph of upstream view of Alaskan weir. Note the panel boat gate (left center of picture).

Figure 4. Photograph of Alaskan weir showing the trapping box on the upstream side of the weir.

The trap was made of 1.9-cm electrical conduit spaced 2.5 cm apart and welded into panels. The panels were wired together at the corners to produce a 2.4-m square box which was bolted to a plywood floor and covered with plywood to prevent fish from jumping out. A fyke, also made of conduit panels, was installed in the trap. Its purpose was to guide the fish into the trap and prevent their escape. The trap was placed on the upstream side of the weir. About 12 weir conduits were raised creating an opening approximately 60 cm, to allow fish to pass through the weir into the trap. A gate, inserted between two weir panels, allowed boat passage at both weirs. The gate was made of welded conduit panels with 2.5-cm spacing between conduits. The gate spanned approximately 6 m.

Processing of Fish

At both weirs, we identified all trapped salmonids to species, measured them to the nearest cm fork length (FL), and examined them for hook, predator, and gill-net scars, fin clips, and tags. Each untagged salmonid judged in good condition and unspawned was tagged with a serially numbered FT-4[3/] spaghetti tag (Project-tagged). Tags were inserted using an applicator needle through the fishes back approximately two cm below the posterior insertion point of the dorsal fin. To determine angler harvest and catch-and-release rates upstream of the weirs, one-third of the Chinook salmon received $10-reward tags, while the remaining tags were non-reward. At WCW, half of the steelhead received reward tags, while the remaining received non-reward. Coho were tagged with non-reward tags due to their status as threatened under the Endangered Species Act (ESA) which prohibits their take by sport anglers. At JCW, brown trout >41 cm, FL

3/ The use of brand or trade names is for identification purposes only, and does not imply the endorsement of any product by the CDFG.

were tagged with reward tags. Steelhead and coho were not tagged at JCW.

Determining the Separation Between Spring and Fall Chinook Salmon Runs at the Weirs

Each year there is a temporal overlap in the spring and fall Chinook runs in the Trinity River. Since the timing of runs varies between years, each season we assign new dates separating the two runs so that numbers of spring and fall Chinook used to estimate the run-size and angler harvest could be determined. We compared the proportions of known and estimated spring and fall Chinook trapped at the weirs each week. The week at which the proportion of fall Chinook exceeded spring Chinook was designated as the first week of the fall Chinook run at that weir. If there are two consecutive weeks with nearly identical proportions, then the first week is designated as spring and the following as fall. A recovered tagged Chinook was identified as either a spring or a fall Chinook based on two separate criteria. First, some Chinook tagged at the weirs carried coded-wire tags (CWT's), placed in their snouts as juveniles at TRH. These fish are identified by the absence of an adipose (AD) fin, which is clipped during the tagging process. If these fish were recovered at the hatchery or during spawning surveys, the CWT code indicated whether they were spring or fall fish. Second, non-CWT'ed Chinook tagged at the weir and recovered at the hatchery were classified as either spring or fall fish based on the date they entered the hatchery. If they entered the hatchery during the period associated with the spring run (based on CWT recoveries at the hatchery) they were considered spring Chinook. Those Chinook entering the hatchery during the period associated with the fall run (again, based on CWT recoveries) were considered fall Chinook.

Estimating Numbers of Spring and Fall Chinook Salmon at Trinity River Hatchery

As at the weirs, there is an overlap in the return timing of spring and fall Chinook into TRH. To estimate the respective numbers of spring and fall Chinook without CWT's entering TRH, we expanded the numbers of tags recovered from each returning CWT group by the ratio of tagged to total Chinook salmon (production multiplier) when they were originally released (same strain, brood year [BY], release site, release group and date). For example, 44,654 fall Chinook of CWT group 06-52-54 plus 438,756 unmarked fall Chinook were released directly from TRH in June of 2000. The expanded estimate for each return of this group is 10.83 (44,654+438,756/44,654). Thus, each CWT return was expanded by its production multiplier to estimate the total number of spring and fall Chinook that entered the hatchery.

If more Chinook salmon entered the hatchery on a particular sorting day than could be accounted for by the expansion of all CWT groups, we assumed the additional fish were naturally produced. We designated these fish as spring or fall in the same proportions that were determined by the expansion of the CWT groups on that day.

For the purpose of estimating spring and fall Chinook run-sizes, we assigned a separation date at the hatchery between the two runs. The separation date was the week in which fall Chinook out-numbered spring Chinook based on the expansion of coded-wire tags.

Size Discrimination Between Adult and Grilse Chinook and Coho Salmon

We designated the size separating an adult fish from a grilse for spring and fall Chinook based on two criteria; length frequency data obtained at the two trapping sites and TRH and length data obtained from groups of CWT'ed fish that entered TRH whose exact age was known. Daily Chinook salmon FL data from TRH were assigned to either spring or fall Chinook only when the expansion of the number of CWTs indicated $\geq$90% of the Chinook salmon entering TRH were from either spring or fall runs.

Coho salmon do not receive CWT's, therefore exact ages are unknown. We relied on length frequency analysis to separate grilse and adults.

Chinook and coho length frequency data collected at the weirs and TRH were smoothed with a moving average of five, 1-cm increments to determine the nadir separating grilse and adults.

Size Discrimination Between Adult and Immature Steelhead

All steelhead >41 cm FL were considered adults, and steelhead $\leq$41 cm FL captured at the weirs were assumed to be half-pounders (assumed to have migrated to the ocean). Steelhead $\leq$41 cm FL that entered TRH were classified as sub-adults, since we did not know whether they had migrated to the ocean or were residual fish.

Recovery of Tagged Fish

Weir Recovery

We measured to the nearest cm, FL all dead salmonids recovered against the weir and examined them for tags, fin clips, and spawning condition. Heads of adipose fin-clipped (Ad-clipped) (potentially hatchery-marked) fish were removed for the recovery of the CWT. After examination, the carcasses were cut in half to prevent recounting and returned to the river downstream of the weir.

Tagging Mortalities

Tagged salmonids recovered dead at the weir, in spawning surveys, or reported dead by anglers were considered tagging mortalities, if there was no evidence they had spawned and they were recovered dead $\leq$30 days after tagging. Tagged fish recovered dead more than 30 days after tagging, or those that had spawned, regardless of the number days after tagging, were not considered tagging mortalities.

Angler Tag Returns

We used the information from Project-tags returned by anglers to assess sport harvest. All the tags placed on fish at the weirs were inscribed with our address so anglers could return the tags to us. All anglers that returned tags were sent questionnaires asking the date and location of their catch and whether they harvested (kept) or released their catch. The questionnaire informed them of the fish's tagging date and location.

Tags returned to us through May 1, 2004 were used to assess harvest and catch-and-release rates. Tags returned after that date were processed for payment but not used for analysis. This date was chosen due to time constraints associated with the completion of this report and because the vast majority of tags have been returned by this date in previous years.

Trinity River Hatchery

The TRH fish ladder was open from 08 September 2003 through 15 March 2004. Hatchery personnel conducted fish sorting and spawning operations generally two days per week. We considered the initial day a fish was observed during sorting as the day it entered the hatchery.

On all sorting days, salmon and steelhead entering TRH were identified to species, sexed, and examined for tags and fin clips. We measured all salmonids to the nearest cm FL, except those that were Project-tagged fish from the weirs. Project-tagged salmon and steelhead recovered at TRH were assigned the FL recorded for them at the weir where they were originally tagged.

During each sorting week, we gave a distinguishing fin-clip to AD-clipped and project-tagged Chinook that were placed in ponds to ripen, so the week they initially entered the hatchery (i.e., were sorted) could be determined when they were spawned. Fish that were neither AD-marked or project-tagged were tallied. On the day they were spawned, we removed the heads of all AD-clipped salmon and placed each in a plastic bag with a serially numbered tab noting the date and location of recovery, species, sex, and FL. Project personnel later performed CWT extraction and decoding.

Spawner Surveys

In cooperation with the U.S. Fish and Wildlife Service, U.S. Forest Service and Yurok Tribe, we conducted spawner surveys in the upper Trinity River from Cedar Flat (RK 78) upstream to Lewiston Dam (RK 180). Tagged fish recovered in these surveys were examined for spawning success and project tag numbers. Results of these surveys are presented in Task 4 of this report.

Statistical Analyses

Effectively Tagged Fish

We estimated the number of effectively tagged fish by subtracting from the total tagged, those fish we classified as tagging mortalities, tagged-fish recovered downstream of the tagging site, and angler-caught-and-released fish.

Run-size Estimates

We determined the run-size estimates by using Chapman's version[4/] of the Petersen Single Census Method:

$$N = \frac{(M+1)\ (C+1)}{(R+1)}, \text{ where}$$

N = estimated run-size
M = the number of effectively tagged fish
C = the number of fish examined at TRH
R = the number of Project-marked fish recovered in the hatchery sample.

We attempted to tag and recover enough fish to obtain 95% confidence limits within ±10% of the run-size estimate. We used criteria established by Chapman (1948) to select the type of confidence interval estimator. We used the proportions of grilse and adult salmon trapped at each weir to estimate the numbers of grilse and adults comprising the run upstream of that respective weir. We did not stratify the estimates into grilse and adult salmon because there were not sufficient grilse and adult salmon recovered to obtain 95% confidence of ±10% of each of the stratified portions of the run.

All steelhead run-size estimates were for adults only. Since the 1997 BY, all TRH-produced steelhead have been adipose-fin-clipped. We determined the proportion of the run that was hatchery produced based upon the percentage of adipose fin clipped steelhead observed at Willow Creek Weir.

For the run-size estimates, we assumed that: 1) fish trapped and released from the weir were a random sample representative of the population; 2) tagged and untagged fish were equally vulnerable to recapture at TRH; 3) all Project tags were recognized upon recovery; 4) tagged and untagged fish were randomly mixed throughout the population and among the fish recovered at TRH; and 5) we accounted for all tagging mortalities.

Angler Harvest and Catch-and-Release Rates and Harvest Estimates

Generally, anglers will return reward tags at a rate higher or nearly equal to that of non-reward tags. When this was the case, we used only reward tag returns to determine harvest rates. When non-reward tags were returned at higher rates than reward tags, we combined the two to determine harvest rates.

We computed the harvest rate for each species (and race of Chinook) by dividing the number of angler-returned tags from harvested fish by the number of fish we effectively tagged. We calculated independent harvest rates for grilse and adult salmon.
We computed the catch-and-release rate for each species (and race of Chinook) by dividing the number of angler-returned tags from caught and released fish by the number of fish effectively

4/ Chapman, D. G. 1951. Some properties of the hypergeometric distribution with applications to zoological census. Univ. Calif. Publ. Stat. 1:131-160, As cited in Ricker (1975).

tagged plus the number of fish reported as released.

We estimated the numbers of fish harvested upstream of each weir by multiplying the harvest rates (for each species and race) by their respective run-sizes upstream of each weir.

Use of Standard Julian Week

Weekly sampling data collected by Project personnel at the weirs are presented in Julian week (JW) format. Each JW is defined as one of a consecutive set of 52 weekly periods, beginning 1 January, regardless of the day of the week on which 1 January falls. The extra day in leap years is included in the ninth week (Appendix 1). This procedure allows inter-annual comparisons of identical weekly periods.

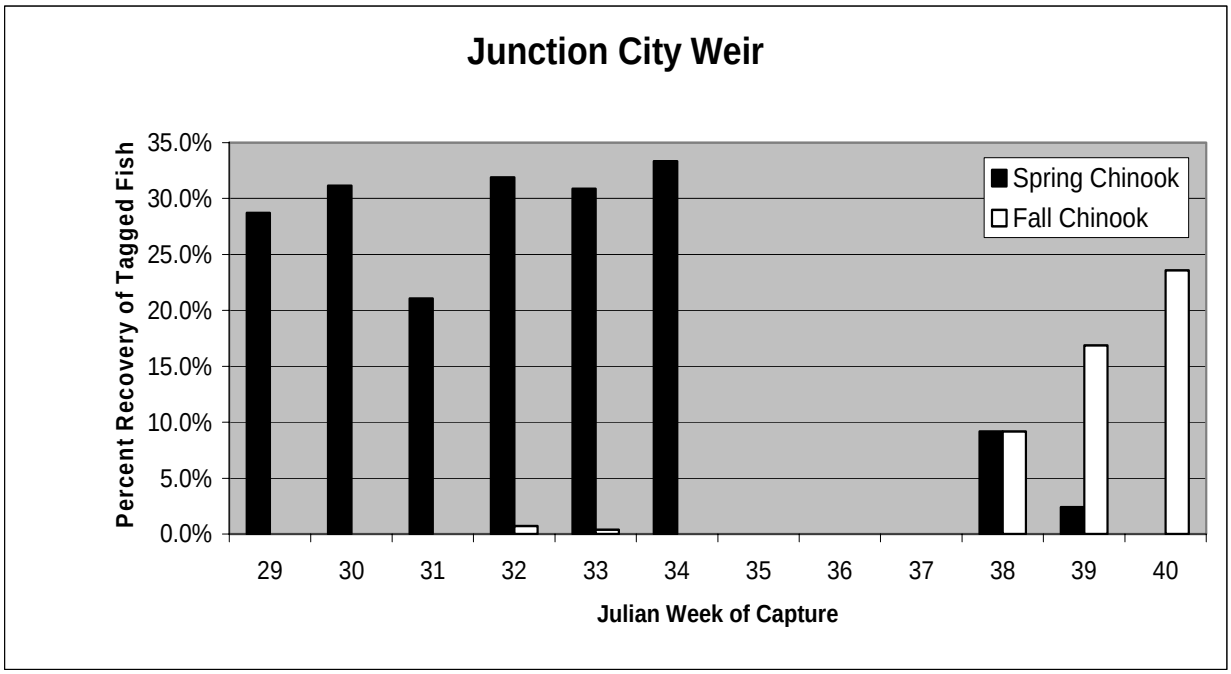
RESULTS

Trapping and Tagging

Chinook Salmon

Spring-Fall Chinook Separation and Run Timing. Spring Chinook were the predominant race at JCW through JW 34, after which fall Chinook became predominate (Figure 5). No trapping was attempted between JW's 35 and 37 due to the aforementioned increased flows, which precluded operation of the weir. At JCW, spring Chinook catch peaked during JW 29, the first week of trapping, at 109 fish/night. Chinook catch declined thereafter, but remained above 27 fish/night, with the exception of JW 31 when only 4.4 fish/night were captured (Table 1, Figure 6).

Based on the return of project-tagged and AD-clipped fish, the proportion of fall Chinook tagged at WCW exceeded spring Chinook throughout the entire season, so for the purpose of analysis all Chinook salmon trapped at the WCW were considered fall-run (Figure 5). Fall Chinook daily catch (fish/night) averaged greater than 43 fish between JW's 38 and 41 (9/17 – 10/14), with the peak observed during JW 40 when 78.4 fish/night were trapped. Catches declined sharply after JW 41 and no Chinook were trapped during the last week, JW 46 (Table 2, Figure 7). Fall Chinook run timing this year may have been affected by increased "fishery" flows released in the Trinity River during late August through early September. The increased flows, released from Lewiston Dam, peaked at 1820 cfs on August 25 and gradually receded to 450 cfs , normal base flow on September 16th. The flows were increased to stimulate Chinook migration out of the lower Klamath River to help avoid a fish kill, similar to which occurred in 2002.



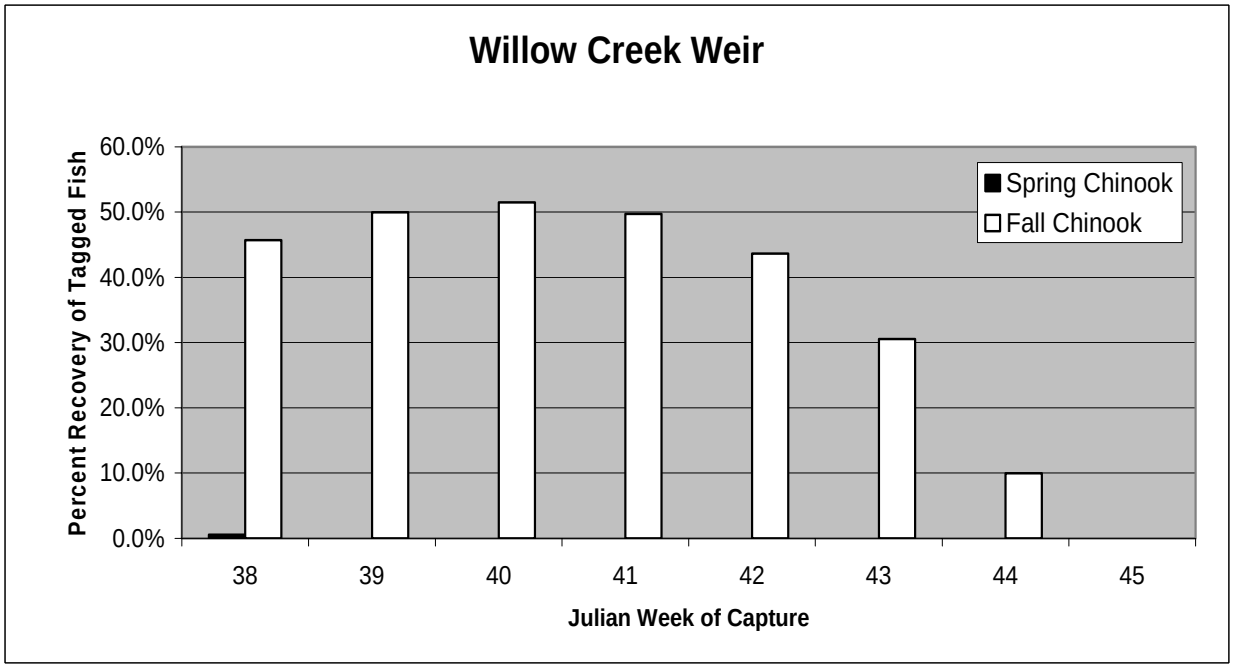


Figure 5. Percent recovery of Junction City and Willow Creek weir project marked Chinook at Trinity River Hatchery during the 2003-04 season. Chinook salmon were designated as either spring or fall-run based on recoveries of coded-wire tags or entry timing into Trinity River Hatchery. For the purposes of analysis, all Chinook salmon captured at Willow Creek Weir were considered fall-run and Chinook salmon captured prior to Julian week 35 at Junction City Weir were considered spring-run.

Table 1. Weekly summary of spring- and fall-run chinook salmon trapped in the Trinity River at Junction City Weir during the 2003-04 season. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped Grilse b/	Adults	Total	fish/night
Spring Chinook								
29	16-Jul	-	22-Jul	2		218	218	109.0
30	23-Jul	-	29-Jul	5	5	308	313	62.6
31	30-Jul	-	5-Aug	5	0	22	22	4.4
32	6-Aug	-	12-Aug	5	4	142	146	29.2
33	13-Aug	-	19-Aug	5	10	248	258	51.6
34	20-Aug	-	26-Aug	2	3	52	55	27.5
			Sub-total:	24	22	990	1,012	
			Sub-mean:					42.2
Fall Chinook c/								
38	17-Sep	-	23-Sep	3	4	95	99	33.0
39	24-Sep	-	30-Sep	5	1	86	87	17.4
40	1-Oct	-	7-Oct	5	4	126	130	26.0
			Sub-total:	13	9	307	316	
			Sub-mean:					24.3
			Grand total:	37	31	1,297	1,328	
			Combined mean:					35.9

a/ Trapping at Junction City took place from 21 July (Julian week 29) through 21 August (Julian week 34) and 19 September (Julian week 38) through 7 October (Julian week 40) of 2003.

b/ Spring-run chinook <52 cm, FL and fall-run <55 cm, FL were considered grilse.

c/ There was a temporal overlap of spring and fall-run chinook during Julian week 38. For the purpose of analysis all chinook trapped prior to Julian week 38 were considered spring run. Chinook trapped during julian week 38 through 40 were considered fall Chinook.

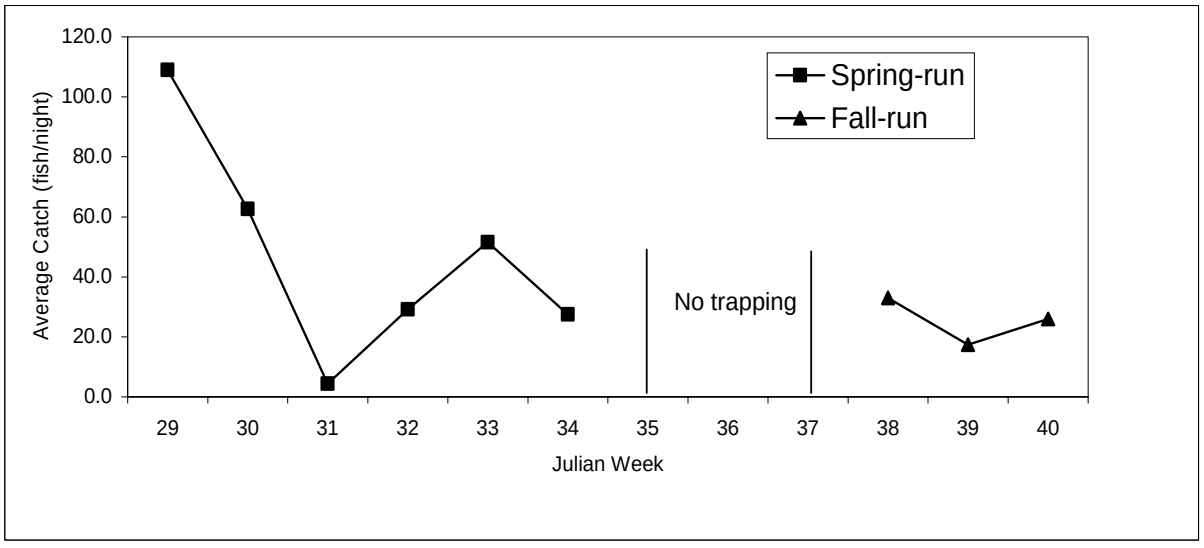


Figure 6. Average catch of spring- and fall-run chinook salmon in the Trinity River at Junction City Weir during the 2003-04 season.

Table 2. Weekly summary of fall-run chinook salmon trapped in the Trinity River at Willow Creek Weir during the 2003-04 season. For the purpose of analysis there were no spring-run chinook salmon trapped at the Willow Creek Weir. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped			fish/night
					Grilse b/	Adults	Total	
38	17-Sep	-	23-Sep	4	6	179	185	46.3
39	24-Sep	-	30-Sep	5	6	258	264	52.8
40	1-Oct	-	7-Oct	5	9	383	392	78.4
41	8-Oct	-	14-Oct	5	7	212	219	43.8
42	15-Oct	-	21-Oct	5	1	97	98	19.6
43	22-Oct	-	28-Oct	5	0	38	38	7.6
44	29-Oct	-	4-Nov	5	1	34	35	7.0
45	5-Nov	-	11-Nov	3	0	17	17	5.7
46	12-Nov		18-Nov	3	0	0	0	0.0
Total:				40	30	1,218	1,248	
Mean:								31.2

a/ Trapping at Willow Creek took place from 18 September (Julian Week 38) through 14 November (Julian Week 46) of 2003.

b/ Fall run chinook <55 cm, FL were considered grilse.

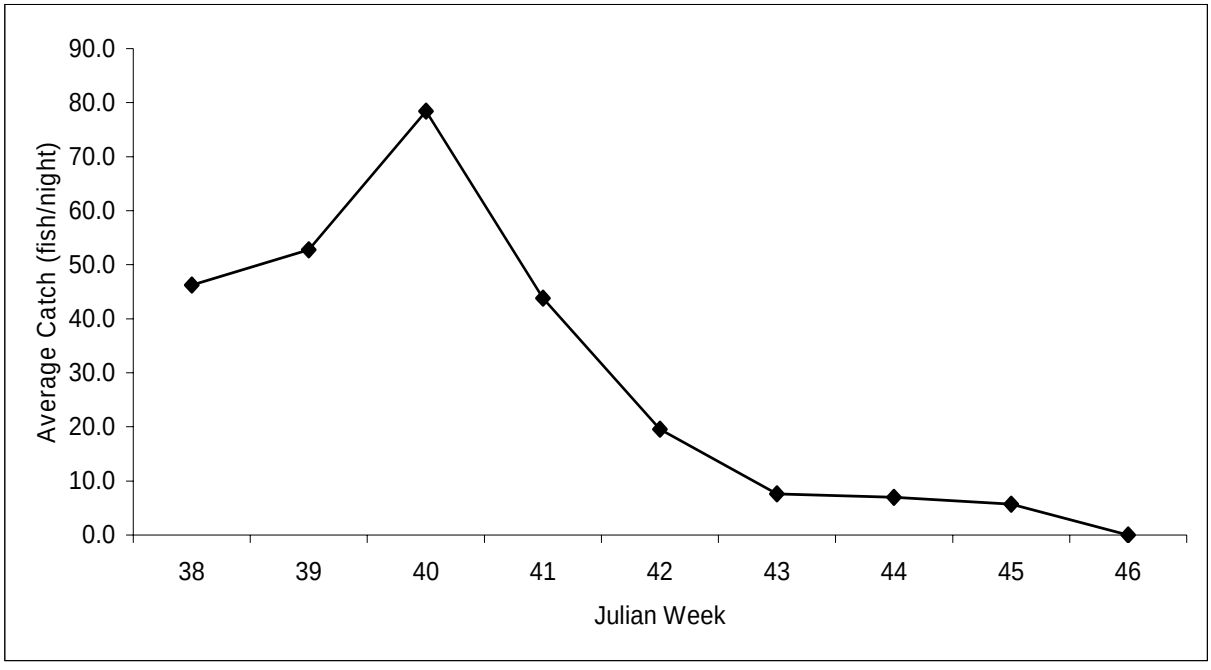


Figure 7. Average catch of fall-run chinook salmon in the Trinity River at Willow Creek Weir during the 2003-04 season.

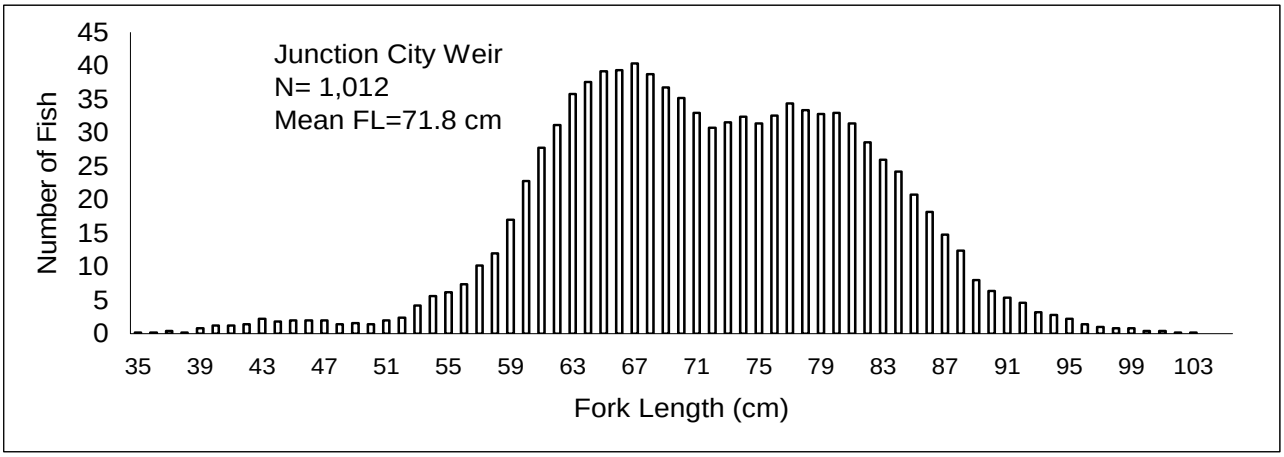
Sizes of Trapped Fish.
Spring Chinook trapped this season at JCW and TRH averaged 71.8 and 73.5 cm FL, respectively. The combined average of the two sites was 73.4 cm, FL (Figure 8). An obvious nadir between grilse and adult spring Chinook was lacking. Using data from known-age, hatchery-marked spring Chinook that entered TRH, we selected a grilse length of $\leq$ 51 cm, FL and adults >51cm, FL (Appendix 2). Applying this size to observed populations, we estimate that grilse comprised 2.2% and 0.9% of the spring Chinook observed at JCW and TRH, respectively.
Fall Chinook trapped at WCW averaged 73.6 cm, FL and 73.3 cm, FL at TRH. The fork length frequency analysis for the two sites combined indicated that the nadir separating grilse from adults was 54 cm (Figure 9). Size data of known-age, hatchery-marked fall Chinook entering TRH generally supported this size separation, however there was considerable overlap between sizes of age 2 and 3 fall Chinook (Appendix 3). Based on a maximum grilse size of 54 cm, fall Chinook grilse comprised 2.4% and 2.1% of the run observed at WCW and TRH respectively.

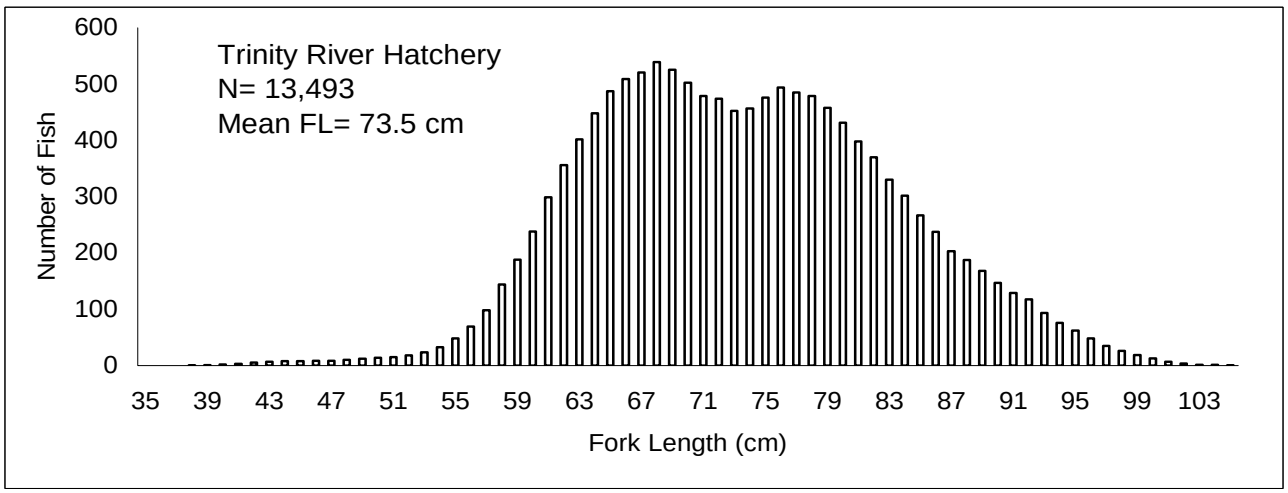
Effectively Tagged Fish. We trapped 1,012 spring Chinook at JCW, of which 988 (22 grilse and 966 adults) were effectively tagged (Appendix 4). There were 16 tagging mortalities and 8 caught-and-released spring Chinook from which anglers reported removing tags that were not considered effectively tagged. We reward-tagged 328 (32.8 %) spring Chinook (6 grilse and 322 adults). The remaining fish received non-reward tags.

We trapped 1,248 fall Chinook at WCW and 1,147 of them (28 grilse and 1,119 adults) were effectively tagged (Appendix 5). Due to poor condition we did not tag 90 fall-run Chinook, anglers removed the tags from 9, and there was one tagging mortality. We placed reward tags on 380 (10 grilse and 370 adults), or 33.1%, of the effectively tagged fall Chinook at WCW.

Incidence of Tags and Fin Clips. Two of the Chinook tagged at WCW were subsequently recaptured at JCW this year. Ad-clipped fish comprised 18.2% (184/1,012) of the spring Chinook captured at JCW (Appendix 4). Sixty seven (including 1 fall Chinook) of the 184 Ad-clipped Chinook designated as Spring Chinook and tagged at JCW were subsequently recovered at TRH (Table 3). These were predominantly from release groups with CWT codes 0625258, four-year-old spring Chinook released as yearlings in October of 1999 and 065279, three-year-old spring Chinook released as yearlings in 2000 (Table 3). Of the 316 Chinook designated as fall-run captured at JCW, 15.8% (50) were Ad-clipped. Sixteen of these fish were subsequently recaptured at TRH.

Ad-clipped fish comprised 21.2% (265/1,248) of the fall Chinook observed at WCW (Appendix 5). One hundred thirty (49.1%) of the Ad-clipped fall Chinook tagged at WCW were recovered at TRH (Table 3). Of these, the vast majority were 3 and 4-year-old fall Chinook released from TRH as yearlings in 1998 and 1999 (CWT groups 065259 and 065280).





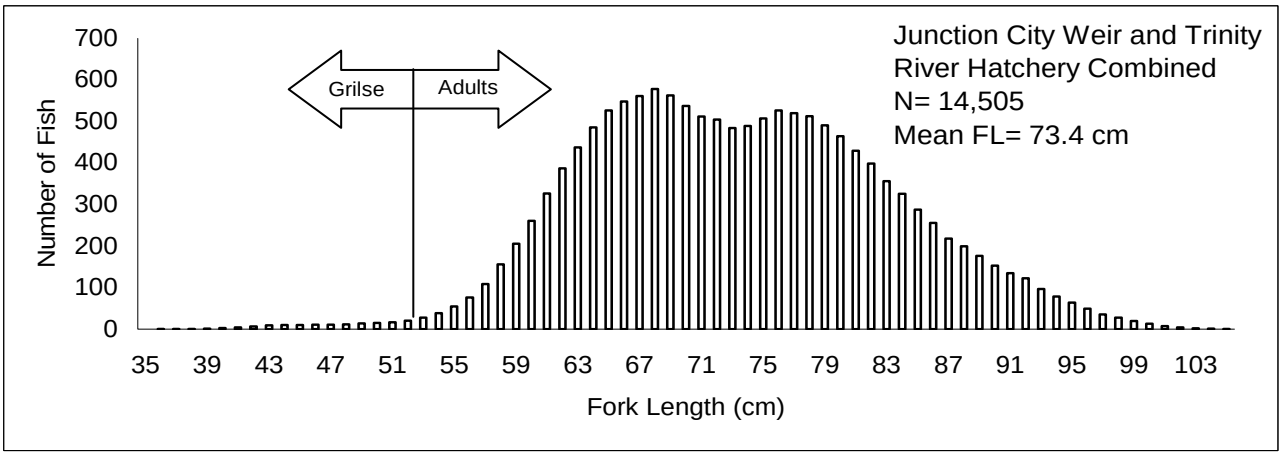
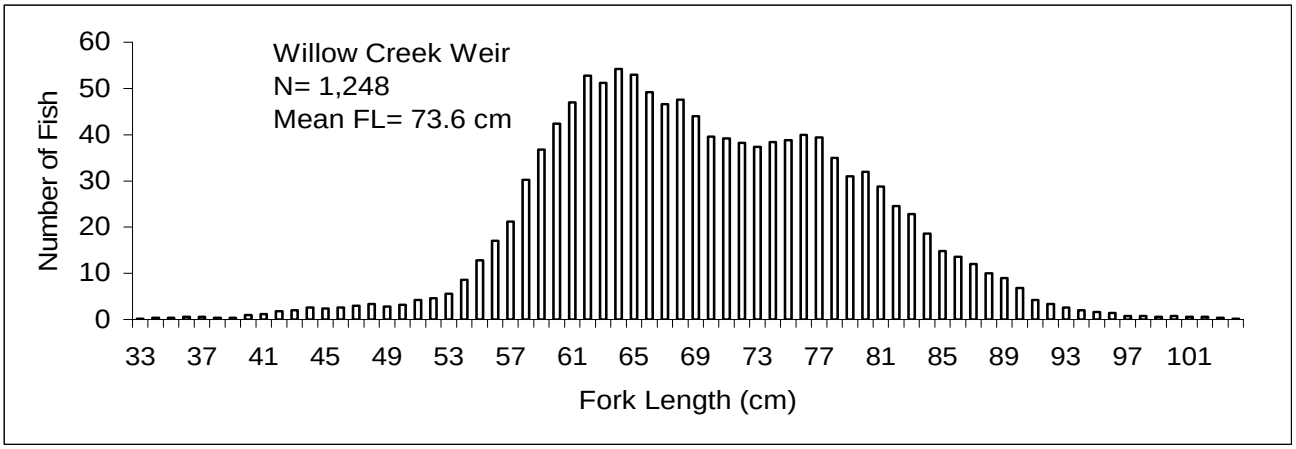
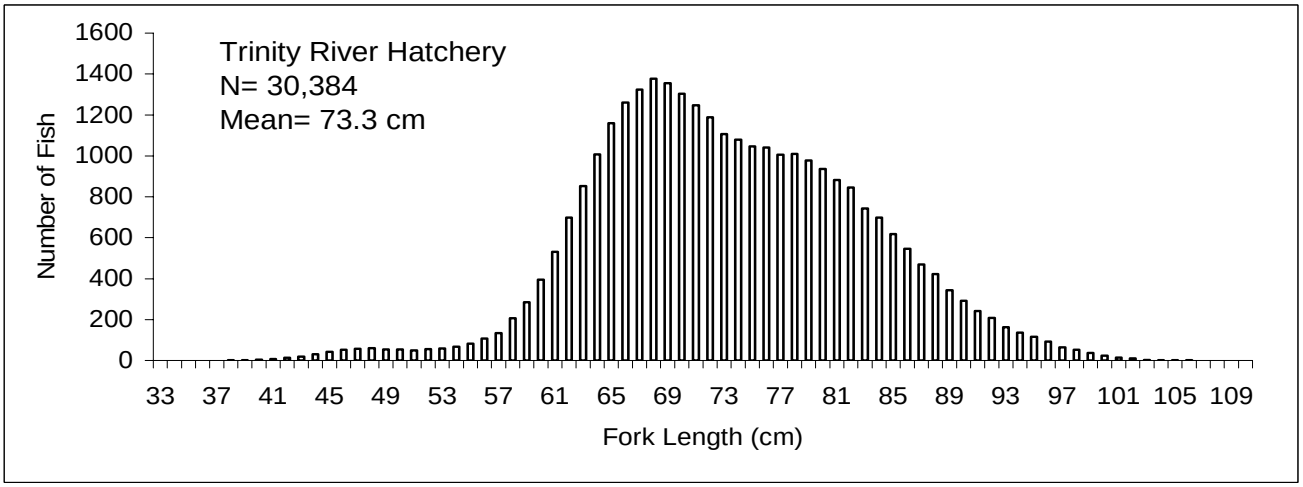


Figure 8. Spring-run Chinook salmon fork lengths (cm) observed at Junction City Weir and Trinity River Hatchery during the 2003-04 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.





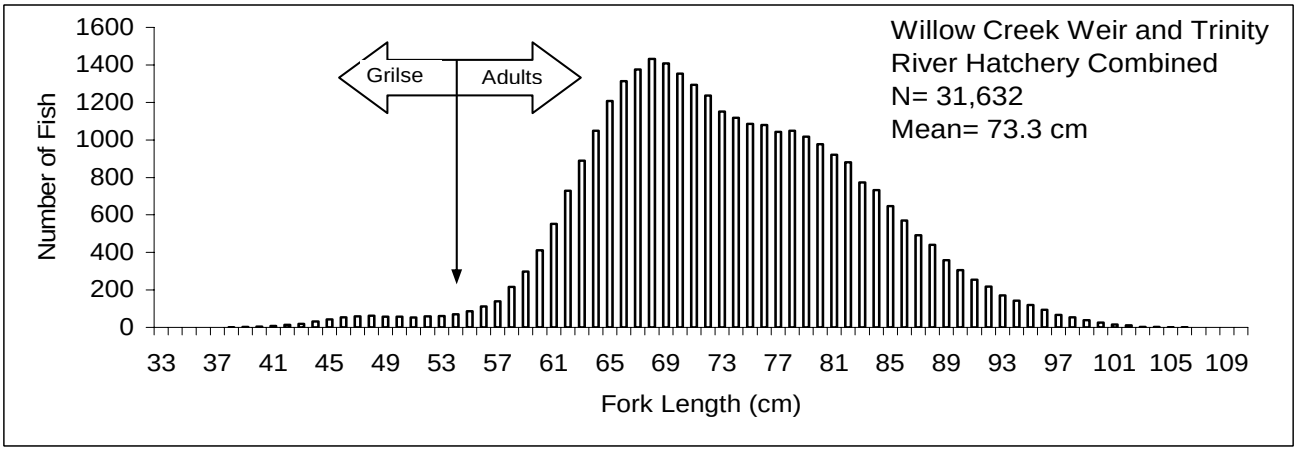


Figure 9. Fall-run Chinook salmon fork lengths (cm) observed at Willow Creek Weir and Trinity River Hatchery during the 2003-04 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Table 3. Release data and recoveries of coded-wire tagged (CWT) and maxillary-clipped salmon trapped in the Trinity River at Willow Creek and Junction City weirs, and subsequently recovered at Trinity River Hatchery during the in the 2003-04 season.

CWT and release type a/	Species	Race	Release data: Brood year	Date	Number of fish	Site c/	Numbers recovered from tagging site: b/ WCW	JCW
			Spring-run Chinnok					
065247-f	Chinook	spring	1998	06/01-07/99	54,378	TRH	0	0
065248-f	Chinook	spring	1998	06/01-07/99	61,516	TRH	0	0
065249-f	Chinook	spring	1998	06/01-07/99	61,074	TRH	0	0
065250-y	Chinook	spring	1998	10/04-13/99	137,602	TRH	0	0
065251-f	Chinook	spring	1999	06/01-07/00	49,421	TRH	0	0
065252-f	Chinook	spring	1999	06/01-07/00	51,993	TRH	0	3
065253-f	Chinook	spring	1999	06/01-07/00	46,966	TRH	0	3
065258-y	Chinook	spring	1999	10/03-06/00	129,919	TRH	0	20
065259-f	Chinook	spring	2000	06/06-13/01	52,491	TRH	0	5
065260-f	Chinook	spring	2000	06/06-13/01	33,049	TRH	0	0
065261-f	Chinook	spring	2000	06/06-13/01	32,621	TRH	0	0
065262-f	Chinook	spring	2000	06/06-13/01	24,480	TRH	0	1
065263-f	Chinook	spring	2000	06/06-13/01	34,385	TRH	0	4
065264-f	Chinook	spring	2000	06/06-13/01	31,857	TRH	0	2
065270-f	Chinook	spring	2000	06/06-13/01	52,580	TRH	0	2
065279-y	Chinook	spring	2000	10/01-10/01	99,304	TRH	0	16
065281-f	Chinook	spring	2001	06/03-10/02	89,482	TRH	0	0
065282-f	Chinook	spring	2001	06/03-10/02	89,978	TRH	0	0
065283-f	Chinook	spring	2001	06/03-10/02	73,788	TRH	0	0
065288-y	Chinook	spring	2001	10/10-16/02	104,627	TRH	0	0
shed tag d/	Chinook	spring					0	10
						Total spring-run Chinook:	0	66
			Fall-run Chinook					
062641-y	Chinook	fall	1998	10/4-13/99	334,726	TRH	0	0
065242-f	Chinook	fall	1998	06/01-07/99	46,399	TRH	0	0
065642-f	Chinook	fall	1998	10/4-13/99	16,673	TRH	0	0
065243-f	Chinook	fall	1998	06/01-07/99	42,659	TRH	0	0
065244-f	Chinook	fall	1998	06/01-07/99	49,332	TRH	0	0
065245-f	Chinook	fall	1998	06/01-07/99	46,391	TRH	0	0
065254-f	Chinook	fall	1999	06/01-07/00	44,654	TRH	0	0
065255-f	Chinook	fall	1999	06/01-07/00	42,549	TRH	0	0
065257-f	Chinook	fall	1999	06/01-07/00	50,533	TRH	0	0
065256-f	Chinook	fall	1999	06/01-07/00	43,565	TRH	1	0
065259-y	Chinook	fall	1999	10/03-06/00	296,892	TRH	47	5
065265-f	Chinook	fall	2000	06/06-13/01	32,795	TRH	4	2
065266-f	Chinook	fall	2000	06/06-13/01	33,806	TRH	1	0
065267-f	Chinook	fall	2000	06/06-13/01	34,852	TRH	3	1
065268-f	Chinook	fall	2000	06/06-13/01	33,240	TRH	2	0
065271-f	Chinook	fall	2000	06/06-13/01	54,867	TRH	7	1
065272-f	Chinook	fall	2000	06/06-13/01	36,035	TRH	4	1
065273-f	Chinook	fall	2000	06/06-13/01	57,444	TRH	7	1
065274-f	Chinook	fall	2000	06/06-13/01	32,096	TRH	3	0
065275-f	Chinook	fall	2000	06/06-13/01	64,250	TRH	3	0
065276-f	Chinook	fall	2000	06/06-13/01	27,159	TRH	2	0
065277-f	Chinook	fall	2000	06/06-13/01	56,582	TRH	2	0
065278-f	Chinook	fall	2000	06/06-13/01	34,183	TRH	2	0
065280-y	Chinook	fall	2000	10/01-10/01	216,593	TRH	38	6
065643-f	Chinook	fall	2000	06/06-13/01	25,007	TRH	1	0
065284-f	Chinook	fall	2001	06/03-10/02	119,555	TRH	1	0
065285-f	Chinook	fall	2001	06/03-10/02	114,119	TRH	0	0
065286-f	Chinook	fall	2001	06/03-10/02	126,135	TRH	1	0
065287-f	Chinook	fall	2001	06/03-10/02	121,607	TRH	0	0
065290-f	Chinook	fall	2001	06/03-10/02	10,234	TRH	0	0
065291-f	Chinook	fall	2001	06/03-10/02	8,269	TRH	0	0
065289-y	Chinook	fall	2001	10/10-16/02	230,055	TRH	0	0
shed tag d/	Chinook	fall					8	0
						Total fall-run Chinook:	137	17
			Coho salmon					
RM e/	coho		2000	03/15-22/02	530,285	TRH	79	
RM e/	coho		2001	03/17-19/03	416,201	TRH	12	
						Total coho:	91	0

a/ CWT=coded-wire tag.
b/ Tagging site: WCW=Willow Creek Weir; JCW=Junction City Weir.
c/ Release site: TRH=Trinity River Hatchery
d/ Fish with shed CWTs were designated as spring- or fall-race based on the date they were trapped at the weirs.
e/ Since 1996, all coho produced at TRH have received a right maxillary clip (RM). Coho less than 54 cm,FL were classified as brood year 2001 and coho greater than 53 cm, FL were classified as brood year 2000. Age cutoff based on fork length distribution.

Incidence of Gill-net Wounds, Hook Scars, and Predator Wounds. One hundred eighty-three (10.5%) of the 1,743 spring Chinook trapped at JCW had gill-net wounds. The average size of gill-net-wounded vs. spring Chinook without gill net wounds was 69.2 and 72.5 cm FL, respectively. Three fresh hooking scars, eight predator scars, and 21 wounds of unknown origin were observed on spring Chinook at JCW.

For fall Chinook, 6.1% (76/1,248) of the fish trapped at WCW were gill-net-wounded. The average size of gill-net-wounded fish was 74.9 cm, FL and non-gill-net-wounded fall Chinook averaged 73.5 cm, FL. Hooking scars, 27 ocean and 98 fresh, were observed on fall Chinook at WCW. Predator wounds were observed on 151 of the fall Chinook and 48 fish had wounds of unknown origin.

Coho Salmon

Run timing. We trapped the first coho at WCW on 18 September, 2003 (JW 38). Coho trapping peaked during JW 41 when average catch was 14.4 fish/night (Table 4, Figure 10). We trapped 250 coho salmon (43 grilse and 207 adults) at WCW this season.

Size of Fish Trapped. Coho trapped at WCW ranged from 38 to 83 cm FL and averaged 60.8 cm FL (Figure 11, Appendix 6). The size separating grilse and adult coho was based on the combined length data from coho trapped at WCW and that entered TRH (Figure 11). This year all coho $\leq$ 53 cm FL were considered grilse, while larger coho were adults. Grilse coho comprised 17.2% and 12.3 % of the coho trapped at WCW and TRH respectively.

Effectively Tagged Fish. Of the 250 coho salmon trapped at WCW, 234 were effectively tagged (Appendix 6). To discourage anglers from harvesting coho, all coho received non-reward tags.

Incidence of Tags and Fin Clips. Eighty six percent (215/250) of the coho salmon we trapped at WCW (38 grilse and 196 adults) bore right maxillary (RM) clips (Appendix 6). Ninety one of the project tagged, RM-clipped coho, were recovered at TRH (Table 3).

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. Eight coho observed at WCW were gill-net-wounded, five had fresh hook wounds, eleven had wounds of unknown origin, and 30 (12%) were observed to have predator scarring.

Fall Steelhead

Run Timing. We trapped steelhead every week of trapping at WCW (Table 5, Figure 12). Peak trapping of steelhead occurred early to mid October. The highest catch was observed during Julian week 41 when an average of 62.4 steelhead/night were trapped. We trapped a total of 752 adult steelhead at WCW during the 2003 season. At JCW, steelhead numbers were low during the early part of the season but increased substantially after the fall "fishery" flows were released. Once the JCW was re-installed during Julian week 38, steelhead were trapped in increasing numbers each week, peaking the last week of trapping at 20.6 fish/night (Table 6, Figure 13).

Table 4. Weekly summary of coho salmon trapped in the Trinity River at Willow Creek Weir during the 2003-04 season. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped			fish/night
					Grilse b/	Adults	Total	
38	17-Sep	-	23-Sep	4		5	5	1.3
39	24-Sep	-	30-Sep	5	7	15	22	4.4
40	1-Oct	-	7-Oct	5	13	33	46	9.2
41	8-Oct	-	14-Oct	5	15	57	72	14.4
42	15-Oct	-	21-Oct	5	3	51	54	10.8
43	22-Oct	-	28-Oct	5	2	17	19	3.8
44	29-Oct	-	4-Nov	5	2	17	19	3.8
45	5-Nov	-	11-Nov	3	0	3	3	1.0
46	12-Nov	-	18-Nov	3	1	9	10	3.3
Total				40	43	207	250	
Mean:								6.3

a/ Trapping at Willow Creek took place from 18 September (Julian Week 38) through 14 November (Julian Week 46) of 2003.
b/ Coho salmon <=53 cm, FL were considered grilse.

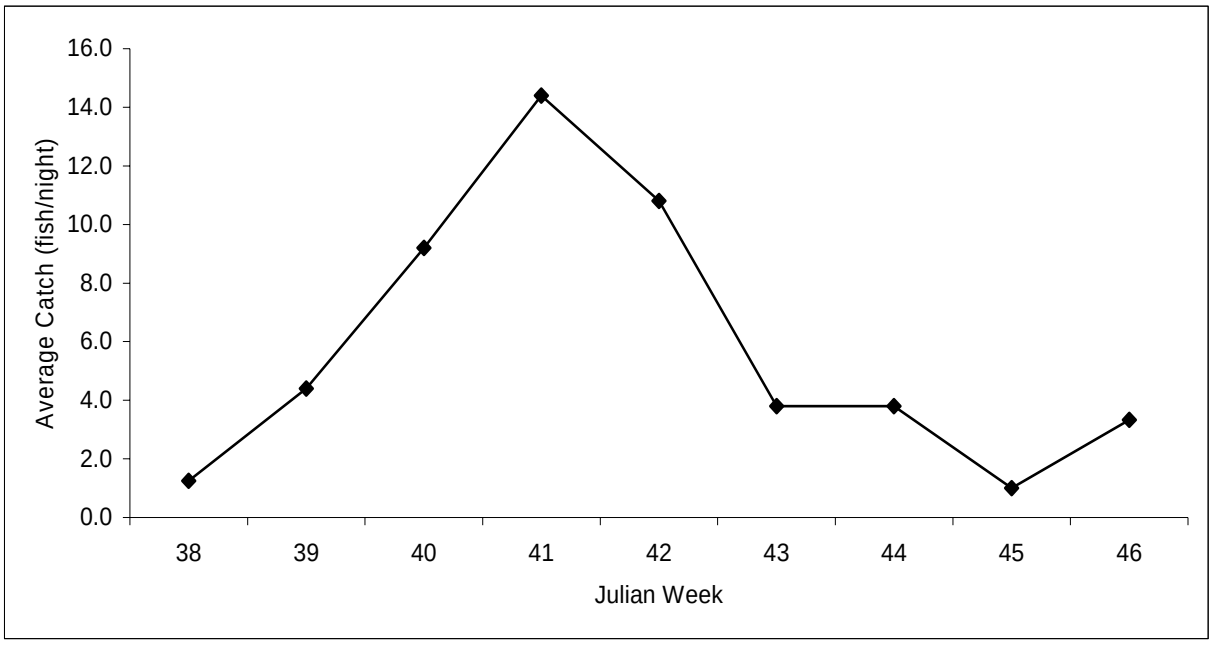
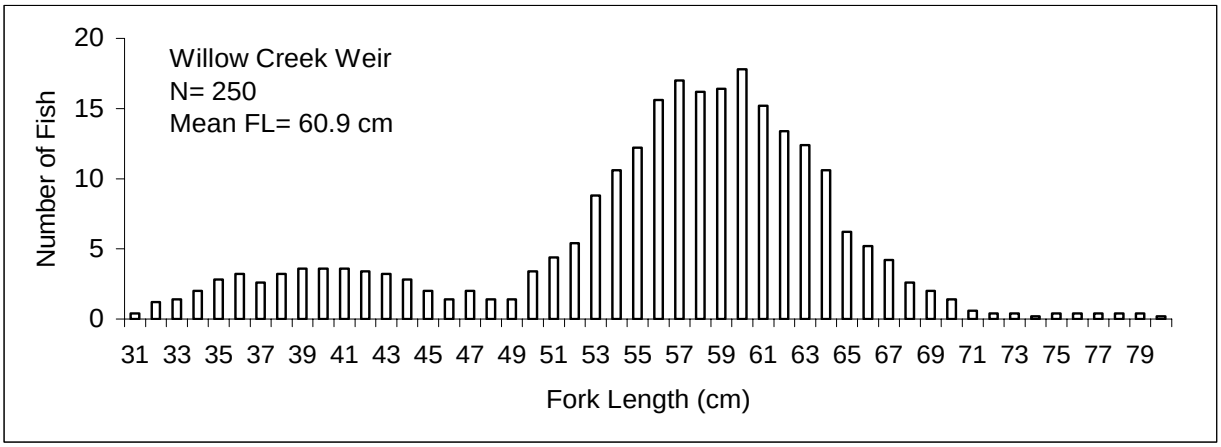
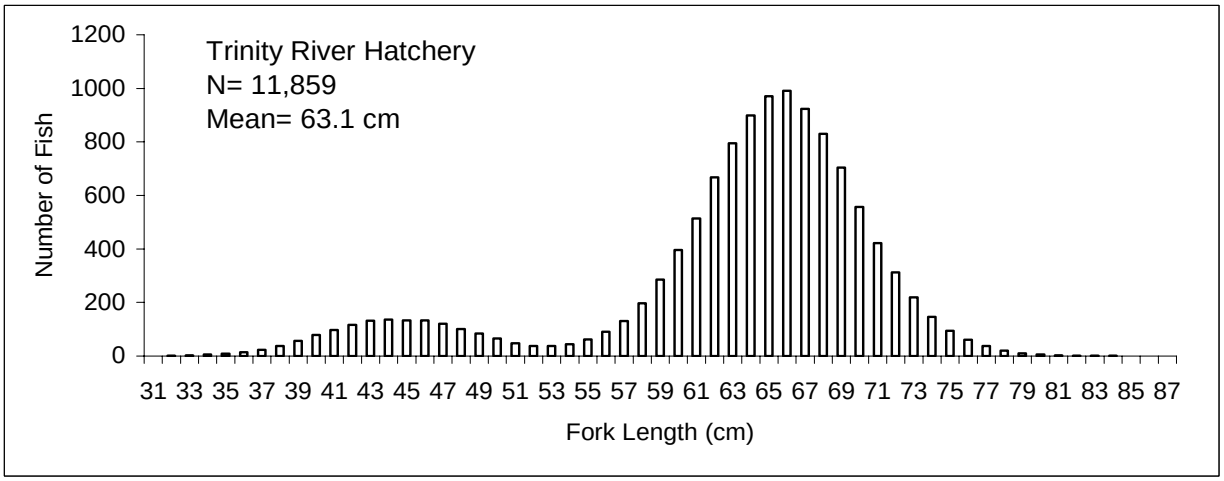


Figure 10. Average catch of coho salmon in the Trinity River at Willow Creek Weir during the 2003-04 season.





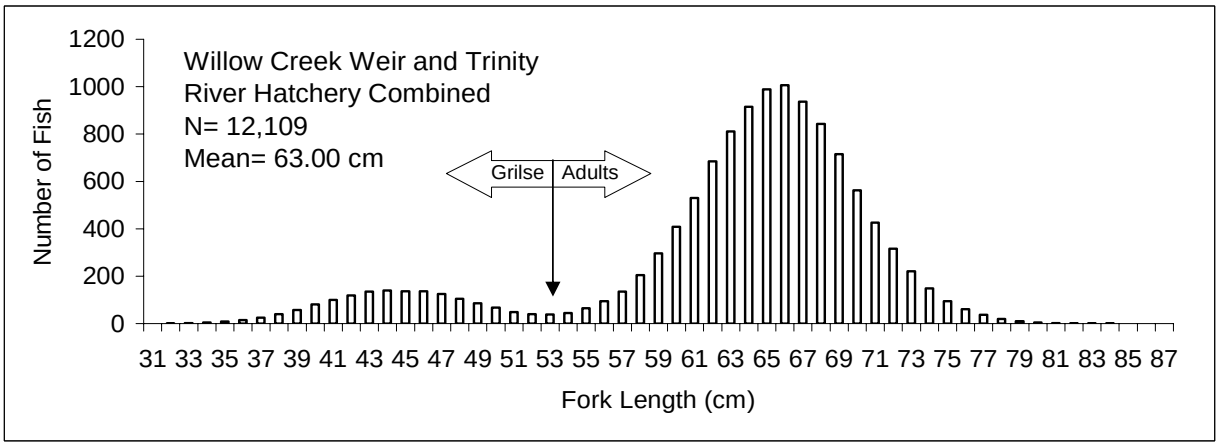


Figure 11. Coho salmon fork lengths (FL) observed at the Willow Creek Weir and Trinity River Hatchery during the 2003-2004 season. The number of fish at each FL is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Table 5. Weekly summary of steelhead trapped in the Trinity River at Willow Creek Weir during the 2003-04 season. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped 1/2 lbers b/	Adults	Total	fish/night
38	17-Sep	-	23-Sep	4		15	15	3.8
39	24-Sep	-	30-Sep	5		59	59	11.8
40	1-Oct	-	7-Oct	5		196	196	39.2
41	8-Oct	-	14-Oct	5		312	312	62.4
42	15-Oct	-	21-Oct	5		119	119	23.8
43	22-Oct	-	28-Oct	5		30	30	6.0
44	29-Oct	-	4-Nov	5		5	5	1.0
45	5-Nov	-	11-Nov	3		10	10	3.3
46	12-Nov	-	18-Nov	3		6	6	2.0
Total				40	0	752	752	
Mean:								18.8

a/ Trapping at Willow Creek took place from 18 September (Julian Week 38) through 14 November (Julian Week 46) of 2003.
b/ Steelhead < 42 cm, FL were considered 1/2 half-pounders.

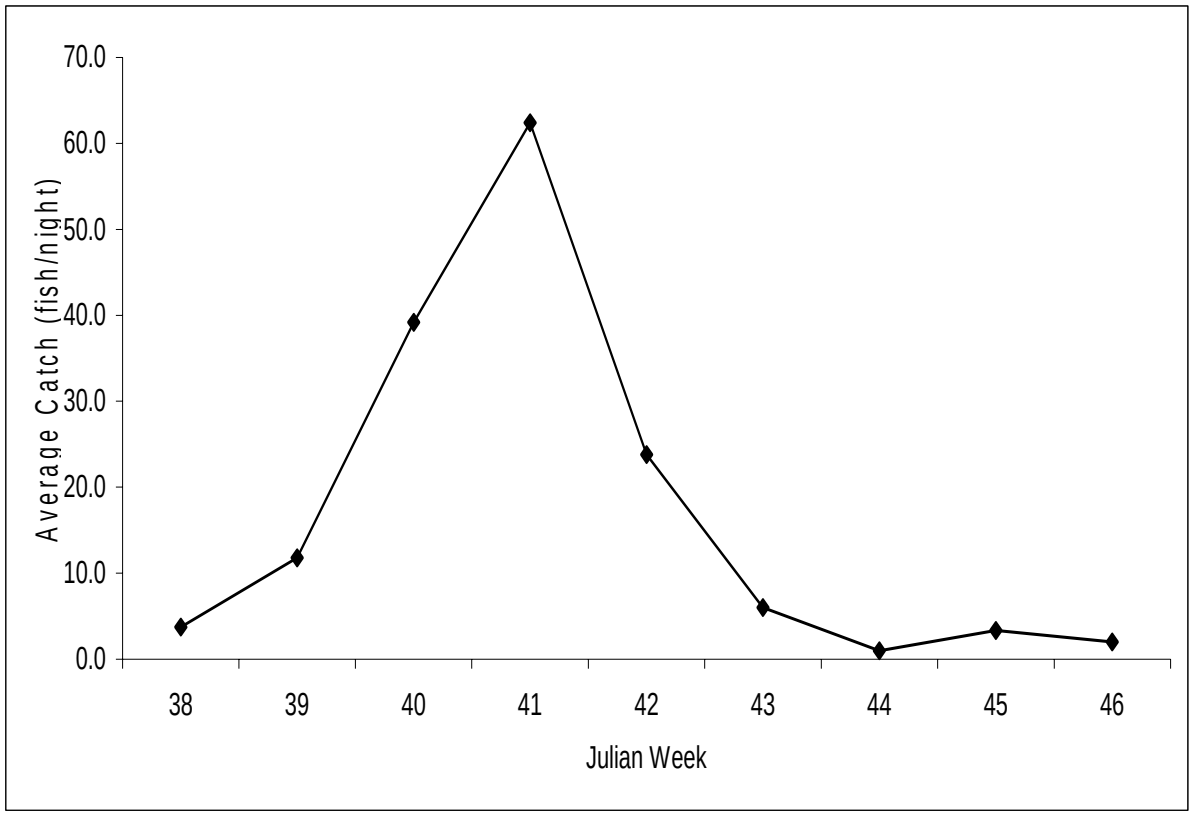


Figure 12. Average catch of steelhead in the Trinity River at Willow Creek Weir during the 2003-04 season.

Table 6. Weekly summary of steelhead trapped in the Trinity River at Junction City Weir during the 2003-04 season. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped 1/2 lbers b/	Adults	Total	fish/night
29	16-Jul	-	22-Jul	2		5	5	2.5
30	23-Jul	-	29-Jul	5		10	10	2.0
31	30-Jul	-	5-Aug	5		5	5	1.0
32	6-Aug	-	12-Aug	5		1	1	0.2
33	13-Aug	-	19-Aug	5		5	5	1.0
34	20-Aug	-	26-Aug	2		0	0	0.0
35	27-Aug	-	2-Sep	high flows				
36	3-Sep	-	9-Sep	no				
37	10-Sep	-	16-Sep	trapping				
38	17-Sep	-	23-Sep	3	1	17	18	6.0
39	24-Sep	-	30-Sep	5	1	63	64	12.8
40	1-Oct	-	7-Oct	5	1	102	103	20.6
Total				37	3	208	211	
Mean:								5.7

a/ Trapping at Junction City took place from 21 July (Julian week 29) through 21 August (Julian week 34) and 19 September (Julian week 38) through 7 October (Julian week 40) of 2003.

b/ Steelhead <42 cm, FL were considered 1/2 half-pounders.

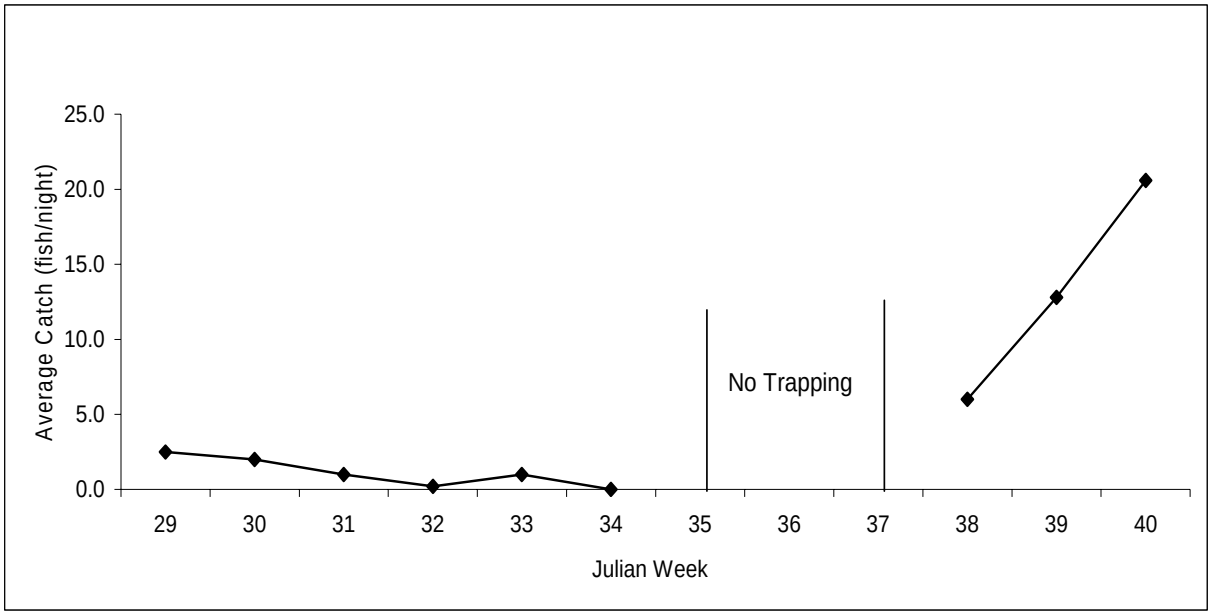


Figure 13. Average catch of steelhead in the Trinity River at Junction City Weir during the 2003-04 season.

Size of Fish Trapped. Steelhead caught at, JCW, WCW, and TRH averaged 58.7, 62.0 and 61.7 cm FL, respectively (Figure 14). Adult steelhead (> 41 cm, FL) made up 98.6%, 100.0% and 99.9% of the steelhead trapped at JCW, WCW and TRH respectively.

Effectively Tagged Fish. We trapped 752 adult steelhead at WCW and 684 of those were effectively tagged (Appendix 7). We detected no tagging mortalities, 23 fish were not tagged, and anglers reported removing tags from 45. Three hundred thirty-eight of the effectively tagged adults were reward-tagged, the remainder received non-reward tags. Steelhead were not tagged at JCW.

Incidence of Tags and Fin Clips. We observed Ad-clips on 615 (81.8 %) of the steelhead at WCW, 187 (88.6 %) at JCW, and 10,193 (99.6%) at TRH. (Appendix 8). Additionally, nine steelhead at WCW had various other clips. The mean FL of adipose-fin-clipped versus un-marked steelhead was less than 1 cm for all three sites. All steelhead released from TRH have been Ad-clipped prior to release since brood year 1997.

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. At WCW, 5 of the steelhead trapped had gill net wounds, 8 had fresh hook wounds, 16 had unknown wounds, and 94 had predator wounds. At JCW, one steelhead had a gill-net wound, one had a wound of unknown origin and one had a predator wound.

Brown trout

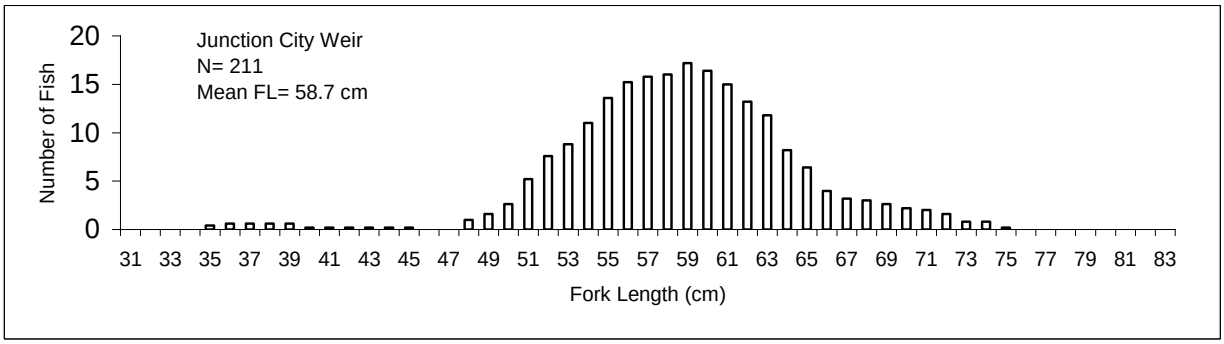
Capture timing. Brown trout were captured every week of trapping at JCW during the 2003 season (Table 7, Figure 15). The peak week of brown trout capture was JW 31 (July 30 – Aug. 5), when an average of 10.2 brown trout were captured per night.

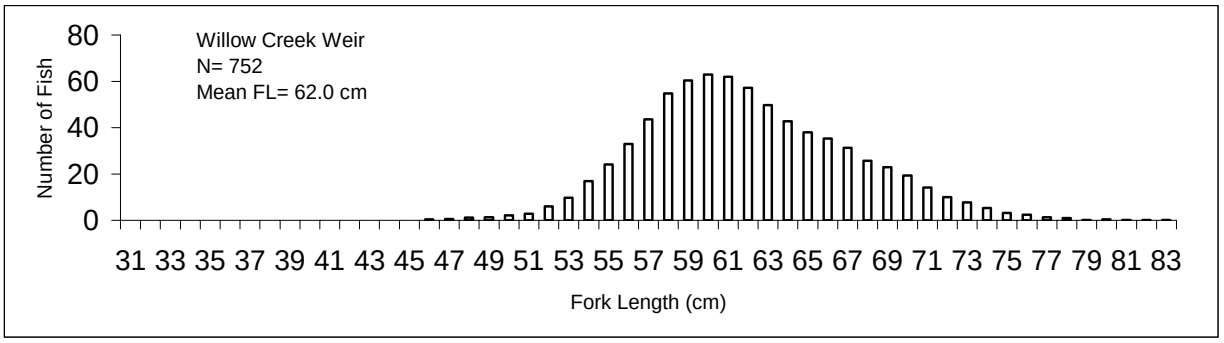
Size of Fish Trapped. Brown trout captured this season ranged in size from 34 to 62 cm, FL and averaged 44.4 cm (Table 8, Figure 16). Average size by week of capture was variable. Length frequency analysis suggests that several year classes of brown trout were trapped at JCW in 2003. The absence of brown trout less than 34 cm FL suggests that fish this size are not vulnerable to capture using our standard weir configuration.

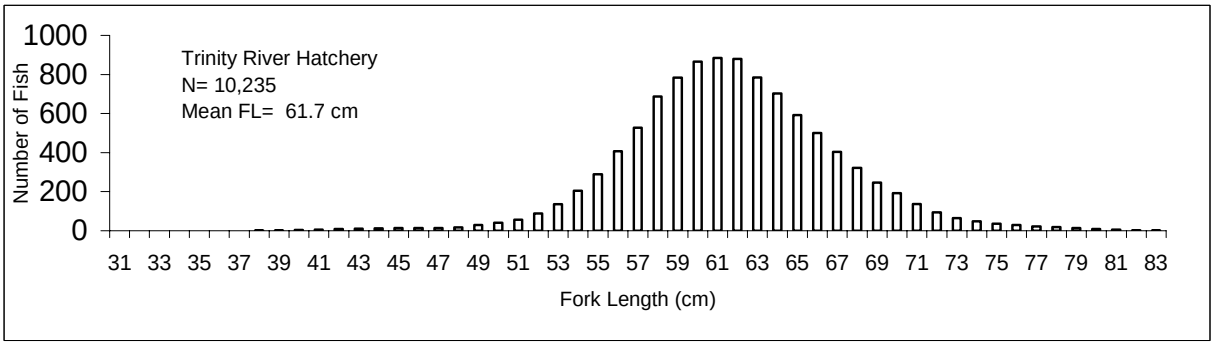
Effectively Tagged Fish. We trapped 112 brown trout greater than 41 cm, FL, of which 110 were effectively tagged. Two brown trout were reported as caught and released by anglers.

Recovery of Tagged Fish

Total Recoveries. Fish tagged at JCW and WCW were recovered from four different sources; at TRH, upper Trinity River spawner surveys, angler returns, and tagging mortalities found on or near the tagging weirs. Length frequencies of spring and fall Chinook, coho, and steelhead tagged at the weirs and subsequently recovered are presented in Appendices 9-12.







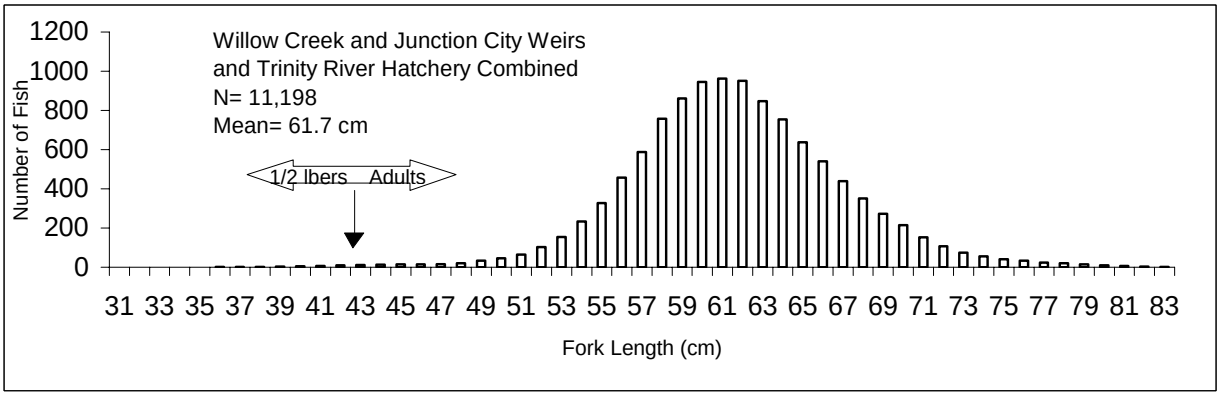


Figure 14. Fall-run steelhead fork lengths observed at Junction City and Willow Creek weirs, and Trinity River Hatchery during the 2003-04 season. The number of fish at each fork length is shown as a moving average of 5, 1-cm increments. The arrow denotes the size we used to separate half-pounders and adults for analysis.

Table 7. Weekly summary of brown trout trapped in the Trinity River at Junction City Weir during the 2003-04 season. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped	
					Total	fish/night
29	16-Jul	-	22-Jul	2	6	3.0
30	23-Jul	-	29-Jul	5	39	7.8
31	30-Jul	-	5-Aug	5	51	10.2
32	6-Aug	-	12-Aug	5	22	4.4
33	13-Aug	-	19-Aug	5	1	0.2
34	20-Aug	-	26-Aug	2	3	1.5
35	27-Aug	-	2-Sep	high flows		
36	3-Sep	-	9-Sep	no		
37	10-Sep	-	16-Sep	trapping		
38	17-Sep	-	23-Sep	3	10	3.3
39	24-Sep	-	30-Sep	5	27	5.4
40	1-Oct	-	7-Oct	5	11	2.2
Total				37	170	4.6
Mean:						

a/ Trapping at Junction City took place from 21 July (Julian week 29) through 21 August (Julian week 34) and 19 September (Julian week 38) through 7 October (Julian week 40) of 2003.

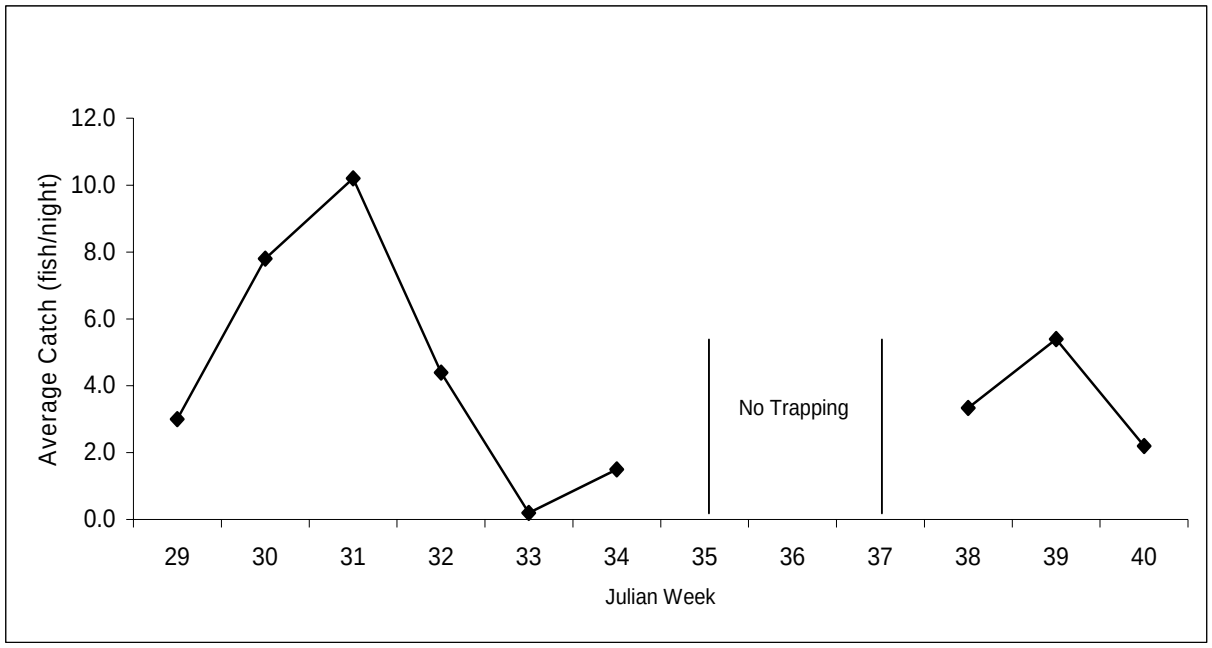


Figure 15. Average catch of brown trout in the Trinity River at Junction City Weir during the 2003-04 season.

Table 8. Summary of fork length by Julian week for brown trout captured at Junction City weir, 2003-04 season.

	Julian week of capture									
	29	30	31	32	33	34	38	39	40	
Fork length	Number of trapping days									
(cm)	2	5	5	5	5	2	3	5	5	Totals
34		1	1							2
35		1	2				1			4
36		0	1				0			1
37		1	2	1		1	0	1		6
38		1	3	0		0	0	2		6
39		1	2	0		0	0	1		4
40		0	8	1		0	0	3	1	13
41	1	7	5	3		0	0	5	1	22
42	0	0	4	0		0	2	2	0	8
43	0	4	7	3		0	1	2	2	19
44	0	0	1	2		0	0	0	1	4
45	1	9	4	4		1	1	2	0	22
46	0	1	3	2		0	0	2	1	9
47	0	2	0	1		0	0	1	0	4
48	1	4	2	1	1	0	0	1	0	10
49	1	2	0	2		1	1	0	3	10
50	0	0	1	0			2	0	0	3
51	0	1	1	1			0	2	0	5
52	0	1	2	0			0	1	0	4
53	1	2	0	0			0	1	2	6
54	1	1	0	0			1	0		3
55			0	1			1	0		2
56			1					0		1
57			0					0		0
58			0					0		0
59			0					0		0
60			0					0		0
61			1					0		1
62								1		1
Totals:	6	39	51	22	1	3	10	27	11	170
Mean FL:	48.3	44.6	42.7	44.9	48.0	43.7	46.5	44.2	46.4	44.4

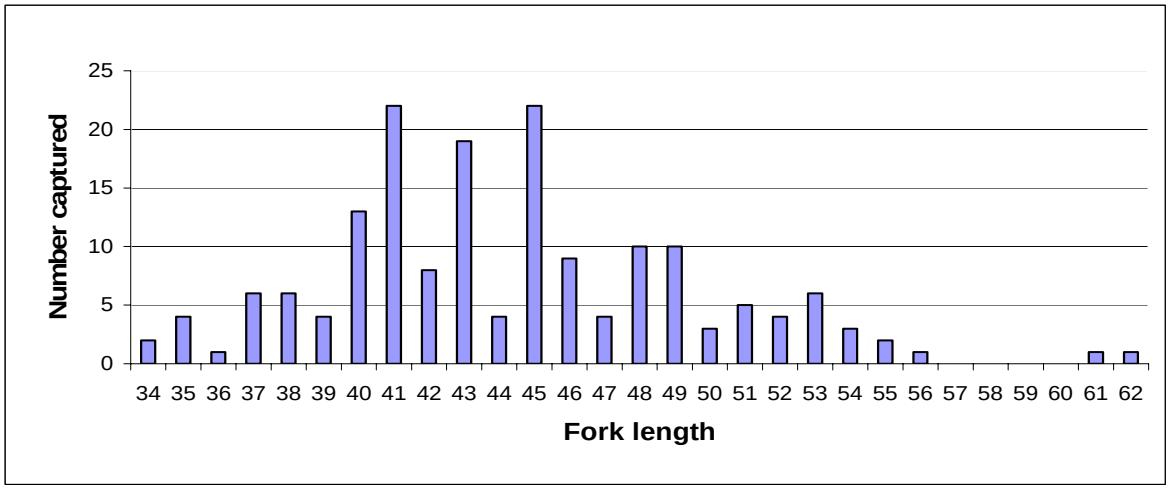


Figure 16. Fork length distribution of brown trout captured at Junction City weir during the 2003-04 season.

Forty-two percent of the effectively tagged spring Chinook at JCW and 56% of the fall Chinook at WCW were recovered. Forty six percent of the effectively tagged coho, and 49% of the effectively tagged steelhead from WCW were recovered. The highest number of recoveries for all species occurred at TRH.

Tag Returns by Anglers

Angler Harvest Regulations. Department of Fish and Game fishing regulations can affect the return of tags each year by limiting harvest. Special quota restrictions were in place during the season, but they did not effect harvest because the quotas were not met (Appendix 13). The adult fall Chinook salmon sport quota for the Trinity River during the 2003-04 season was 3,564 fish, split equally between the lower River (Weitchpec to Cedar Flat) and the upper River (Cedar Flat to Lewiston). Additionally, anglers were allowed to retain adipose-fin-clipped steelhead only. The take of coho was prohibited.

Spring Chinook. Anglers returned 14 reward and 16 non-reward tags from harvested adult spring Chinook tagged at JCW. No tags from grilse were returned this season (Appendix 9). We estimated harvest rate, based on the return of reward tags, at 0.0% for grilse and 4.3% for adults. Anglers reported releasing three reward-tagged adult and five non-reward-tagged adults, a rate of 0.9% using reward tags. No grilse were reported as caught and released.

Fall Chinook. Anglers returned tags from 1 grilse (1 reward tag) and 26 (11 reward, 15 non-reward) adult harvested fall Chinook salmon tagged at WCW (appendix 10). Based on the return of reward tags, the estimated harvest rate upstream of WCW was 3.0% for adults and 10.0% for grilse fall Chinook. Anglers returned an additional 9 (4 reward, 5 non-reward) tags from adult Chinook that were caught and released (Appendix 10). Using reward tagged fish; we estimated that the catch-and-release rate upstream of WCW was 1.2% for adults. No tags from caught and released grilse Chinook were returned.

Coho Salmon. To discourage the harvest of threatened coho salmon, we tagged coho at WCW with non-reward tags only. No tags were returned from angler caught coho and 2 tags were returned from caught and released adult coho, a rate of 1.0% (Appendix 11).

Fall Steelhead. Anglers returned 12 tags from steelhead tagged at WCW (Appendix 12). Based on the reward tags returned, we estimated that anglers harvested 1.8% of the steelhead migrating upstream of WCW. Anglers returned 45 tags from steelhead reported as caught and released (Appendix 12). Based on the return of reward tags, we estimated that anglers caught and released 7.2% of the steelhead migrating upstream of the WCW.

Spawner Surveys

Spring Chinook. A total of 73 adult and 2 grilse spring Chinook tagged at JCW were subsequently recovered during spawner carcass surveys (Appendix 9). Chinook found during spawner surveys were approximately the same size as Chinook tagged at JCW.

Fall Chinook. Zero grilse and 69 adults from WCW were recovered during the spawner survey (Appendix 10). The mean fork length of these fish was 73.1 cm while fall Chinook salmon tagged at WCW averaged about the same length, 73.6 cm FL.

Coho. No grilse and seven adult coho salmon tagged at WCW were subsequently recovered during the spawner surveys this year (appendix 11). Coho averaged 64.4 cm, FL in spawner surveys versus 60.9 for all coho observed at WCW. Since coho spawn later in the year (December through February), it is likely that the time frame of the spawner surveys (October through December) inhibited full recovery of coho salmon.

Steelhead. No steelhead were recovered during spawner surveys this season (Appendix12).

Trinity River Hatchery

Operation Dates. The fish ladder and trapping facilities at TRH operated from September 8th, 2003 (JW 37) through March 15th, 2004 (JW 11). The ladder and trap were closed for a two week period from 10 October through 26 October (JW's 41 – 43). The closure was implemented to allow for separation of the spring and fall runs of Chinook. The ladder is also occasionally closed at the discretion of the hatchery manager for fish health concerns or labor constraints.

Spring Chinook. Based on CWT recoveries, spring Chinook began entering TRH during JW 36 (3-9 Sept 2003) and continued through JW 46 (Figure 17, Table 9). Based upon CWT expansion, we estimated that 14,188 spring Chinook entered TRH (Figure 17). For the purpose of analysis, the 14,642 Chinook which entered TRH prior to Julian week 43 were considered spring Chinook.

We recaptured 30.8% (304/988) of effectively tagged spring Chinook from JCW at TRH (Table 10). The mean FL for effectively tagged JCW Chinook was 71.9 cm, slightly larger than tagged spring Chinook recovered at TRH, which averaged 70.7 cm (Appendix 4).

We recovered 3,459 Ad-clipped spring Chinook at TRH, from which we recovered 3,320 CWTs (Table 9). The age structure of TRH spring Chinook was dominated by a mix of age three and four year old returns (See Task 2 of this report).

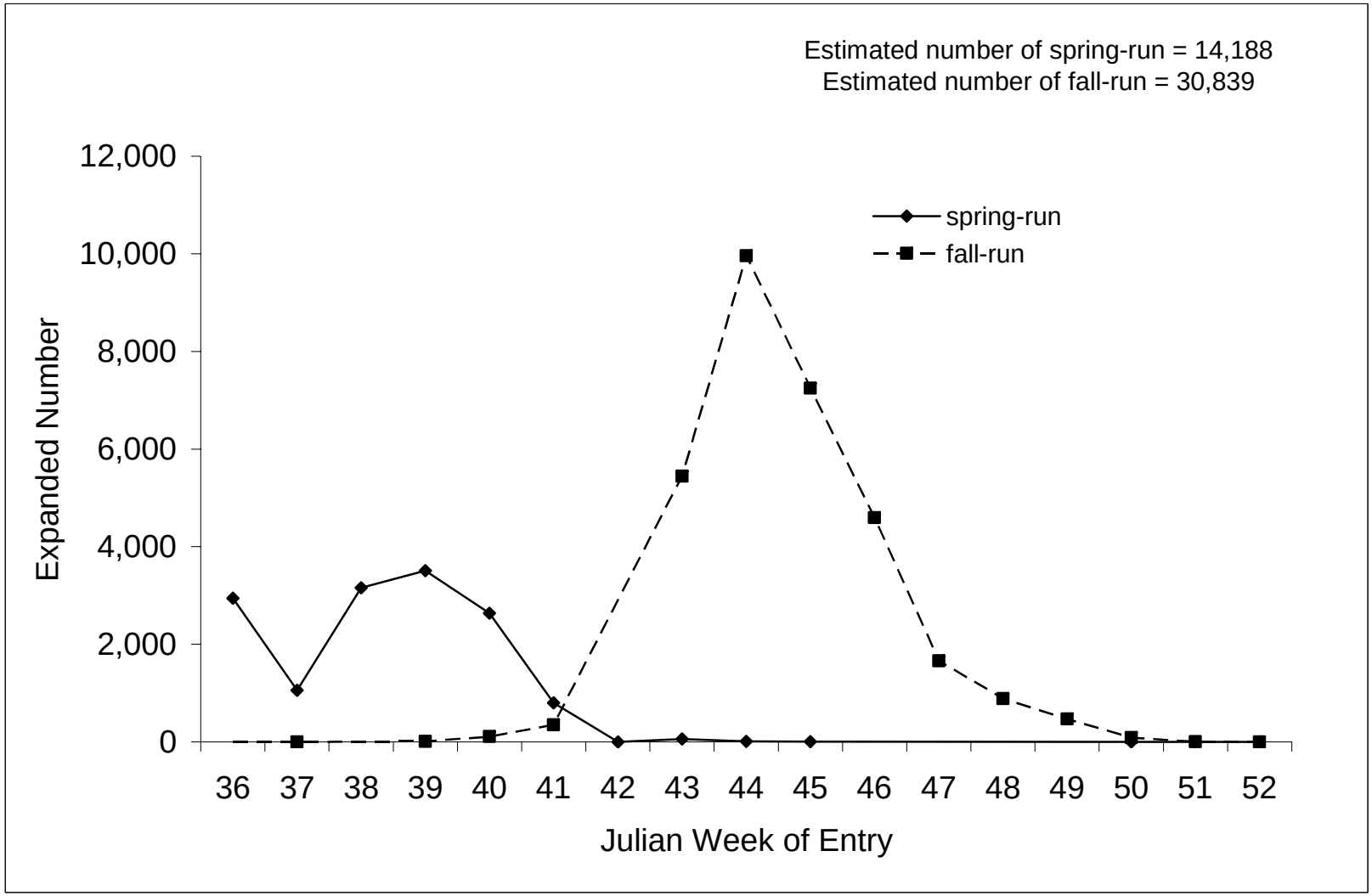


Figure 17. Estimated numbers of spring- and fall-run Chinook salmon that entered Trinity River Hatchery during the 2003-04 season, based on expansion of coded-wire tagged fish.

Table 9. Recoveries at Trinity River Hatchery of coded-wire tagged, spring-run Chinook salmon during the 2003-04 season. a/

Coded-wire tag number and release type c/	Brood year	Julian week of entry b/ 36	37	38	39	40	41	42 d/	43	44	45	46	Totals
065247-f	1998												0
065248-f	1998												0
065249-f	1998												0
065250-y	1998	1	0	0	3	1	1						6
065251-f	1999	25	16	47	31	16	2						137
065252-f	1999	14	10	22	27	12	2						87
065253-f	1999	7	3	11	31	27	9						88
065258-y	1999	258	80	216	301	208	43	0	4	1			1,111
065260-f	2000	41	18	57	39	21	3						179
065261-f	2000	52	8	57	35	28	6						186
065262-f	2000	46	13	33	28	10	3						133
065263-f	2000	48	18	54	52	36	9	0	0	0	0	1	218
065264-f	2000	13	5	17	31	53	27	0	5	1			152
065269-f	2000	75	31	82	74	58	8						328
065270-f	2000	21	4	34	46	76	39	0	3				223
065279-y	2000	113	39	88	94	87	20	0	1	0	1		443
065281-f	2001			1	1								2
065282-f	2001	2	0	0	4	1	1						8
065283-f	2001					1	1						2
065288-y	2001	1	0	0	7	3	6						17
No CWT e/		34	8	29	42	22	4						139
Weekly totals:		751	253	748	846	660	184	0	13	2	1	1	
											Grand Total:		3,459

a/ The fish ladder was open from September 8, 2003 through March 15, 2004 (Julian weeks 36-11).

b/ Entry week was the week that fish were initally sorted, although they may have actually entered the hatchery during the previous sorting week.

c/ Release types are either fingerling (f) or yearling (y).

d/ The hatchery was closed to fish entry this week.

e/ No CWT's were recovered from these Ad-clipped fish. Chinook salmon with shed or lost tags recovered after October 21,2003 (JW 42) were considered fall-run and are shown on Table 11.

Table 10. Total number and numbers of Project-tagged Chinook and coho salmon that entered Trinity River Hatchery (TRH) during the 2003-04 season.a/

		Numbers of chinook salmon					Numbers of coho salmon	
Julian Week		Total entering	Spring-run from tagging site b/		Fall-run from tagging site b/		Total entering	From tagging site
of entry c/	Inclusive Dates	TRH d/	WCW	JCW	WCW	JCW	TRH d/	WCW
36	09/03/03 - 09/09/03	2,284		21				
37	09/10/03 - 09/16/03	863		21				
38	09/17/03 - 09/23/03	3,828		68				
39	09/24/03 - 09/30/03	3,770		89				
40	10/01/03 - 10/07/03	2,747		77		6	5	
41	10/08/03 - 10/14/03	1,150		26	1	8	13	
42	10/15/03 - 10/21/03	0		0	0	0	0	
43	10/22/03 - 10/28/03	4,924		2	66	21	325	1
44	10/29/03 - 11/04/03	10,083			156	24	734	6
45	11/05/03 - 11/11/03	7,661			145	3	1,668	23
46	11/12/03 - 11/18/03	4,603			111	1	3,044	25
47	11/19/03 - 11/25/03	1,659			38		1,736	15
48	11/26/03 - 12/02/03	888			21		1,922	16
49	12/03/03 - 12/09/03	471			4		1,607	6
50	12/10/03 - 12/16/03	87					622	3
51	12/17/03 - 12/23/03	8					146	1
52	12/24/03 - 12/31/03	1					25	2
1	01/01/04 - 01/07/04	0					6	
2	01/08/04 - 01/14/04	0					5	
3	01/15/04 - 01/21/04	0					1	
4	01/22/04 - 01/28/04	0						
5	01/29/04 - 02/04/04	0						
6	02/05/04 - 02/11/04	0						
7	02/12/04 - 02/18/04	0						
8	02/19/04 - 02/25/04	1						
Totals:		45,028	0	304	542	63	11,859	98

a/ The fish ladder was open from September 8, 2003 through March 15,2004 (Julian Week 36-11)

b/ Tagging site: WCW= Willow Creek Weir; JCW= Junction City Weir.

c/ Entry week was the week that fish were initally sorted, although they may have actually entered the hatchery during the previous sorting week.

d/ Numbers shown include tagged fish recovered the same week.

Fall Chinook. Based on the recovery of CWTs, the first fall Chinook entered TRH during JW 38 of 2003 (Table 11). The run peaked during JW 44 when 10,083 Chinook salmon entered the facility, decreasing thereafter until the last Chinook entered during JW 8 (Figure 17, Table 10). Based on CWT expansions, we estimated that 30,839 fall Chinook entered TRH (Figure 17). For the purpose of estimating fall Chinook run-size however, the 30,386 Chinook which entered TRH after JW 42 were considered fall run.

Hatchery recovery of fall Chinook tagged at WCW consisted of 7 grilse and 535 adults. This total represented 47.3% (542/1,147) of those effectively tagged at WCW (Table 10, Appendix 5). The mean FL of effectively tagged Chinook at WCW was slightly higher than WCW-tagged fall Chinook that subsequently entered TRH; 73.6 cm and 72.3 cm, respectively.

We recovered 7,598 Ad-clipped fall Chinook at TRH, from which we recovered 7,314 CWTs (Table 11). Similar to spring Chinook, the age structure of TRH fall Chinook was dominated by a mix of age three and four year old returns. Based on CWT's, no five-year-old fall Chinook returned to TRH this season.

Coho Salmon. The first coho entered TRH during JW 40, 2003. The coho run peaked during Julian week 46 and the last coho entered TRH during JW 3, 2004 (Table 10). We recovered 11,859 coho (2,129 grilse and 9,730 adults) at TRH. We recovered 98 WCW-tagged coho (12 grilse and 86 adults) at TRH (41.9 % of those effectively tagged). The mean FL of WCW-tagged coho recovered at TRH was 62.0 cm, which was slightly larger than the mean FL of 60.9 cm for those effectively tagged (Appendix 6). Coho were not tagged at JCW this year.

Of the 11,859 coho recovered at TRH, 11,169 (94.2%) were observed to have right maxillary (RM) clips, indicating they were of TRH origin (Table 12). Six hundred seventy nine (5.7%) had no clips. These fish are believed to be coho which received no or poor clips prior to release from the hatchery or naturally produced fish which entered the hatchery. Eleven other marks were observed on coho which entered TRH this year, including LM (left maxillary) and ADRM (Adipose + right maxillary) clips.

Based on length frequency analysis, we apportioned TRH-produced, RM-clipped coho, into two brood years. Coho $\leq$ 53 cm, FL were considered grilse (age 2) from the 2001 brood year and accounted for 9.8% (703/7,198) of the total, the remaining 6,495 were considered adults (age 3), progeny of the 2000 brood year. The 679 unmarked coho which entered the hatchery were also considered grilse or adults based on their length (Appendix 14). Unmarked coho entering TRH had a slightly larger mean fork length (66.6 cm) than marked coho (62.8 cm).

Table 11. Recoveries at Trinity River Hatchery of coded-wire tagged fall-run Chinook salmon during the 2003-04 season.

Coded-wire tag number and release type c/	Brood year	Julian week of entry a/ 38	39	40	41	42 d/	43	44	45	46	47	48	49	50	51	Totals
062641-y	1998															0
065242-f	1998															0
065243-f	1998															0
065244-f	1998															0
065245-f	1998															0
065642-y	1998															0
065254-f	1999			1	2		12	21	19	10	2					67
065255-f	1999						3	18	8	2	6	2	1			40
065256-f	1999						6	18	16	10	5					55
065257-f	1999						6	14	9	11	8	5	2			55
065259-y	1999		4	14	41		536	758	647	408	166	110	64	17	1	2,766
065265-f	2000	1	0	3	5		34	48	28	10	2					131
065266-f	2000				2		19	37	34	19	2	2				115
065267-f	2000						34	42	35	15	5	1	3			135
065268-f	2000						3	9	12	14	15	3	3	1		60
065271-f	2000			2	4		78	91	49	28	5	2				259
065272-f	2000			2	2		44	72	31	12	1	1				165
065273-f	2000				1		40	81	60	26	13	6				227
065274-f	2000						28	48	23	10	6	1	1			117
065275-f	2000				3		39	93	41	24	7	4				211
065276-f	2000				2		25	48	28	18	1	2	1			125
065277-f	2000						4	16	16	21	12	11	6	2	1	89
065278-f	2000						4	6	15	15	7	7	6	1		61
065643-f	2000						6	19	25	16	8	6	2			82
065280-y	2000			6	25		362	824	596	370	148	69	20	4		2,424
065284-f	2001				1		2	7	2	0	0	1				13
065285-f	2001						2	6	1	2	1	1				13
065286-f	2001							3	8	2						13
065287-f	2001							4	4	5	1	0	1			15
065290-f	2001									1						1
065289-y	2001						4	17	32	12	3	3	2	2		75
No CWT e/							52	92	75	43	8	11	3			284
	Weekly totals:	1	4	28	88	0	1,291	2,300	1,739	1,061	424	237	112	27	2	
															Grand Total:	7,598

a/ The fish ladder was open from September 8, 2003 through March 15, 2004 (Julian Week 36-11).
b/ Entry week was the week that fish were initally sorted, although they may have actually entered the hatchery during the previous sorting week.
c/ Release types are either fingerling (f) or yearling (y).
d/ The hatchery was closed to fish entry this week.
e/ No CWT's were recovered from these Ad-clipped fish. Chinook salmon with shed or lost tags recovered prior to October 21,2003 (JW 42) were considered spring-run and are shown on Table 9.

Table 12. Recovery of coho salmon that returned to Trinity River Hatchery during the 2003-04 season. a/

Julian Week		Brood year and clip b/								
		2000					2001			
of entry c/	Inclusive Dates	No clip	RM	LM	ADRM	AD	No clip	RM	ADRM	Total
40	10/01/03 - 10/07/03		3					2		5
41	10/08/03 - 10/14/03	1	5				1	6		13
42	10/15/03 - 10/21/03	0	0				0	0		0
43	10/22/03 - 10/28/03	4	116				1	204		325
44	10/29/03 - 11/04/03	18	373				2	341		734
45	11/05/03 - 11/11/03	84	1,240	2			3	339		1,668
46	11/12/03 - 11/18/03	157	2,675	0	2		4	206		3,044
47	11/19/03 - 11/25/03	104	1,515	0	1		0	116		1,736
48	11/26/03 - 12/02/03	130	1,669	1	0		1	121		1,922
49	12/03/03 - 12/09/03	114	1,402	1	1	1	1	86	1	1,607
50	12/10/03 - 12/16/03	34	568		0			20		622
51	12/17/03 - 12/23/03	14	123		1			8		146
52	12/24/03 - 12/31/03	4	21							25
1	01/01/04 - 01/07/04	2	4							6
2	01/08/04 - 01/14/04		5							5
3	01/15/04 - 01/21/04		1							1
	Totals:	666	9,720	4	5	1	13	1,449	1	11,859

a/ The fish ladder was open from September 8, 2003 through March 15,2004 (Julian weeks 36-11).

b/ Brood year determinations were estimated using length frequency analysis; coho less than or equal to 53 cm, fl were considered to be from the 2001brood year, larger coho from the 2000 brood year. RM=right maxillary; LM=left maxillary; ADRM=adipose+right maxillary; AD=adipose.

c/ Entry week was the week the fish were initially sorted, although they may have actually entered the hatchery during the previous week.

Fall Steelhead. Appreciable numbers of steelhead did not enter the hatchery until late October (Table 13). A total of 11 sub-adults (<42 cm, FL) and 10,224 adult steelhead entered TRH during the season. A total of 301 WCW-tagged steelhead (31.6% of those effectively tagged) also entered TRH this season (Appendix 7). These fish were essentially the same size as those effectively tagged at WCW.

Steelhead recovered at TRH were composed of 10,193 Ad-clipped fish and 42 unmarked fish. Unmarked steelhead were slightly larger, on average, than Ad-clipped fish (62.8 vs. 61.7 cm). Sub-adult steelhead, less than 42 cm, FL, comprised 0.1% of the total number of steelhead entering TRH. All of the sub-adults were Ad-clipped fish (Appendix 8). Beginning with the 1997 brood year, all steelhead released from TRH have been Ad-clipped prior to their release.

Table 13. Total number and numbers of Project-tagged steelhead that entered Trinity River Hatchery (TRH) during the 2003-2004 season. a/

Julian Week of entry c/	Inclusive Dates	Number entering TRH			Recoveries from tagging site b/
		Adults	Sub adults d/	Total	WCW
36	09/03/03 - 09/09/03	1		1	
37	09/10/03 - 09/16/03	2		2	
38	09/17/03 - 09/23/03	7		7	
39	09/24/03 - 09/30/03	1		1	
40	10/01/03 - 10/07/03	2		2	
41	10/08/03 - 10/14/03	2		2	
42	10/15/03 - 10/21/03	0		0	
43	10/22/03 - 10/28/03	47	1	48	
44	10/29/03 - 11/04/03	107	2	109	2
45	11/05/03 - 11/11/03	125	0	125	1
46	11/12/03 - 11/18/03	204	2	206	5
47	11/19/03 - 11/25/03	62	0	62	4
48	11/26/03 - 12/02/03	40	0	40	0
49	12/03/03 - 12/09/03	493	5	498	6
50	12/10/03 - 12/16/03	755	0	755	16
51	12/17/03 - 12/23/03	304	0	304	8
52	12/24/03 - 12/31/03	551	0	551	16
1	01/01/04 - 01/07/04	29	0	29	1
2	01/08/04 - 01/14/04	562	0	562	17
3	01/15/04 - 01/21/04	890	0	890	27
4	01/22/04 - 01/28/04	1126	0	1,126	34
5	01/29/04 - 02/04/04	629	0	629	28
6	02/05/04 - 02/11/04	700	0	700	20
7	02/12/04 - 02/18/04	726	0	726	29
8	02/19/04 - 02/25/04	1705	1	1,706	52
9	02/26/04 - 03/03/04	711		711	22
10	03/04/04 - 03/10/04	351		351	12
11	03/11/04 - 03/17/04	92		92	1
	Totals:	10,224	11	10,235	301

a/ The fish ladder was open from September 8, 2003 through March 15, 2004 (Julian weeks 36-11).
b/ Tagging site: WCW = Willow Creek Weir
c/ Entry week was the week the fish were initially sorted, although they may have actually entered the hatchery during the previous sorting week.
d/ Steelhead less than or equal to 41 cm FL are considered sub-adults.

Run-size, Angler Harvest, and Spawner Escapement Estimates

We tagged and recovered too few grilse salmon to generate independent estimates for adults and grilse. Therefore, we combined the numbers of adults and grilse tagged and recovered for calculating the population estimate, and stratified the estimate based on the ratio of adults and grilse observed at each of the respective weirs.

Spring Chinook Salmon

We estimated 47,795 (46,756 adults and 1,039 grilse) spring Chinook (including those harvested) migrated into the Trinity River basin upstream of JCW. Based on the Poisson Approximation, the 95% confidence interval for the run-size estimate was 42,805– 53,633 spring Chinook salmon (Table 14). We estimated that the spawning escapement above JCW was 44,723 adult fish, including 14,512 adult spring Chinook that entered TRH (Table 15). Mean spring Chinook run-size since 1978, excluding two years in which no estimate was made, is 19,018. Estimated spring Chinook run-size has ranged from 2,381 fish in 1991 to 62,692 fish in 1988 (Appendix 15). This year's run-size estimate was the third highest since 1978. Anglers caught and kept an estimated 2,033 (4.3%) of the adults from the spring run (Table 15). We did not receive any tag returns by anglers from harvested grilse salmon.

Fall Chinook Salmon

We estimated that 64,362 (62,815 adults and 1,547 grilse) fall Chinook (including those harvested) migrated into the Trinity River basin upstream of WCW. Based on the Poisson Approximation, the 95% confidence interval for the fall Chinook run-size estimate upstream of WCW was 59,226-70,096 (Table 14). We estimated the Trinity River fall Chinook spawner escapement, upstream of WCW, was 62,339 adult fish, including 29,752 adult fall Chinook that entered TRH (Table 15). We estimated that anglers harvested 155 (10.0%) grilse and 1,868 (3.0%) adults. The estimated total fall Chinook run-size, upstream of WCW, has ranged from 9,207 fish in 1991 to 147,888 fish in 1986 (Appendix 16). This year's fall Chinook estimated run-size of 64,362 fish is 1.5 times the mean fall Chinook run-size since 1977 of 43,806 fish.

Coho Salmon

We estimated 28,152 (24,651 adults and 3,501 grilse) coho migrated upstream of WCW. Based on the Poisson Approximation, the 95% confidence interval for the coho run-size estimate upstream of WCW was 23,253-34,539 fish (Table 14). The spawning escapement estimate for coho upstream of WCW this year was 24,651 adult fish, 10,396 of which entered TRH (Table 15). Estimated coho salmon run-size, upstream of WCW, has ranged from 59,079 fish in 1987 to 852 fish in 1994 (Appendix 17). The mean run-size since 1977 is 16,997 fish. This year's coho estimate was 1.7 times larger than the long term average. There were no angler returned tags from harvested coho salmon this year, therefore we estimate that none of the coho migrating upstream of WCW were harvested (Table 15).

Table 14. Run-size estimates and confidence limits for Trinity River basin spring and fall-run Chinook and coho salmon, and adult fall-run steelhead during the 2003-2004 season.

Species/ race	Area of Trinity River basin for run size estimate	Stratum a/	Trinity River Hatchery recoveries: Number effectively tagged b/	Trinity River Hatchery recoveries: Number examined for tags c/	Trinity River Hatchery recoveries: Number of tags in sample	Run-size estimate d/	Confidence limits 1-p= 0.95	Confidence limit estimator
Spring-run chinook	Upstream of Junction City Weir	Grilse	22	130	5	1,039		
		Adults	966	14,512	297	46,756		
		Total	988	14,642	302	47,795	42,805 - 53,633	Poisson Approximation
Fall-run chinook	Upstream of Willow Creek Weir	Grilse	28	634	6	1,547		
		Adults	1,119	29,752	535	62,815		
		Total	1,147	30,386	541	64,362	59,226 - 70,096	Poisson Approximation
Coho	Upstream of Willow Creek Weir	Grilse	38	1,463	12	3,501		
		Adults	196	10,396	86	24,651		
		Total	234	11,859	98	28,152	23,253 - 34,539	Poisson Approximation
Fall-run steelhead	Upstream of Willow Creek Weir	Adults	684	10,224	301	23,192	20,758 - 26,018	Poisson Approximation

a/ Stratum: Grilse = two year old salmon, Adults = three years old or older, Steelhead adults were fish greater than 41 cm FL.

b/ The number of effectively tagged fish was corrected for tagging mortalities, fish not tagged and fish which had their tags removed (caught and released).

c/ Numbers of spring and fall-run Chinook were estimated from expansion of coded-wire-tag recoveries at Trinity River Hatchery, coho and steelhead numbers were actualy recoveries.

d/ Estimates for grilse and adult spring and fall-run Chinook and salmon were based on proportioning the total run size by the ratio of grilse to adults observed at the respective weirs. Combined TRH and WCW grilse and adult ratios were used to proportion coho salmon estimates.

Table 15. Estimates of Trinity River basin spring and fall-run chinook and coho salmon, and adult fall-run steelhead run size, angler harvest, and spawner escapements during the 2003-2004 season.

Species/ race	Area of Trinity River basin for run size estimate	Stratum a/	Run-size estimate	Angler Harvest: Harvest rate b/	Angler Harvest: Number of fish c/	Spawner Escapement: Natural d/	Spawner Escapement: Trinity River Hatchery	Spawner Escapement: Total
Spring-run chinook	Upstream of Junction City Weir	Grilse	1,039	0.000	0	909	130	1,039
		Adults	46,756	0.043	2,033	30,211	14,512	44,723
		Total	47,795	0.043	2,033	31,120	14,642	45,762
Fall-run chinook	Upstream of Willow Creek Weir	Grilse	1,547	0.100	155	758	634	1,392
		Adults	62,815	0.030	1,868	31,195	29,752	60,947
		Total	64,362	0.040	2,023	31,953	30,386	62,339
Coho	Upstream of Willow Creek Weir	Grilse	3,501	0	0	2,038	1,463	3,501
		Adults	24,651	0	0	14,255	10,396	24,651
		Total	28,152	0	0	16,293	11,859	28,152
Fall-run adult steelhead	Upstream of Willow Creek Weir	Natural	3,947	0.017	68	3,837	42	3,879
		Hatchery	19,245	0.018	346	8,717	10,182	18,899
		Total	23,192		414	12,554	10,224	22,778

a/ Stratum: Grilse = two year old salmon, Adults = three years old or older, Steelhead adults were fish greater than 41 cm FL.

b/ Harvest rates were based on the return of reward tags, except for coho, which were based on return of non-reward tags.

c/ Calculated as the run size times the harvest rate.

d/ Calculated as run size minus angler harvest minus hatchery escapement.

Adult Fall Steelhead

We estimated 23,192 adult fall-run steelhead migrated upstream of WCW this season. The 95% confidence interval for our estimate, based on the Poisson Approximation, was 20,758-26,018 adult steelhead (Table 14). The adult steelhead spawning escapement was composed of 3,947 naturally produced fish and 19,245 steelhead of TRH origin. We estimate anglers harvested 68 wild and 346 TRH-produced steelhead (Table 15).

Intermittent fall steelhead run-size estimates made since 1980 have ranged from 37,276 in 1989 to 3,046 in 1992 (Appendix 18). Mean run-size for fall adult steelhead, for years in which we have estimates, is 11,034 fish.

DISCUSSION

All the anadromous runs we monitor, spring and fall Chinook, coho and steelhead, were estimated to have had runs larger than the long term averages this season. All of these runs have experienced fairly good returns since 1995 (Appendicies 15-18), with the exception of fall Chinook in 2002, which fell victim to the large adult fish kill in the lower Klamath River.

The "fall fishery" flows released this season interrupted our trapping operations at JCW and prevented an earlier installation at WCW. It is unknown how these breaks in our trapping routine may have biased our estimates. We also noticed a slightly earlier arrival time for fall Chinook at JCW and TRH which suggests that the fall fishery flows did induce fall Chinook to migrate upstream out of the lower Klamath River. The consequence of this action is still not fully understood. Historically spring and fall Chinook spawning was spatially separated. Spatial separation no longer exists due to the construction of Lewiston and Trinity Dams. We are concerned that earlier run-timing for fall Chinook may cause a temporal overlap between spawning spring and fall Chinook salmon, both at TRH and in the wild. This racial mixing may lead to genetic changes in both populations that could result in intermediate life history traits such as run and spawn timing that will lead to greater difficulty in maintaining two distinct races of Chinook salmon.

Also of concern is our inability to fish JCW prior to late June or early July. Historically, we fished JCW beginning in May and observed peak numbers of spring Chinook in late May and early June. However, in these years spring flow releases from Lewiston Dam were much lower than under the current flow schedule. Thus, spring Chinook run-timing past JCW may have shifted in response to the recent increased flows. If a change in our trapping effectiveness (percentage of the run trapped) has occurred, a bias to our estimates may result. We investigated how a change in run-timing and coincident lowered number of fish trapped may influence our run-size estimates. We calculated run-size estimates for years where we had data from trapping in May and June through September and compared these data to recalculated estimates excluding the number of spring Chinook trapped in May and June. Based on six years of data, population estimates generated only using data from July through September were not significantly different from the whole season data (Appendix 19), although recalculated estimates did produce a small

positive bias in estimates.

Unaccounted tagging mortality creates a positive bias in all mark-recapture studies (Hankin 2001). Although we attempt to account for these mortalities through recovery of tagged fish found dead at the weirs or in carcass surveys, we can not be sure that all mortalities are recovered. Most of our tagging mortalities from WCW are observed during the early part of the season when water temperatures are high (near 22° C). We believe that tagging mortality is not a constant rate and is a function of water temperature. This postulation leads to difficulty in applying a potential tagging mortality rate for the season. Hankin (2001) concluded that tagging mortality could substantially positively bias our estimates. Using Hankin's example: if 90% of untagged fish passing WCW survive to arrive at TRH (assuming that they are otherwise programmed to arrive at that destination), but only 75% of WCW-tagged fish survive to arrive at TRH, then the approximate positive proportional bias would be almost 30%. We have attempted to partially address this concern through our tagging protocols at the weirs. Fish are not tagged if deemed in poor condition, if they have already spawned, or if water temperatures exceed 21°C.

RECOMMENDATIONS

1. Tagging and recapture operations for adult spring and fall Chinook and coho salmon, and adult fall steelhead in the Trinity River basin should be continued during the migration season, using the capture sites near Willow Creek and Junction City.

2. An alternate weir site for the Junction City area should be investigated. The current site does not allow for trapping at flows that exceed approximately 800 cfs. Current releases from Lewiston Dam do not subside to this level until late June or early July which is after spring Chinook have already begun migrating to the upper Trinity basin. Ideally, we should commence trapping in mid to late May.

3. Continue to trap five (instead of four) nights-per-week with mid-day weir openings at the weirs. Preliminary data indicates that our trapping efficiency has increased using the five-day schedule, while reducing numbers of fish "stacking up" downstream of the weir.

4. Conduct snorkel surveys upstream of the weirs for several miles to recover any tagging mortalities.

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Appendix 1. List of Julian weeks and their calendar date equivalents.

Julian Week	Inclusive dates			Julian Week	Inclusive dates		
1	1-Jan	-	7-Jan	27	2-Jul	-	8-Jul
2	8-Jan	-	14-Jan	28	9-Jul	-	15-Jul
3	15-Jan	-	21-Jan	29	16-Jul	-	22-Jul
4	22-Jan	-	28-Jan	30	23-Jul	-	29-Jul
5	29-Jan	-	4-Feb	31	30-Jul	-	5-Aug
6	5-Feb	-	11-Feb	32	6-Aug	-	12-Aug
7	12-Feb	-	18-Feb	33	13-Aug	-	19-Aug
8	19-Feb	-	25-Feb	34	20-Aug	-	26-Aug
9/a	26-Feb	-	4-Mar	35	27-Aug	-	2-Sep
10	5-Mar	-	11-Mar	36	3-Sep	-	9-Sep
11	12-Mar	-	18-Mar	37	10-Sep	-	16-Sep
12	19-Mar	-	25-Mar	38	17-Sep	-	23-Sep
13	26-Mar	-	1-Apr	39	24-Sep	-	30-Sep
14	2-Apr	-	8-Apr	40	1-Oct	-	7-Oct
15	9-Apr	-	15-Apr	41	8-Oct	-	14-Oct
16	16-Apr	-	22-Apr	42	15-Oct	-	21-Oct
17	23-Apr	-	29-Apr	43	22-Oct	-	28-Oct
18	30-Apr	-	6-May	44	29-Oct	-	4-Nov
19	7-May	-	13-May	45	5-Nov	-	11-Nov
20	14-May	-	20-May	46	12-Nov	-	18-Nov
21	21-May	-	27-May	47	19-Nov	-	25-Nov
22	28-May	-	3-Jun	48	26-Nov	-	2-Dec
23	4-Jun	-	10-Jun	49	3-Dec	-	9-Dec
24	11-Jun	-	17-Jun	50	10-Dec	-	16-Dec
25	18-Jun	-	24-Jun	51	17-Dec	-	23-Dec
26	25-Jun	-	1-Jul	52 b/	24-Dec	-	31-Dec

a/ Eight day week in each leap year.
b/ Eight day week every year.

Appendix 2. Fork length (FL) distribution of coded-wire-tagged, Trinity River Hatchery produced, spring-run Chinook salmon recovered at TRH during the 2003-2004 season. a/

FL	Brood year																	
	1998	1999				2000												
	Coded-wire-tag number and release type b/																	
(cm)	65250-y	65251-f	65252-f	65253-f	65258-y	65260-f	65261-f	65262-f	65263-f	65264-f	65269-f	65270-f	65279-y	65281-f	65282-f	65283-f	65288-y	Total
43																	4	4
44																	1	1
45													1		2	1	2	6
46													0		0	0	3	3
47													0		0	0	1	1
48													0		2	0	4	6
49													1		0	0	1	2
50													1		1	1	1	4
51									1				2	2	0			5
52						1			0				4		1			6
53						0			0				3		2			5
54		1				0		1	0				3					5
55		0				2		0	0				8					10
56		0				0		0	0				13					13
57		0				0	3	1	1	1	1	1	15					23
58		0				2	1	2	0	1	1	0	22					29
59		0			2	1	1	1	0	3	1	0	21					30
60		0			2	6	3	5	3	3	6	4	49					81
61		0			2	4	8	5	2	2	4	6	39					72
62		0			7	8	10	8	9	3	11	7	32					95
63		1			3	14	3	4	8	9	20	9	25					96
64		0			5	9	8	9	9	7	13	6	26					92
65		0			8	13	14	2	9	10	24	12	33					125
66		1			4	16	21	4	11	7	17	10	24					115
67		0			15	5	16	14	15	8	24	15	15					127
68		0			14	11	9	10	20	8	26	13	22					133
69		0			16	16	12	5	14	17	27	12	16					135
70		1		1	29	15	15	10	15	9	32	18	16					161
71	1	1	2	2	24	6	12	6	16	8	8	14	10					110
72	0	3	2	1	37	4	4	8	9	9	15	8	6					106
73	0	0	2	0	47	9	6	4	12	4	17	8	5					114
74	0	4	2	1	55	10	7	9	8	7	17	15	7					142
75	0	4	3	2	62	7	2	2	5	6	24	12	3					132
76	0	7	1	3	60	3	5	3	11	5	10	9	4					121
77	0	2	5	5	73	3	11	3	9	7	6	8	7					139
78	0	4	4	7	64	1	2	6	5	6	4	6	3					112
79	1	8	3	3	73	6	3	3	8	2	3	3	3					119
80	0	10	5	3	68	2	1	0	3	3	4	6	1					106
81	0	4	4	2	49	1	2	3	2	1	3	5	2					78
82	0	15	4	8	56	2	2	1	3	1	1	6	0					99
83	0	6	6	5	55	1	2	1	2	0	3	1	0					82
84	0	6	8	7	47	1	2	1	2	1	2	4	1					82
85	0	6	3	3	33		0	1	0	2	0	1						49
86	0	4	2	6	35		1	1	2	2	2	2						57
87	0	5	4	3	27				3		0	0						42
88	0	4	4	3	27				1		1	1						41
89	1	3	0	3	23						0	1						31
90	1	7	3	3	23						0							37
91	0	4	4	1	20						0							29
92	0	1	0	2	17						0							20
93	0	8	4	3	11						1							27
94	1	3	3	4	6													17
95	1	4	0	1	3													9
96		5	0	1	2													8
97		2	3	1	3													9
98		2	0	1	3													6
99		1	2	1	0													4
100			3	1	1													5
101			0	1														1
102			0															0
103			0															0
104			1															1
Totals:	6	137	87	88	1,111	179	186	133	218	152	328	223	443	2	8	2	17	3,320
Means:	86.3	83.9	84.4	84.3	79.2	68.4	69.0	69.2	70.7	70.0	69.7	71.1	63.7	51.0	49.3	47.5	46.0	73.3

a/ The fish ladder was open from September 8, 2003 through March 15, 2004 (Julian Week 36-11).
b/ Release type: f = fingerlings, y = yearlings.

Appendix 3. Fork length (FL) distribution of coded-wire-tagged, Trinity River Hatchery produced, fall-run Chinook salmon recovered at TRH during the 2003-2004 season. a/

FL (cm)	Brood Year 1999					Brood Year 2000													Brood Year 2001						Total
	Coded-wire-tag number and release type b/																								
	65254-f	65255-f	65256-f	65257-f	65259-y	65265-f	65266-f	65267-f	65268-f	65271-f	65272-f	65273-f	65274-f	65275-f	65276-f	65277-f	65278-f	65280-y	65643-f	65284-f	65285-f	65286-f	65287-f	65289-y	65290-f	
40																								1		1
41																								0		0
42																								0		0
43																								2		2
44																								6		6
45																								4		4
46																						2		18		20
47																						0	1	10		11
48																				1		0	1	14		16
49								1												1		3	0	8	1	14
50								0												2	1	0	0	4		7
51								0										1		1	1	0	2	1		6
52								0										5		0	3	1	3	1		13
53								0										3		1	2	0	0	1		7
54								0	1					1				4		3	3	4	1	3		20
55								0	0					0				8		0	0	1	1	1		11
56								0	0	1				1				19	1	0	0	0	3	0		25
57					1			0	0	0				0				25	1	1	1	1	3	0		33
58					1			0	0	0		1		0				32	0	1	2	0		0		37
59					1			0	0	0		0		1	1		1	44	0	2		0		1		51
60					0	1		0	1	1	1	2	1	1	2		1	77	0			0				88
61					3	0		0	0	2	2	5	2	1	1	1	0	79	0			0				96
62					1	2		3	2	1	2	3	1	2	1	0	2	146	2			0				168
63					5	4	2	0	3	3	1	4	0	1	0	3	2	171	3			1				203
64					3	1	1	3	2	4	6	2	3	5	5	6	4	180	2							227
65					10	3	4	5	8	11	6	7	4	8	4	8	2	192	1							273
66					8	5	5	5	4	14	6	12	6	9	4	0	3	222	2							305
67				1	13	7	2	10	9	9	10	11	8	18	7	8	4	226	3							346
68			1	0	14	10	8	10	3	17	10	11	5	12	6	7	6	181	4							305
69			0	0	25	15	8	11	6	19	13	9	6	18	8	10	5	153	10							316
70			0	0	42	10	15	15	5	17	12	23	13	9	10	8	3	151	7							340
71			1	1	46	7	9	8	2	12	14	15	9	14	8	7	3	102	7							265
72			2	1	61	9	14	8	4	28	13	21	9	19	10	8	3	108	9							327
73		2	1	2	71	9	4	5	3	17	9	11	8	11	5	4	1	71	6							240
74		2	0	1	87	7	7	15	1	15	8	15	5	16	9	3	9	54	3							257
75	2	3	0	1	109	10	4	4	1	10	11	13	7	12	8	4	1	41	0							241
76	1	0	1	3	122	4	6	3	2	11	7	7	3	11	6	1	1	36	4							229
77	1	1	4	4	155	5	6	5	1	16	9	10	3	7	8	1	2	24	3							265
78	0	6	5	1	185	4	2	4	0	12	10	12	3	9	6	2	0	16	7							284
79	5	2	1	3	153	2	2	4	1	4	2	12	2	2	2	2	1	16	1							217
80	4	3	2	3	200	4	5	8	0	10	0	9	6	3	5	1	0	14	1							278
81	6	1	5	5	175	2	3	2	0	5	2	4	4	7	2	1	1	6	2							233
82	0	3	2	5	166	6	2	3	1	1	4	3	2	4	0	2	0	2	1							207
83	5	1	6	5	166	1	2	2		6	2	1	4	0	3	0	1	4	1							210
84	7	5	1	5	145	1	1	1		5	1	2	1	3	2	0	3	5	1							189
85	7	2	4	3	119	0	1			4	2	1	0	1	0	2	2	2								150
86	3	2	2	2	115	1	0			0	1	0	0	0	2			0								128
87	2	2	3	1	84	1	2			4	0	0	0	2				0								101
88	4	0	1	0	92						0	1	1	3				3								105
89	2	0	3	2	69						1		1					1								79
90	3	2	0	1	76																					82
91	4	1	0	0	49																					54
92	1	0	0	1	41																					43
93	0	0	1	2	45																					48
94	2	0	1	1	36																					40
95	3	2	0	1	14																					20
96	1		3		17																					21
97	0		1		13																					14
98	1		1		5																					7
99	1		0		5																					6
100	1		3		14																					18
101	0				1																					1
102	1				0																					1
103					0																					0
104					1																					1
105					0																					0
106					1																					1
Totals:	67	40	55	55	2,765	131	115	135	60	259	165	227	117	211	125	89	61	2,424	82	13	13	13	15	75	1	7,313
Means:	85.9	81.7	84.0	81.7	81.2	72.2	72.7	71.8	68.3	72.7	72.0	72.1	72.4	72.0	72.3	70.4	70.9	66.8	71.5	53.5	53.7	52.5	53.4	47.5	49.0	73.7

a/ The fish ladder was open from September 8, 2003 through March 15, 2004 (Julian Week 36-11).
b/ Release type: f = fingerlings, y = yearlings.

Appendix 4. Fork length (FL) distribution of spring-run Chinook salmon trapped and tagged in the Trinity River at Junction City Weir and recovered atTrinity River Hatchery (TRH) during the 2003-04 season. a/

FL (cm)	Total Trapped	Ad-clips b/	Effective Tags c/	TRH Recoveries
35	1		1	
36	0		0	
37	0		0	
38	0		0	
39	1		1	
40	0		0	
41	3		3	1
42	2	1	2	0
43	0	0	0	0
44	2	1	2	0
45	4	1	4	2
46	1	0	1	0
47	3	0	3	0
48	0	0	0	0
49	2	0	2	1
50	1	0	1	0
51	2	0	2	1
52	2	0	2	1
53	3	0	3	2
54	4	0	4	2
55	10	2	9	3
56	9	2	9	2
57	5	1	5	2
58	9	3	9	3
59	18	2	18	4
60	19	2	19	5
61	34	5	32	13
62	34	8	33	14
63	34	5	33	12
64	35	12	34	18
65	42	7	41	14
66	43	12	42	9
67	42	10	41	6
68	35	3	31	10
69	40	3	39	17
70	34	5	34	17
71	33	4	33	10
72	34	5	34	11
73	24	5	22	3
74	29	7	28	8
75	38	10	37	15
76	37	7	37	14
77	29	4	28	12
78	30	9	29	10
79	38	6	37	9
80	33	10	32	8
81	34	5	34	6
82	30	1	30	9
83	22	4	22	4
84	24	4	24	8
85	20	4	20	4
86	25	2	24	4
87	13	6	12	4
88	9	2	9	2
89	7	0	7	0
90	8	2	8	0
91	3	0	3	0
92	5	1	5	1
93	4	0	4	0
94	3	0	3	2
95	1	0	1	0
96	1	0	1	0
97	2	0	2	0
98	0	0	0	0
99	1	0	1	0
100	0	0	0	0
101	1	1	1	1
Totals:	1,012	184	988	304
Mean FL:	71.8	71.8	71.9	70.7
Total grilse d/:	22	3	22	5
Total adults:	990	181	966	299

a/ Trapping at Junction City took place from July 21st through August 21st (Julian Weeks 29-34) and September 19th through October 7th week 38 -40).
b/ Ad-clip = Adipose fin clipped fish.
c/ Number of effectively tagged fish excludes fish that were not tagged, tagging mortalities, and fish that had their tags removed (caught and released)
d/ Spring-run Chinook salmon less than or equal to 51 cm FL were considered grilse.

Appendix 5. Fork length (FL) distribution of fall-run Chinook salmon trapped and tagged at the Willow Creek Weir and recovered at Trinity River Hatchery (TRH) during the 2003-04 season. a/

FL (cm)	Total Trapped	Ad-clips b/	Effective Tags c/	TRH Recoveries
39	1			
40	1		1	1
41	0		0	0
42	1		1	0
43	0		0	0
44	0		0	0
45	1		1	0
46	3		3	1
47	2		2	0
48	3		3	1
49	1		1	0
50	4	1	4	2
51	2	1	2	0
52	3	2	3	1
53	5	1	5	0
54	3	0	2	1
55	1	0	1	0
56	4	0	4	1
57	8	0	8	6
58	7	0	6	1
59	8	1	5	3
60	16	4	16	10
61	25	9	21	14
62	29	6	26	11
63	28	9	24	18
64	53	10	46	25
65	49	5	46	29
66	53	9	52	30
67	52	12	48	25
68	57	10	55	29
69	45	10	39	20
70	64	17	63	38
71	47	11	45	18
72	33	8	30	18
73	44	10	42	22
74	50	9	46	18
75	46	14	41	20
76	25	7	23	10
77	31	11	27	13
78	39	8	32	13
79	46	13	41	22
80	51	8	44	22
81	27	6	26	9
82	37	12	34	14
83	36	8	35	15
84	24	7	24	12
85	31	2	27	8
86	32	7	31	10
87	21	2	17	6
88	15	4	15	4
89	15	2	15	5
90	10	1	10	3
91	13	1	13	3
92	15	4	13	3
93	7	2	6	2
94	5	0	5	1
95	5	0	4	2
96	2	0	2	0
97	2	0	2	0
98	3	0	3	0
99	1	0	1	0
100	2	1	2	1
101	0		0	0
102	1		0	0
103	0		0	0
104	1		1	1
105	1		1	
106	1		1	
Totals:	1,248	265	1,147	542
Mean FL:	73.6	73.5	73.6	72.3
Total grilse d/:	30	5	28	7
Total adults:	1,218	260	1,119	535

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46).
b/ Ad-clip = Adipose fin clipped fish.
c/ Number of effectively tagged fish excludes fish that were not tagged, tagging mortalities, and fish that had their tags removed (caught and released).
d/ Fall-run Chinook salmon less than or equal to 54 cm FL were considered grilse.

Appendix 6. Fork length (FL) distribution of coho salmon trapped and tagged at the Willow Creek Weir and recovered at Trinity River Hatchery (TRH) during the 2003-04 season. a/

FL (cm)	Total Trapped	RM-clips b/	Effective Tags c/	TRH Recoveries
38	2	2	1	
39	4	3	4	
40	1	1	1	1
41	3	3	3	1
42	4	4	4	1
43	4	4	4	0
44	1	1	1	0
45	4	4	4	1
46	5	5	4	3
47	4	4	4	0
48	4	4	4	3
49	0	0	0	0
50	3	3	2	1
51	3	2	2	0
52	0	0	0	0
53	1	1	0	0
54	3	3	3	1
55	0	0	0	0
56	3	3	3	2
57	10	9	10	4
58	6	6	6	3
59	8	6	8	3
60	17	16	14	4
61	12	11	12	7
62	18	16	18	10
63	23	20	23	9
64	15	14	14	10
65	13	10	12	6
66	13	11	12	7
67	25	18	24	8
68	10	8	7	3
69	6	6	6	1
70	8	8	8	4
71	4	3	4	1
72	3	1	3	1
73	5	3	5	1
74	1	1	1	1
75	0	0	0	0
76	1	0	0	0
77	0	0	0	0
78	1	1	1	0
79	0		0	0
80	0		0	0
81	0		0	0
82	1		1	0
83	1		1	1
Totals:	250	215	234	98
Mean FL:	60.8	60.1	60.9	61.8
Total grilse d/:	43	41	38	12
Total adults:	207	174	196	86

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46).

b/ RM-clip = Right maxillary clipped fish.

c/ Number of effectively tagged fish excludes fish that were not tagged, tagging mortalities, and fish that had their tags removed (caught and released).

d/ Coho salmon less than or equal to 53 cm FL were considered grilse.

Appendix 7. Fork length (FL) distribution of fall-run steelhead trapped and tagged in the Trinity River at the Willow Creek and Junction City weirs, and recovered at Trinity River Hatchery (TRH) during the 2003-2004 season.

	Willow Creek Weir a/					Junction City Weir a/	
FL (cm)	Total Trapped	Ad-clips b/	Other-clips c/	Effective Tags d/	TRH Recoveries	Total Trapped	Ad-clips b/
37						2	2
38						1	1
39						0	0
40						0	0
41						0	0
42						0	0
43						1	1
44						0	0
45						0	0
46						0	0
47						0	0
48	2					0	0
49	1	1		1		0	0
50	3	1		3		5	2
51	1	1		1		3	3
52	4	4		4	1	5	3
53	5	4		5	2	13	12
54	17	13		14	3	12	10
55	22	19		18	6	11	10
56	37	27	1	34	12	14	13
57	40	35	0	38	10	18	17
58	49	43	0	44	22	21	20
59	70	60	1	63	26	15	15
60	78	66	2	71	39	12	11
61	65	55	1	63	29	20	18
62	53	42	1	47	16	14	13
63	44	39	0	42	27	14	12
64	46	39	1	42	21	6	5
65	41	35	0	39	26	5	5
66	30	24	0	30	12	2	2
67	29	24	0	25	9	5	3
68	31	22	0	26	13	2	1
69	26	18	0	24	9	2	2
70	13	7	2	10	1	4	3
71	16	14		15	6	0	0
72	11	7		10	4	3	2
73	5	5		5	3	1	1
74	5	4		4	2		
75	2	1		1	0		
76	4	3		4	2		
77	0	0		0			
78	1	1		0			
79	0	0		0			
80	0	0		0			
81	0	0		0			
82	1	1		1			
Totals:	752	615	9	684	301	211	187
Mean FL:	62.0	61.9	62.4	62.0	62.3	58.7	58.6
Total 1/2 pounders e/:	0	0	0	0	0	3	3
Total adults:	752	615	9	684	301	208	184

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46) and at Junction City from July 21 through August 21 (julian weeks 29-34) and September 19 through October 7 (Julian weeks 38-40).
b/ Ad clips= Adipose fin clipped fish.
c/ Other clips include: 3-ADLM (adipose fin and left maxillary clip); 3-ADRM (adipose fin and right maxillary clip); 2-LM (left maxillary clip) and 1-RM (right maxillary clip).
d/ Number of effectively tagged fish excludes fish that were not tagged, tagging mortalities, and fish that had their tags removed (caught and released).
e/ Steelhead less than or equal to 41 cm FL were considered half pounders.

Appendix 8. Fork Length (FL) distribution of Ad-clipped and non-clipped fall-run steelhead trapped in the Trinity River at Willow Creek and Junction City weirs and that entered Trinity River Hatchery during the 2003-2004 season.

	Recovery Site						
	Willow Creek Weir a/			Junction City Weir a/		Trinity River Hatchery b/	
	Fin-Clip						
FL (cm)	Unmarked	Ad-clips c/	Other-clips d/	Unmarked	Ad-clips c/	Unmarked	Ad-clips c/
31							1
32							1
33							0
34							0
35							0
36							0
37					2		1
38					1		0
39					0		2
40					0		2
41					0		4
42					0	1	12
43					1	0	13
44					0	1	11
45					0	0	15
46					0	0	8
47					0	0	20
48	2				0	1	16
49	0	1			0	0	15
50	2	1		3	2	0	28
51	0	1		0	3	0	69
52	0	4		2	3	2	73
53	1	4		1	12	0	97
54	4	13		2	10	1	170
55	3	19		1	10	0	265
56	9	27	1	1	13	2	415
57	5	35	0	1	17	1	498
58	6	43	0	1	20	2	685
59	9	60	1	0	15	0	771
60	10	66	2	1	11	2	1,061
61	9	55	1	2	18	3	894
62	10	42	1	1	13	1	906
63	5	39	0	2	12	4	784
64	6	39	1	1	5	4	744
65	6	35	0	0	5	4	585
66	6	24	0	0	2	0	486
67	5	24	0	2	3	2	351
68	9	22	0	1	1	2	327
69	8	18	0	0	2	3	264
70	4	7	2	1	3	1	175
71	2	14		0	0	0	110
72	4	7		1	2	0	84
73	0	5			1	1	48
74	1	4				2	54
75	1	1				0	25
76	1	3				0	30
77		0				1	24
78		1				0	16
79		0				0	17
80		0				0	9
81		0				0	3
82		1				1	3
83							1
Totals:	128	615	9	24	187	42	10,193
Mean FL:	62.4	61.9	62.4	59.1	58.6	62.8	61.7
Total 1/2 pounders e/	0	0	0	0	3	0	11
Total adults:	128	615	9	24	184	42	10,182

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46) and at Junction City from July 21st through August 21st (Julian weeks 29-34) and September 19th through October 7th (Julian weeks 38-40).

b/ The fish ladder was open from September 8th through March 15th (Julian Weeks 36-11).

c/ Ad clips= Adipose fin clipped fish.

d/ Other clips include: 3-ADLM (adipose fin and left maxillary clip); 3-ADRM (adipose fin and right maxillary clip); 2-LM (left maxillary clip) and 1-RM (right maxillary clip).

e/ Steelhead less than or equal to 41 cm FL were considered half pounders.

Appendix 9 . Fork Length (FL) distribution of spring-run Chinook salmon tagged at Junction City Weir and subsequently recovered during the 2003-2004 season. a/

		Recoveries							
FL (cm)	Total Tagged	Tag Morts b/	Carcass c/ Recoveries	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/	Total Recoveries	% Recoveries
35	1							0	0.0
36	0							0	-
37	0							0	-
38	0							0	-
39	1							0	0.0
40	0							0	-
41	3			1				1	33.3
42	2		1	0				1	50.0
43	0		0	0				0	-
44	2		0	0				0	0.0
45	4		0	2				2	50.0
46	1		0	0				0	0.0
47	3		0	0				0	0.0
48	0		0	0				0	-
49	2		0	1				1	50.0
50	1		0	0				0	0.0
51	2		1	1				2	100.0
52	2		0	1				1	50.0
53	3		0	2				2	66.7
54	4		0	2				2	50.0
55	10	1	1	3		1		6	60.0
56	9	0	1	2		0		3	33.3
57	5	0	1	2		0		3	60.0
58	9	0	1	3		0		4	44.4
59	18	0	1	4		0		5	27.8
60	19	0	1	5		1		7	36.8
61	34	1	2	13	1	0		17	50.0
62	34	0	4	14	1	1		20	58.8
63	34	0	2	12	1	3		18	52.9
64	35	0	2	18	1	0		21	60.0
65	42	0	4	14	1	2		21	50.0
66	43	1	2	9	0	1		13	30.2
67	42	1	4	6	0	2		13	31.0
68	35	3	1	10	1	0		15	42.9
69	40	0	4	17	1	1		23	57.5
70	34	0	1	17	0	2		20	58.8
71	33	0	2	10	0	0		12	36.4
72	34	0	4	11	0	1		16	47.1
73	24	2	1	3	0	0		6	25.0
74	29	1	4	8	0	0		13	44.8
75	38	1	4	15	0	2		22	57.9
76	37	0	1	14	0	0		15	40.5
77	29	1	3	12	0	0		16	55.2
78	30	1	2	10	0	1		14	46.7
79	38	1	3	9	0	3		16	42.1
80	33	1	6	8	0	0		15	45.5
81	34	0	3	6	0	1		10	29.4
82	30	0	2	9	0	0		11	36.7
83	22	0	2	4	0	0		6	27.3
84	24	0	3	8	0	0		11	45.8
85	20	0	1	4	0	0		5	25.0
86	25	0		4	1	0		5	20.0
87	13	1		4		1		6	46.2
88	9			2		0		2	22.2
89	7			0		0		0	0.0
90	8			0		1		1	12.5
91	3			0				0	0.0
92	5			1				1	20.0
93	4			0				0	0.0
94	3			2				2	66.7
95	1			0				0	0.0
96	1			0				0	0.0
97	2			0				0	0.0
98	0			0				0	-
99	1			0				0	0.0
100	0			0				0	-
101	1			1				1	100.0
Grilse: h/	22	0	2	5	0	0	0	7	31.8
Adults:	990	16	73	299	8	24	0	420	42.4
Total:	1,012	16	75	304	8	24	0	427	42.2
Mean FL:	71.8	71.8	71.0	70.7	67.3	70.8		70.7	

a/ Trapping at Junction City took place from July 21st through August 21st (Julian Weeks 29-34) and September 19th through October 7th (Julian Weeks 38-40).

b/ Tagged fish found dead and unspawned within 30 days of tagging.
c/ Fish recovered in upper Trinity River spawner surveys.
d/ TRH = Trinity River Hatchery
e/ Fish reported as caught and released by anglers.
f/ Fish reported as harvested by anglers.
g/ Tags found on dead fish or found unattached.
h/ Grilse were considered fish less than or equal to 51 cm FL.

Appendix 10 . Fork Length (FL) distribution of fall-run Chinook salmon tagged at Willow Creek Weir and subsequently recovered during the 2003-04 season a/.

		Recoveries							
FL (cm)	Total Tagged	Tag Morts b/	Carcass c/ Recoveries	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/	Total Recoveries	% Recoveries
40	1			1				1	100.0
41	0			0				0	-
42	1			0				0	0.0
43	0			0				0	-
44	0			0				0	-
45	1			0				0	0.0
46	3			0				0	0.0
47	2			0		1		1	50.0
48	3			1		0		1	33.3
49	1			0		0		0	0.0
50	4			2		0		2	50.0
51	2			0		0		0	0.0
52	3			1		0		1	33.3
53	5			0		0		0	0.0
54	2			1		0		1	50.0
55	1			0		0		0	0.0
56	4			1		0		1	25.0
57	8			6		0		6	75.0
58	6			1		1		2	33.3
59	5			3		0		3	60.0
60	16		1	10		0		11	68.8
61	22		2	14	1	0		17	77.3
62	26		1	11	0	1	1	14	53.8
63	25		1	18	1	0		20	80.0
64	46		6	25	0	3		34	73.9
65	47	1	1	29	0	0		31	66.0
66	52	0	2	30	0	1		33	63.5
67	50	0	4	25	2	1		32	64.0
68	55	0	3	29	0	1		33	60.0
69	40	0	4	20	1	0		25	62.5
70	63	0	4	37	0	3		44	69.8
71	45	0	4	18	0	1		23	51.1
72	30	0	2	18	0	1		21	70.0
73	42	0	3	22	0	1		26	61.9
74	46	0	2	19	0	2		23	50.0
75	42	0	4	20	1	3		28	66.7
76	23	0	2	11	0	0		13	56.5
77	27	0	2	13	0	0		15	55.6
78	34	0	4	13	2	1		20	58.8
79	41	0	2	22	0	0		24	58.5
80	44	0	3	22	0	0		25	56.8
81	26	0	2	9	0	1		12	46.2
82	34	0	2	14	0	0		16	47.1
83	35	0	1	15	0	1		17	48.6
84	24	0	0	12	0	1		13	54.2
85	28	0	4	8	1	0		13	46.4
86	31	0	0	10		1		11	35.5
87	17	0	0	6		0		6	35.3
88	15	0	1	4		0		5	33.3
89	15	0	1	5		0		6	40.0
90	10	0	0	3		1		4	40.0
91	13	0	0	3		1		4	30.8
92	13	0	0	3				3	23.1
93	6	0	1	2				3	50.0
94	5	0		1				1	20.0
95	5	1		2				3	60.0
96	2			0				0	0.0
97	2			0				0	0.0
98	3			0				0	0.0
99	1			0				0	0.0
100	2			1				1	50.0
101	0			0				0	-
102	0			0				0	-
103	0			0				0	-
104	1			1				1	100.0
105	1							0	0.0
106	1							0	0.0
Grilse: h/	28	0	0	6	0	1	0	7	25.0
Adults:	1,130	2	69	536	9	26	1	643	56.9
Total:	1,158	2	69	542	9	27	1	650	56.1
Mean FL:	73.6	80.0	73.1	72.3	71.4	72.3	62.0	72.4	

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46).
b/ Tagged fish found dead and unspawned within 30 days of tagging.
c/ Fish recovered in upper Trinity River spawner surveys.
d/ TRH = Trinity River Hatchery
e/ Fish reported as caught and released by anglers.
f/ Fish reported as harvested by anglers.
g/ Tags found on dead fish or found unattached.
h/ Grilse were considered fish less than or equal to 54 cm FL.

Appendix 11 . Fork Length (FL) distribution of coho salmon tagged at Willow Creek Weir and subsequently recovered during the 2003-04 season a/.

		Recoveries							
FL (cm)	Total Tagged	Tag Morts b/	Carcass c/ Recoveries	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/	Total Recoveries	% Recoveries
38	1							0	0.0
39	4							0	0.0
40	1			1				1	100.0
41	3			1				1	33.3
42	4			1				1	25.0
43	4			0				0	0.0
44	1			0				0	0.0
45	4			1				1	25.0
46	4			4				4	100.0
47	4			0				0	0.0
48	4			3				3	75.0
49	0			0				0	-
50	2			1				1	50.0
51	2			0				0	0.0
52	0			0				0	-
53	0			0				0	-
54	3			1				1	33.3
55	0			0				0	-
56	3			2				2	66.7
57	10			4				4	40.0
58	6			3				3	50.0
59	8			3				3	37.5
60	15			4	1			5	33.3
61	12		1	7	0			8	66.7
62	18		0	10	0			10	55.6
63	23		3	9	0			12	52.2
64	15		0	9	1			10	66.7
65	12		1	6				7	58.3
66	12		1	7				8	66.7
67	24		0	8				8	33.3
68	8	1	0	3				4	50.0
69	6		0	1				1	16.7
70	8		1	4				5	62.5
71	4			1				1	25.0
72	3			1				1	33.3
73	5			1				1	20.0
74	1			0				0	0.0
75	0			0				0	-
76	0			0				0	-
77	0			0				0	-
78	1			0				0	0.0
79	0			0				0	-
80	0			0				0	-
81	0			0				0	-
82	1			1				1	100.0
83	1			1				1	100.0
Grilse: h/	38	0	0	12	0	0	0	12	31.6
Adults:	199	1	7	86	2	0	0	96	48.2
Total:	237	1	7	98	2	0	0	108	45.6
Mean FL:	60.9	68.0	64.4	61.7	62.0			61.9	

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46).
b/ Tagged fish found dead and unspawned within 30 days of tagging.
c/ Fish recovered in upper Trinity River spawner surveys.
d/ TRH = Trinity River Hatchery.
e/ Fish reported as caught and released by anglers.
f/ Fish reported as harvested by anglers.
g/ Tags found on dead fish or found unattached.
h/ Grilse were considered fish less than or equal to 53 cm FL.

Appendix 12 . Fork Length (FL) distribution of fall-run steelhead tagged at Willow Creek Weir and subsequently recovered during the 2003-04 season. a/

		Recoveries							
FL (cm)	Total Tagged	Tag Morts b/	Carcass Recoveries c/	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/	Total Recoveries	% Recoveries
48	2				2			2	100.0
49	1				0			0	0.0
50	3				0			0	0.0
51	1				0			0	0.0
52	4			1	0			1	25.0
53	5			2	0			2	40.0
54	17			3	3			6	35.3
55	22			6	4	3		13	59.1
56	37			12	3	1		16	43.2
57	40			10	2	1		13	32.5
58	47			22	3	0		25	53.2
59	66			26	3	3		32	48.5
60	75			39	4	0		43	57.3
61	65			29	2	1		32	49.2
62	52			16	5	0		21	40.4
63	43			27	1	0		28	65.1
64	44			21	2	0		23	52.3
65	41			26	2	0		28	68.3
66	30			12	0	1		13	43.3
67	26			9	1	0		10	38.5
68	29			13	3	0		16	55.2
69	25			9	1	0		10	40.0
70	11			1	1	0		2	18.2
71	15			6	0	2		8	53.3
72	11			4	1			5	45.5
73	5			3	0			3	60.0
74	4			2	0			2	50.0
75	2			0	1			1	50.0
76	4			2	0			2	50.0
77	0				0			0	-
78	1				1			1	100.0
79	0							0	-
80	0							0	-
81	0							0	-
82	1							0	0.0
Adults:	729	0	0	301	45	12	0	358	49.1
Mean FL:	61.9			62.3	60.9	60.3		62.0	

a/ Trapping at Willow Creek took place from September 18th through November 14th (Julian Weeks 38-46).
b/ Tagged fish found dead and unspawned within 30 days of tagging.
c/ Fish recovered in upper Trinity River spawner surveys.
d/ TRH = Trinity River Hatchery.
e/ Fish reported as caught and released by anglers.
f/ Fish reported as harvested by anglers.
g/ Tags found on dead fish or found unattached.

Appendix 13. Summary of California Fish and Game Commission regulations that affected salmonid harvest in the Trinity River during the 2003-2004 season.[a/]

Body of Water	Open Season and Special Regulations[b/]	Daily Bag Limit (if Different from general bag limits in subsection 7.50(b)(91.1)(D))*.
6. Trinity River and Tributaries.		
a. Trinity River main stem from 250 feet below Lewiston Dam to Old Lewiston bridge.	Last Saturday in Apr. through Sept.15. Only artificial flies with barbless hooks may be used.	0
b. Trinity River main stem from Old Lewiston bridge to the Highway 299 West bridge at Cedar Flat.	Fourth Saturday in May through Mar. 31.	Quota Area. Also see subsection (b)(91.1)(C)**.
c. Canyon Creek above the falls located about four miles above the wilderness boundary.	Last Saturday in Apr. through Nov.15.	2
d. Trinity River main stem from the Highway 299 West bridge at Cedar Flat downstream to the Hawkins Bar Bridge (Road to Denny)	Fourth Saturday in May through Aug. 31 and Dec.1 through Mar. 31.	See subsection (b)(91.1)(D)*
e. Trinity River main stem from Hawkins Bar Bridge (Road to Denny) to the confluence with the Klamath River.	Fourth Saturday in May through Mar. 31.	Quota Area. Also see subsection (b)(91.1)(C)***.
f. Trinity River South Fork downstream from the mouth of Grouse Creek.	Fourth Saturday in May through Mar. 31.	1 hatchery trout or 1 hatchery steelhead 0 king salmon
g. Trinity River South Fork from the mouth of Grouse Creek to the South Fork Trinity River bridge at Hyampom.	Nov. 1. through Mar. 31.	1 hatchery trout or 1 hatchery steelhead 0 king salmon
h. Hayfork Creek main stem, from Highway 3 bridge in Hayfork downstream to the mouth.	Fourth Saturday in May through Mar. 31. Only artificial lures with barbless hooks may be used.	0

*(b)(91.1)(D) In anadromous waters of the Trinity River basin, except for those with special bag limits provided above, the daily trout/salmon bag limit is three king salmon, but no more than one king salmon over 22 inches total length, and 1 hatchery trout or brown trout or 1 hatchery steelhead. No more than 4 king salmon over 22 inches total length may be retained in any 7 consecutive days. No more than 12 king salmon may be possessed, of which no more than 4 may be over 22 inches total length.

**(b)(91.1)(C)(c)(ii) No salmon over 22 inches total length may be retained after 50% of the basin quota has been taken in the Klamath River basin above Coon Creek Falls. Exception: King salmon over 22 inches total length may be retained from the Old Lewiston Bridge to the mouth of Indian Creek when the adult fall-run king salmon spawning escapement at Trinity River Hatchery exceeds 4,800 fish.

***(b)(91.1)(C)(e)(ii) No salmon over 22 inches total length may be retained after 50% of the basin quota has been taken in the Klamath River basin above Coon Creek Falls.

(b)(91.1)(E) All anadromous waters of the Trinity River basin are closed to all fishing all year except those listed above.

a/. From State of California, Fish and Game Commission, California Code of Regulations for 2003, Title 14. Natural Resources, Division 1. Fish and Game Commission-Department of Fish and Game, Supplemental regulations, Section 7.50(b)(91.1).

b/. The 2003 Klamath River basin quota is 10,800 king salmon over 22 inches total length.

Appendix 14. Fork length (FL) distribution of coho salmon recovered at Trinity River Hatchery during the 2003-04 season. a/

FL (cm)	Unmarked	Right maxillary clip b/	Other Clips c/	Total
31		1		1
32		0		0
33		1		1
34		2		2
35	1	7		8
36	0	15		15
37	1	18		19
38	0	27		27
39	0	49		49
40	0	80		80
41	1	104		105
42	1	132		133
43	0	120		120
44	1	144		145
45	1	155		156
46	0	125		125
47	1	119		120
48	1	117		118
49	1	85		86
50	0	57		57
51	0	39		39
52	2	25	1	28
53	2	27	0	29
54	0	37	0	37
55	2	52	0	54
56	5	68	0	73
57	2	116	0	118
58	8	163	0	171
59	7	228	0	235
60	9	377	0	386
61	23	494	3	520
62	36	630	2	668
63	36	724	0	760
64	58	944	2	1,004
65	45	977	0	1,022
66	64	975	1	1,040
67	69	958	1	1,028
68	56	803	1	860
69	71	593		664
70	49	511		560
71	40	368		408
72	32	259		291
73	15	170		185
74	15	103		118
75	13	80		93
76	3	43		46
77	6	21		27
78	1	17		18
79	0	3		3
80	0	3		3
81	0	0		0
82	0	2		2
83	1	0		1
84		0		0
85		0		0
86		0		0
87		1		1
Grilse:	13	1,449	1	1,463
Adults:	666	9,720	10	10,396
Totals:	679	11,169	11	11,859
Mean FL:	66.6	62.8	62.5	63.0

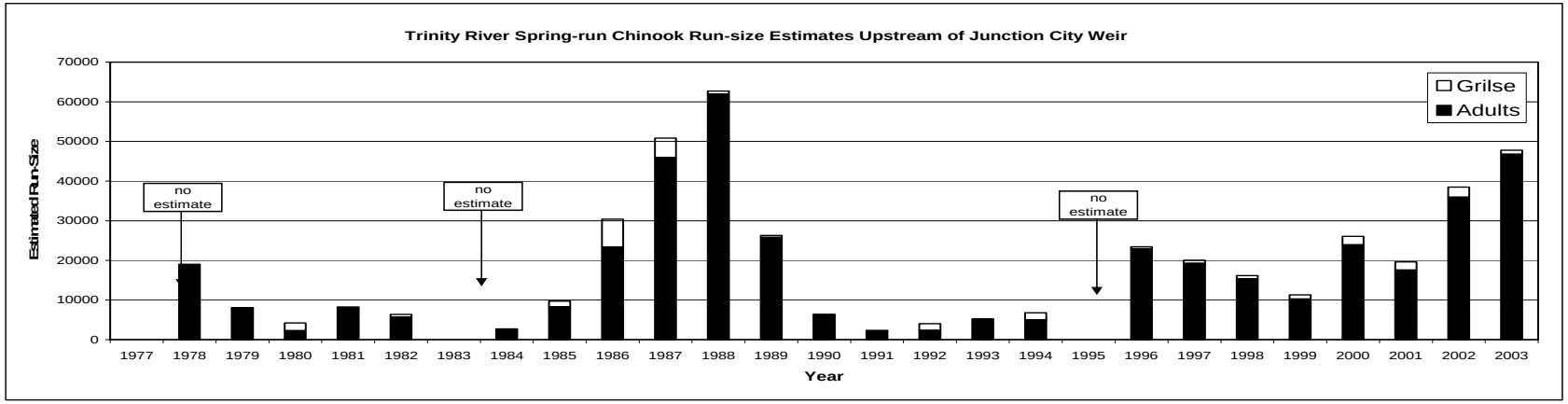
a/ The fish ladder was open from September 8th through March 15th (Julian Weeks 36-11).

b/ Beginning with the 1994 brood, all coho salmon reared at Trinity River Hatchery received a right maxillary clip prior to release.

c/ Other clips include: 1 AD (adipose fin clip); 6 ADRM (adipose fin clip and right maxillary clip); 4 LM (left maxillary clip).

Appendix 15. Spring-run Chinook salmon run-size, spawner escapement and angler harvest estimates for the Trinity River upstream of Junction City Creek Weir from 1977 through 2003.

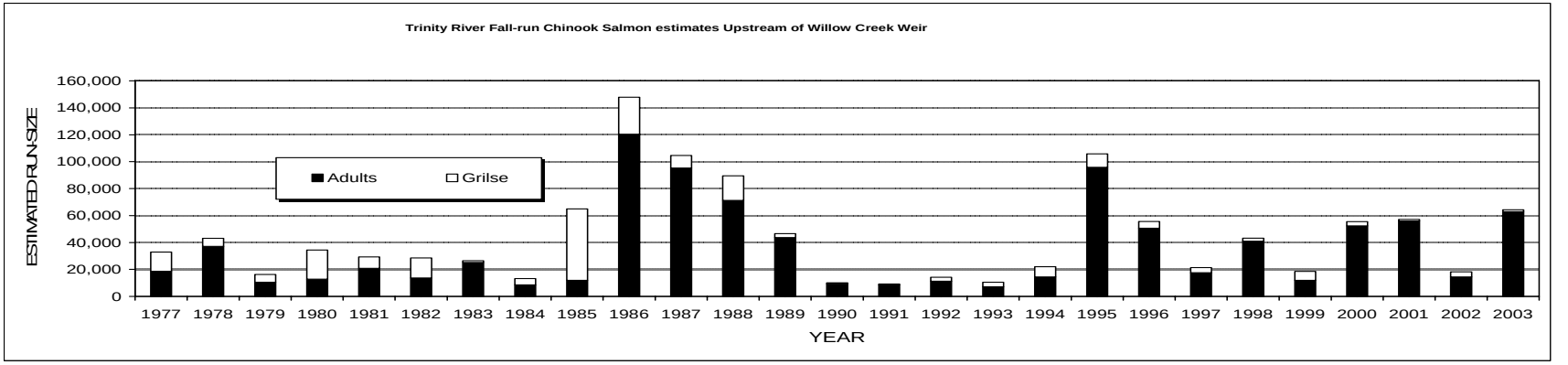
	Run-size estimate					Spawner escapements						Angler harvest			
						Natural			Trinity River Hatchery						
	Grilse		Adults		Total	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults		Total
Year	Number	Percent	Number	Percent											
1977			no estimates				no estimates		385	1,124	1,509	no estimates			
1978	190	1.0%	18,816	99.0%	19,006	29	14,384	14,413	153	3,680	3,833	8	752	a/	760
1979	113	1.4%	7,964	98.6%	8,077	0	5,008	5,008	113	1,658	1,771	0	1,298		1,298
1980	1,949	45.9%	2,301	54.1%	4,250	1,312	1,614	2,926	353	547	900	284	140		424
1981	347	4.2%	7,913	95.8%	8,260	242	3,362	3,604	95	2,405	2,500	10	2,146		2,156
1982	656	10.3%	5,731	89.7%	6,387	387	3,868	4,255	150	1,226	1,376	119	637		756
1983			no estimates				no estimates		385	930	1,315	no estimates			
1984	255	9.4%	2,465	90.6%	2,720	140	1,354	1,494	76	736	812	39	375		414
1985	1,434	14.8%	8,278	85.2%	9,712	799	4,897	5,696	508	2,645	3,153	127	736	b/	863
1986	7,018	23.1%	23,403	76.9%	30,421	4,335	13,371	17,706	1,461	7,083	8,544	1,222	2,949		4,171
1987	4,858	9.5%	46,016	90.5%	50,874	2,577	29,083	31,660	1,387	8,466	9,853	894	8,467		9,361
1988	720	1.1%	61,972	98.9%	62,692	241	39,329	39,570	377	13,905	14,282	102	8,738		8,840
1989	502	1.9%	25,804	98.1%	26,306	435	18,241	18,676	17	4,983	5,000	50	2,580		2,630
1990	265	4.1%	6,123	95.9%	6,388	126	2,880	3,006	104	2,433	2,537	35	810		845
1991	190	8.0%	2,191	92.0%	2,381	92	1,268	1,360	71	614	685	27	309		336
1992	1,671	41.5%	2,359	58.5%	4,030	944	942	1,886	533	1,313	1,846	194	104	b/	298
1993	68	1.3%	5,164	98.7%	5,232	37	2,111	2,148	31	2,630	2,661	0	423	b/	423
1994	1,793	26.4%	4,995	73.6%	6,788	550	2,897	3,447	944	1,943	2,887	299	155	b/	454
1995			no estimates				no estimates		385	8,722	9,107	no estimates			
1996	489	2.1%	22,927	97.9%	23,416	370	16,283	16,653	119	5,131	5,250	0	1,513	b/	1,513
1997	768	3.8%	19,271	96.2%	20,039	543	13,049	13,592	225	4,892	5,117	0	1,330	b/	1,330
1998	802	5.0%	15,365	95.0%	16,167	567	9,057	9,624	184	4,679	4,863	51	1,629	b/	1,680
1999	1,028	9.1%	10,265	90.9%	11,293	440	5,968	6,408	547	3,671	4,218	41	626	b/	667
2000	2,159	8.3%	23,923	91.7%	26,082	1,264	10,846	12,110	571	11,594	12,165	324	1,483	b/	1,807
2001	2,065	10.5%	17,556	89.5%	19,621	1,178	10,284	11,462	629	6,366	6,995	258	906		1,164
2002	2,575	6.7%	35,910	93.3%	38,485	1,883	23,674	25,557	617	10,440	11,057	75	1,796		1,871
2003	1,039	2.2%	46,756	97.8%	47,795	909	30,211	31,120	130	14,512	14,642	0	2,033		2,033



a/ The 1978 sport harvest of spring-run chinook was limited by a salmon fishing closure beginning 25 August 1978.
b/ The sport harvest of adult spring-run chinook was limited by fishing closures to the taking chinook salmon greater than or equal to 56 cm total length during these years. The closures took effect 22 September in 1985, 5 November 1992, 9 October 1994. The Trinity River was subject to seasonal closures during the 1995-03 seasons, commencing 9 September in the lower river. Various periods of opening and closures (seasons) were instituted along the river through November 30.

Appendix 16. Fall-run Chinook salmon run-size, spawner escapement and angler harvest estimates for the Trinity River upstream of Willow Creek Weir from 1977 through 2003.

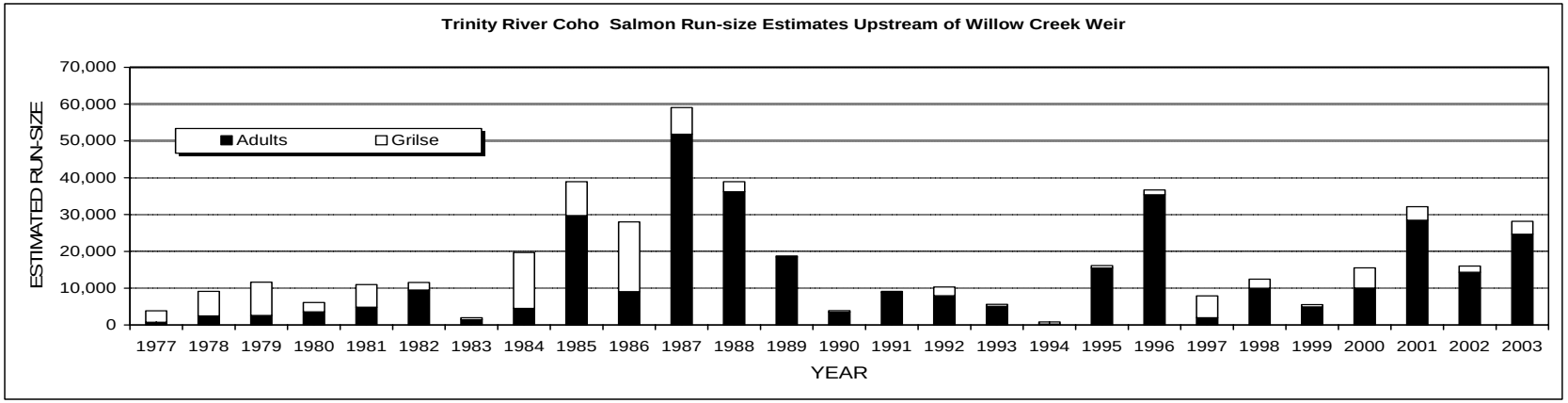
	Run-size estimate					Spawner escapements						Angler harvest		
						Natural			Trinity River Hatchery					
	Grilse		Adults		Total	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults	Total
Year	Number	Percent	Number	Percent										
1977	14,318	43.5%	18,596	56.5%	32,914	9,737	13,501	23,238	2,177	2,035	4,212	2,404	3,060	5,464
1978	6,037	14.0%	37,086	86.0%	43,123	4,712	31,052	35,764	1,325	6,034	7,359	Fishing closure a/		0
1979	5,665	35.0%	10,520	65.0%	16,185	3,936	8,028	11,964	964	1,335	2,299	765	1,157	1,922
1980	21,549	62.7%	12,797	37.3%	34,346	16,837	7,700	24,537	2,256	4,099	6,355	2,456	998	3,454
1981	8,366	28.6%	20,884	71.4%	29,250	5,906	15,340	21,246	1,004	2,370	3,374	1,456	3,174	4,630
1982	14,938	52.2%	13,653	47.8%	28,591	8,149	9,274	17,423	4,235	2,058	6,293	2,554	2,321	4,875
1983	1,240	4.7%	25,138	95.3%	26,378	853	17,284	18,137	271	5,494	5,765	116	2,360	2,476
1984	4,575	34.8%	8,556	65.2%	13,131	3,416	5,654	9,070	766	2,166	2,932	393	736	1,129
1985	53,062	81.6%	11,954	18.4%	65,016	29,454	9,217	38,671	18,166	2,583	20,749	5,442	154 b/	5,596
1986	27,506	18.6%	120,382	81.4%	147,888	20,459	92,548	113,007	3,609	15,795	19,404	3,438	12,039	15,477
1987	9,325	8.9%	95,287	91.1%	104,612	5,949	71,920	77,869	2,453	13,934	16,387	923	9,433	10,356
1988	18,113	20.3%	71,309	79.7%	89,422	10,626	44,616	55,242	4,752	17,352	22,104	2,735	9,341	12,076
1989	2,991	6.4%	43,631	93.6%	46,622	2,543	29,445	31,988	239	11,132	11,371	209	3,054	3,263
1990	634	6.3%	9,358	93.7%	9,992	241	7,682	7,923	371	1,348	1,719	22	328	350
1991	681	7.4%	8,526	92.6%	9,207	382	4,867	5,249	205	2,482	2,687	94	1,177	1,271
1992	2,932	20.7%	11,232	79.3%	14,164	2,563	7,139	9,702	211	3,779	3,990	158	314 b/	472
1993	3,381	32.2%	7,104	67.8%	10,485	2,473	5,898	8,371	736	815	1,551	172	391 b/	563
1994	7,494	34.2%	14,430	65.8%	21,924	2,505	10,906	13,411	4,442	3,264	7,706	547	260 b/	807
1995	9,892	9.4%	95,833	90.6%	105,725	9,262	77,876	87,138	76	15,178	15,254	554	2,779 b/	3,333
1996	5,072	9.1%	50,574	90.9%	55,646	4,478	42,646	47,124	249	6,411	6,660	345	1,517 b/	1,862
1997	3,767	17.6%	17,580	82.4%	21,347	2,845	11,507	14,352	820	5,387	6,207	102	686 b/	788
1998	2,307	5.3%	40,882	94.7%	43,189	1,974	24,460	26,434	192	14,296	14,488	141	2,126 b/	2,267
1999	6,583	35.6%	11,933	64.4%	18,516	4,154	6,753	10,907	2,027	5,037	7,064	402	143 c/	545
2000	3,163	5.7%	52,310	94.3%	55,473	1,964	24,880	26,844	1,028	26,018	27,046	171	1,412 d/	1,583
2001	1,214	2.1%	55,895	97.9%	57,109	914	36,152	37,066	204	17,971	18,175	96	1,772 d/	1,868
2002	3,812	21.0%	14,344	79.0%	18,156	2,566	10,310	12,876	1,078	3,475	4,553	168	559 d/	727
2003	1,547	2.4%	62,815	97.6%	64,362	758	31,195	31,953	634	29,752	30,386	155	1,867 d/	2,022



a/ The 1978 sport harvest of fall-run chinook was essentially eliminated by a salmon fishing closure beginning 25 August 1978.
b/ The sport harvest of adult fall-run chinook was limited by fishing closures to the taking chinook salmon greater than or equal to 56 cm total length during these years. The closures took effect 22 September 1985, 5 November 1992, 9 October 1993, and 3 October 1994. The Trinity River was subject to seasonal closures during the 1995-'98 seasons, commencing 9 September in the lower river. Various periods of openings and closures (seasons) were instituted along the river through November 30.
c/ The 1999 sport harvest of Trinity River fall-run chinook was managed with a quota system. In 1999, the quota was 957 adult fall-run chinook.
d/ The 2001 through 2003 sport harvest of Trinity River fall-run chinook was managed with a quota system. The quota for adult fall-run chinook salmon was 9,834 in 2001; 6,926 in 2002 and 3,564 in 2003.

Appendix 17. Coho salmon run-size, spawner escapement and angler harvest estimates for the Trinity River upstream of Willow Creek Weir from 1977 through 2003.

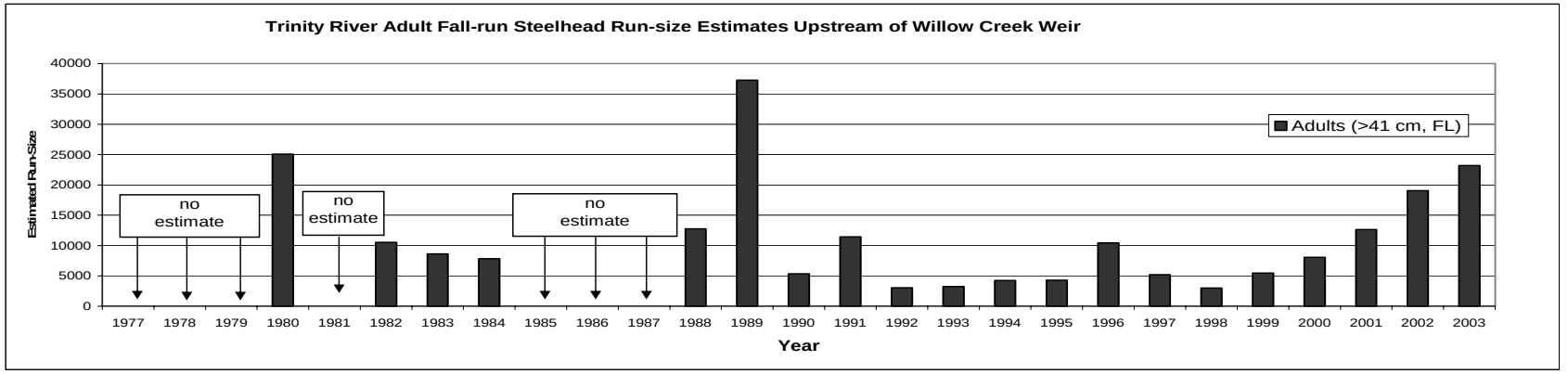
	Run-size estimate					Spawner escapements						Angler harvest		
						Natural			Trinity River Hatchery					
	Grilse		Adults		Total	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults	Total
Year	Number	Percent	Number	Percent										
1977	3,106	80.5%	752	19.5%	3,858	1,756	25	1,781	1,230	698	1,928	120	29	149
1978	6,685	73.2%	2,447	26.8%	9,132	4,309	1,168	5,477	2,376	1,279	3,655	Fishing closure a/		0
1979	9,067	78.0%	2,557	22.0%	11,624	5,567	1,695	7,262	2,793	742	3,535	707	120	827
1980	2,499	41.0%	3,595	59.0%	6,094	954	1,817	2,771	1,545	1,778	3,323			0
1981	6,144	56.0%	4,826	44.0%	10,970	3,486	1,995	5,481	1,994	2,529	4,523	664	302	966
1982	2,021	17.5%	9,508	82.5%	11,529	1,158	5,097	6,255	823	3,975	4,798	40	436	476
1983	536	27.2%	1,435	72.8%	1,971	295	788	1,083	192	514	706	49	133	182
1984	15,208	77.2%	4,486	22.8%	19,694	6,188	2,971	9,159	7,727	1,134	8,861	1,293	381	1,674
1985	9,216	23.7%	29,717	76.3%	38,933	4,798	21,586	26,384	4,237	7,549	11,786	181	582 b/	763
1986	18,909	67.6%	9,063	32.4%	27,972	13,034	6,247	19,281	5,402	2,589	7,991	473	227	700
1987	7,253	12.3%	51,826	87.7%	59,079	3,975	28,398	32,373	2,865	20,473	23,338	413	2,955	3,368
1988	2,731	7.0%	36,173	93.0%	38,904	1,850	22,277	24,127	743	12,073	12,816	138	1,823	1,961
1989	290	1.5%	18,462	98.5%	18,752	208	13,274	13,482	77	4,893	4,970	5	295	300
1990	412	10.6%	3,485	89.4%	3,897	234	1,981	2,215	173	1,462	1,635	5	42	47
1991	265	2.9%	8,859	97.1%	9,124	164	6,163	6,327	98	2,590	2,688	3	106	109
1992	2,378	23.0%	7,961	77.0%	10,339	1,168	5,565	6,733	1,210	2,372	3,582	0	24	24
1993	573	10.2%	5,048	89.8%	5,621	416	3,024	3,440	93	2,024	2,117	64	0	64
1994	613	71.9%	239	28.1%	852	453	105	558	160	134	294	0	0	0
1995	634	3.9%	15,477	96.1%	16,111	370	10,680	11,050	264	4,503	4,767	0	294	294
1996	1,269	3.5%	35,391	96.5%	36,660	1,149	25,308	26,457	120	9,835	9,955	0	248	248 c/
1997	5,951	75.0%	1,984	25.0%	7,935	5,038	1,097	6,135	871	887	1,758	42	0	42 c/
1998	2,471	19.8%	10,009	80.2%	12,480	1,494	5,995	7,489	977	4,014	4,991	0	0	0 c/
1999	623	11.3%	4,912	88.7%	5,535	234	1,696	1,930	389	3,118	3,507	0	98	98 c/
2000	5,486	35.3%	10,046	64.7%	15,532	4,560	6,585	11,145	926	3,461	4,387	0	0	0 c/
2001	3,670	11.4%	28,470	88.6%	32,140	2,644	18,715	21,359	1,026	9,755	10,781	0	0	0 c/
2002	1,709	10.7%	14,307	89.3%	16,016	1,006	7,812	8,818	703	6,495	7,198	0	0	0 c/
2003	3,501	12.4%	24,651	87.6%	28,152	2,038	14,255	16,293	1,463	10,396	11,859	0	0	0 c/



a/ The 1978 sport harvest of coho was essentially eliminated by a salmon fishing closure beginning 25 August 1978.
b/ The 1985 sport harvest of adult coho was limited by a closure for the taking salmon greater than or equal to 56 cm total length beginning 22 September 1985.
c/ The 1996-'03 sport fishery was closed to the take of coho salmon.

Appendix 18. Fall-run adult steelhead run-size, spawner escapement and angler harvest estimates for the Trinity River upstream of Willow Creek Weir from 1977 through 2003.

	Run-size estimate					Spawner escapement						Angler harvest		
						Natural			Trinity River Hatchery					
	Hatchery b/		Wild c/			Hatchery	Wild	Total	Hatchery	Wild	Total	Hatchery	Wild	Total
Year	Number	Percent	Number	Percent	Total									
1977	No estimates						No estimates		269	16	285	No estimates		
1978	"						"		628	55	683	"		
1979	"						"		329	53	382	"		
1980	8,449	33.7%	16,645	66.3%	25,094	5,101	14,462	19,563	1,903	102	2,005	1,445	2,081	3,526
1981	No estimates						No estimates		892	112	1,004	No estimates		
1982	2,106	20.0%	8,426	80.0%	10,532	971	6,889	7,860	634	79	713	501	1,458	1,959
1983	No estimates for hatchery/wild components				8,605			6,661			599			1,345
1984	"				7,833			6,430			142			1,261
1985	No estimates						No estimates				461	No estimates		
1986	"						"				3,780	"		
1987	"						"				3,007	"		
1988	No estimates for hatchery/wild components				12,743			11,926 d/			817	"		
1989	"				37,276			28,933			4,765			3,578
1990	"				5,348			3,188			930			1,230
1991	"				11,417			8,631			446			2,340
1992	1,315	43.2%	1,731	56.8%	3,046	759	1,540	2,299	430	25	455	126	166	292
1993	1,894	58.4%	1,349	41.6%	3,243	801	1,176	1,977	875	10	885	218	163	381
1994	1,477	34.8%	2,767	65.2%	4,244	878	2,410	3,288	403	8	411	196	349	545
1995	1,595	37.2%	2,693	62.8%	4,288	1,424	1,867	3,291	24	681	705	147	145	292
1996	8,598	82.4%	1,837	17.6%	10,435	4,127	1,703	5,830	3,964	48	4,012	507	86	593
1997	No estimates for hatchery/wild components				5,212	No estimates		4,267	No estimates		429	No estimates		516
1998	"				2,972	"		2,463	"		441	"		68 e/
1999	"				5,470	"		3,817	"		1,571	"		82 e/
2000	"				8,042	"		7,097	"		768	"		177 e/
2001	"				12,638	"		9,938	"		2,333	"		367 e/
2002	14,408	75.6%	4,650	24.4%	19,058	7,715	4,551	12,266	5,966	42	6,038	697	57	754 e/
2003	19,245	83.0%	3,947	17.0%	23,192	8,717	3,837	12,554	10,182	42	10,224	346	68	414 e/

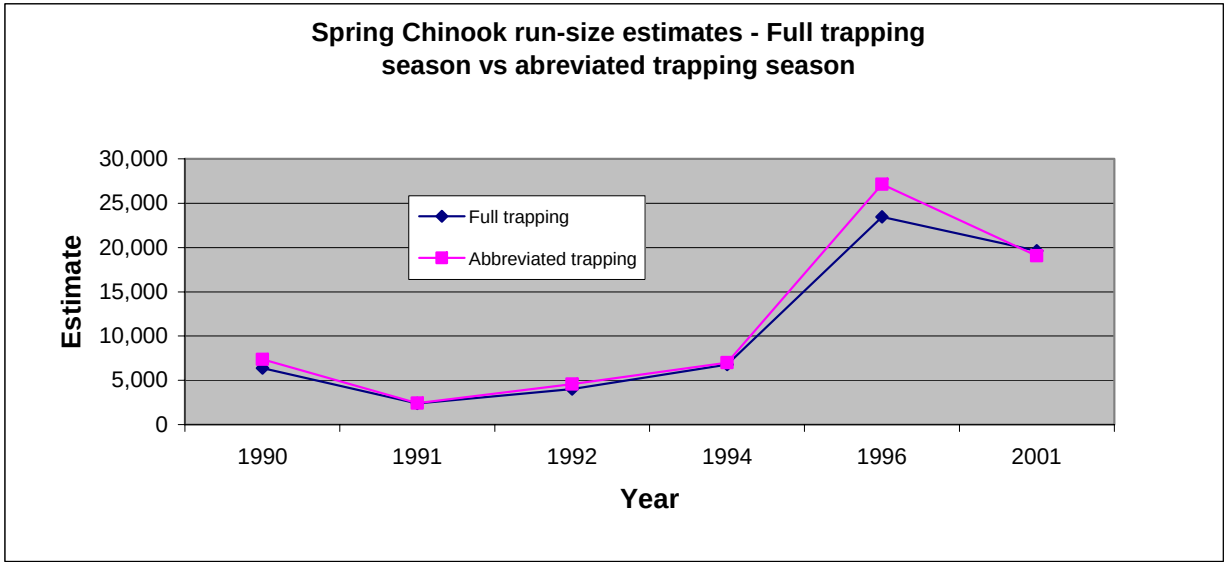


a/ Adult steelhead are greater than 41 centimeters, fork length.
b/ Trinity River Hatchery-produced steelhead.
c/ Naturally produced steelhead.
d/ The natural spawner escapement reflects an overestimate due to the unknown number of fish harvested by anglers upstream of Willow Creek Weir.
e/ Harvest was limited to hatchery produced fish only. Hatchery fish are those with an adipose fin-clip.

Appendix 19. Run-size simulation analysis for spring Chinook above Junction City (JC) weir for a full trapping season vs. an abbreviated trapping season.

	JC weir data			TRH data			Run size estimates a/		
Year	Inclusive trapping Jweeks	Total number of spring Spring tagged	Number of spring Chinook tagged during jweeks 29 -39	TRH recov Jweek<42	JC tag recov. <tjweek 40	JC tag recov tjweeks 29 -39	Run size estimate (Jweeks <40)	Run size estimate (jweeks 29 - 39)	Full trap/ abbr. trap
1990	21 - 37	1,109	287	2,537	440	98	6,388	7,383	0.87
1991	23 - 36	301	109	685	86	30	2,381	2,434	0.98
1992	21 - 37	610	302	1,846	279	121	4,030	4,587	0.88
1994	21 - 38	824	217	2,887	350	89	6,788	6,995	0.97
1996	24 - 39	2,026	893	5,250	453	172	23,444	27,135	0.86
2001	24 - 38	717	424	6,995	255	155	19,622	19,060	1.03
	Means:	931	372	3,367	311	111	10,442	11,266	0.93

a/ This analysis uses standard cutoff jweeks for input data (ie number trapped at JC weir). Actual reported run-size estimates differ slightly from simulated estimates presented here.



ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2003-04 SEASON

TASK 2
SURVIVAL AND CONTRIBUTIONS TO THE FISHERIES AND SPAWNER ESCAPEMENTS MADE BY CHINOOK SALMON PRODUCED AT TRINITY RIVER HATCHERY

by

Wade Sinnen

ABSTRACT

Recovery of marked spring-run (spring) and fall-run (fall) Chinook salmon (*Oncorhynchus tshawytscha)* at Trinity River Hatchery (TRH) was conducted between 8 September, 2003 and 15 March, 2004. Of the 45,028 Chinook salmon that entered TRH, we recovered 11,057 adipose fin-clipped (AD) Chinook salmon, 24.6% of the total. Of these, coded-wire tags (CWT) were recovered from 3,320 spring Chinook and 7,314 fall Chinook salmon.

We estimated that 8,438 marked (AD+CWT) spring Chinook returned to the Trinity River upstream of the Junction City Weir (JCW) and 13,337 marked fall Chinook returned to the Trinity River upstream of the Willow Creek Weir (WCW) during the 2003-04 season.

Run-size, in-river angler harvest, and spawner escapements of marked TRH spring and fall Chinook salmon for the 1998 through 2001 brood years (BY's) are presented. Complete returns are only available for both runs of fish from the 1998 brood year. These fish have reached age five and are considered to have completed their life cycle. Chinook return rates for the completed 1998 BY ranged from 0.44% to 0.52% for spring Chinook fingerling CWT groups and 0.10% to 0.24% for fall Chinook fingerlings. Returns of spring Chinook released as yearlings was estimated at 1.6%, while fall Chinook yearling returns from two groups ranged between 1.6% and 2.1%.

Based on estimated total spring Chinook run-size above Junction City Weir and fall Chinook run-size above Willow Creek Weir, we estimate that the hatchery produced portion of these two runs was 70.2% and 82.3% respectively.

Returns of BY 1998 -2000 Trinity River Hatchery-produced fall Chinook were negatively impacted by a fish kill in the lower Klamath River that occurred in fall, 2002.

TASK OBJECTIVES

To determine relative return rates and the contribution to spawning escapement and the fisheries made by Chinook salmon produced at Trinity River Hatchery, and to evaluate experimental hatchery management practices aimed at increasing adult returns, while reducing competition among wild fish.

INTRODUCTION

During the period of 8 September, 2003 through 15 March, 2004, the California Department of Fish and Game's (CDFG) Trinity River Project recaptured Chinook salmon returning to Trinity River Hatchery (TRH) from previously marked brood years (BY's). Marked Chinook (AD+CWT) were identified by an adipose fin-clip (AD). These fish were implanted with a binary coded-wire tag (CWT) prior to their release from TRH as either smolts or yearlings. Both spring-run (spring) and fall-run (fall) Chinook were representatively marked at a rate of 25%. Prior to 1995, the CDFG was responsible for the coded-wire tagging program at TRH. Beginning in 1995, the coded-wire tagging program at TRH has been conducted by the Hoopa Valley Tribal Fisheries Department. Due to the change in responsibilities, the Department will no longer report on the juvenile tagging effort at TRH. Our efforts are directed at the recovery of these coded-wire tagged fish and analyzing the information derived from their recovery. This study is a continuation of previous studies conducted by the CDFG and is reliant on data presented in Sinnen 2000, 2002, 2004.

METHODS

We examined all salmon entering TRH for fin-clips and Project tags (also part of TASK 1). The heads from AD-clipped salmon were retained for later coded-wire tag removal and decoding.

The information needed to estimate the numbers of salmon of a specific CWT group that returned to the Trinity River basin, and contributed to the fisheries and spawner escapement are; 1) total run-size, 2) angler harvest rate, 3) proportion of the run comprised of marked fish, and 4) proportion of CWT groups recovered at TRH. Independent estimates of spring and fall Chinook run-size and angler harvest rates for each race of Chinook are required. Methods to determine total run-size and angler harvest rate estimates were presented in "TASK 1" of this report.

To estimate the numbers of the salmon above a specific weir site with a CWT, we used the equation:

$$N_{CWT} = \frac{NW_{ADclip}}{NW} \times \frac{NH_{ADCWT}}{NH_{ADclip}} \times N_{run\text{-}size\ estimate}$$

where, N_{CWT} = estimated number of the specific species of salmon above the weir with a CWT; NW_{ADclip} = number of salmon observed at the weir with an AD clip; NW = total number of salmon observed at the respective weir; NH_{ADCWT} = number of salmon observed at TRH with an AD clip and a CWT; NH_{ADclip} = total number of AD-clipped salmon observed at TRH; and $N_{run\text{-}size\ estimate}$ = run-size estimate.

Using the various CWT groups recovered at TRH, we estimated the fraction of the population upstream of the weir with a specific CWT with the equation:

$$F_{CWT\ group} = \frac{NH_{CWT\ group}}{NH_{ADCWT}}$$

where, $F_{CWT\ group}$ = fraction of the salmon population with a specific CWT code; and $NH_{CWT\ group}$ = number of salmon observed at TRH with a specific CWT code.

We estimated the total number of Chinook salmon upstream of the weir with a specific CWT code with the equation:

$$N_{CWT\ group} = N_{CWT} \times F_{CWT\ group}$$

where, $N_{CWT\ group}$ = estimated total number of salmon of a specific CWT group.

The estimated number of fish from each CWT group caught in the Trinity River sport fishery upstream of the weir was then estimated by the equation:

$$SF_{CWT\ group} = N_{CWT\ group} \times N_{harvest\ rate\ estimate}$$

where, $SF_{CWT\ group}$ = number of salmon of a specific CWT group caught in the Trinity River sport fishery; and $N_{harvest\ rate\ estimate}$ = harvest rate estimate.

We estimated the total number of fish of a specific CWT code group available to the spawner escapement by the equation:

$$N_{CWT\ escapement} = N_{CWT\ group} - SF_{CWT\ group}$$

where, $N_{CWT\ escapement}$ = the total number of salmon of a specific CWT group available to the

spawner escapement.

The estimated number of salmon of specific CWT code group available to natural spawner escapement was:

$$N_{\text{CWT natural escapement}} = N_{\text{CWT escapement}} - NH_{\text{CWT group}}$$

where, $N_{\text{CWT natural escapement}}$ = the estimated number of a specific CWT group contributing to natural spawning escapement.

As stated above, estimating the total return of individual CWT groups depends on a basin run-size estimate. In evaluating the return of CWT hatchery Chinook, we normally report on the individual year's return along with a summary of each CWT group throughout their five-year life cycle.

Run size estimates for spring and fall Chinook are calculated for the Trinity River upstream of the JCW (river km [RKM] 137.1) and the WCW (RKM 36.4), respectively.

In this report, we present estimated contribution rates of TRH-produced Chinook salmon to total spring and fall Chinook run-sizes. This is accomplished by expanding each of the individual CWT estimated run-sizes, by its corresponding hatchery expansion factor (total releases represented by each CWT release group/CWT'ed fish released). In doing this, we assume that marked fish are representative of their unmarked counterparts.

RESULTS

Coded-wire tag recovery

We recovered 11,057 AD-clipped Chinook at TRH this season, of which we recovered CWT's from 3,320 spring Chinook and 7,314 fall Chinook. The remaining 423 AD-clipped fish had either shed their CWT or the CWT was lost or unreadable. Chinook without CWT's were classified as either spring- or fall-run based on their date of entry into TRH. Fish which entered the hatchery prior to 11 October were considered spring Chinook, while Chinook entering after 23 October were considered fall fish. Recovered spring Chinook CWT's were composed of 20 release groups from the 1998 through 2001 BY's. Recovered fall Chinook with CWT's were from 26 groups representing the 1999 through 2001 BY's (Table 1). We did not recover any five-year-old fall Chinook (BY 1998) with CWT's this season.

Table 1. Release and recovery data for adipose fin-clipped Chinook recovered at Trinity River Hatchery (TRH) during the 2003-04 season.

	Release data						Recovery data				
							Males		Females		
CWT a/ code	Egg source	Brood year	Date	Number	Size (No./lb)	Site	No.	FL b/	No.	FL b/	Total No.
Spring-run chinook salmon											
065247	TRH	1998	06/1-7/99	54,378	55	TRH	0	-----	0	-----	0
065248	TRH	1998	06/1-7/99	61,516	64	TRH	0	-----	0	-----	0
065249	TRH	1998	06/1-7/99	61,074	67	TRH	0	-----	0	-----	0
065250	TRH	1998	10/4-13/99	137,602	11.25	TRH	3	91.3	3	81.3	6
065251	TRH	1999	06/1-07/00	49,421	40.8	TRH	65	88.7	72	80.0	137
065252	TRH	1999	06/1-07/00	51,993	40.8	TRH	39	90.3	48	79.7	87
065253	TRH	1999	06/1-07/00	46,966	50.6	TRH	40	89.5	48	79.9	88
065258	TRH	1999	10/03-06/00	129,919	10.3	TRH	496	83.0	615	76.1	1,111
065260	TRH	2000	06/6-13/01	33,049	33.3	TRH	71	71.1	108	66.7	179
065261	TRH	2000	06/6-13/01	32,621	33.3	TRH	84	72.3	102	66.2	186
065262	TRH	2000	06/6-13/01	24,480	33.3	TRH	57	73.0	76	66.4	133
065263	TRH	2000	06/6-13/01	34,385	33.3	TRH	108	73.9	110	67.6	218
065264	TRH	2000	06/6-13/01	31,587	42.0	TRH	68	72.9	84	67.6	152
065269	TRH	2000	06/6-13/01	52,491	33.3	TRH	164	72.4	164	66.9	328
065270	TRH	2000	06/6-13/01	52,580	42.0	TRH	106	74.8	117	67.8	223
065279	TRH	2000	10/1-10/01	99,304	7.9	TRH	250	65.4	193	61.4	443
065281	TRH	2001	06/3-10/02	89,482	39.0	TRH	2	51.0	0	-----	2
065282	TRH	2001	06/3-10/02	89,978	39.0	TRH	7	48.9	1	52.0	8
065283	TRH	2001	06/3-10/02	73,788	45.0	TRH	2	47.5	0	-----	2
065288	TRH	2001	10/10-16/02	104,627	8.3	TRH	17	46.0	0	-----	17
No CWT c/ d/							65	76.3	74	71.5	139
				Spring-run chinook salmon totals:			1,644		1,815		3,459
Fall-run chinook salmon											
062641	TRH	1998	10/4-13/99	334,726	19.05	TRH	0	-----	0	-----	0
065242	TRH	1998	06/1-7/99	46,399	106	TRH	0	-----	0	-----	0
065642	TRH	1998	10/4-13/99	16,673	19.05	TRH	0	-----	0	-----	0
065243	TRH	1998	06/1-7/99	42,659	118	TRH	0	-----	0	-----	0
065244	TRH	1998	06/1-7/99	49,332	135	TRH	0	-----	0	-----	0
065245	TRH	1998	06/1-7/99	46,391	141	TRH	0	-----	0	-----	0
065254	TRH	1999	06/1-07/00	44,654	79.4	TRH	29	89.6	38	83.1	67
065255	TRH	1999	06/1-07/00	42,549	79.4	TRH	19	84.5	21	79.2	40
065256	TRH	1999	06/1-07/00	43,565	90.5	TRH	25	87.6	30	81.0	55
065257	TRH	1999	06/1-07/00	50,533	90.5	TRH	27	83.1	28	80.4	55
065259	TRH	1999	10/03-06/00	296,892	14.7	TRH	1,339	84.0	1,427	78.6	2,766
065265	TRH	2000	06/6-06/13/01	32,795	56.5	TRH	48	75.0	83	70.5	131
065266	TRH	2000	06/6-06/13/01	33,806	56.5	TRH	56	75.4	59	70.2	115
065267	TRH	2000	06/6-06/13/01	34,852	56.5	TRH	58	74.0	77	70.3	135
065268	TRH	2000	06/6-06/13/01	33,240	86.0	TRH	27	69.2	33	67.6	60
065271	TRH	2000	06/6-06/13/01	54,867	56.5	TRH	104	74.8	155	71.3	259
065272	TRH	2000	06/6-06/13/01	36,035	56.5	TRH	70	74.1	95	70.5	165
065273	TRH	2000	06/6-06/13/01	57,444	56.5	TRH	102	74.0	125	70.6	227
065274	TRH	2000	06/6-06/13/01	32,096	56.5	TRH	62	74.5	55	70.0	117
065275	TRH	2000	06/6-06/13/01	64,250	56.5	TRH	97	73.5	114	70.8	211
065276	TRH	2000	06/6-06/13/01	27,159	56.5	TRH	58	73.6	67	71.3	125
065277	TRH	2000	06/6-06/13/01	56,582	86.0	TRH	50	71.6	39	68.9	89
065278	TRH	2000	06/6-06/13/01	34,183	86.0	TRH	32	72.5	29	69.0	61
065643	TRH	2000	06/6-06/13/01	25,007	86.0	TRH	42	73.2	40	69.6	82
065280	TRH	2000	10/1-10/10/01	216,593	12.3	TRH	1,415	67.7	1,009	65.6	2,424
065284	TRH	2001	06/3-10/02	119,555	71.0	TRH	13	53.5	0	-----	13
065285	TRH	2001	06/3-10/02	114,119	71.0	TRH	13	53.7	0	-----	13
065286	TRH	2001	06/3-10/02	126,135	86.0	TRH	12	51.6	1	63.0	13
065287	TRH	2001	06/3-10/02	121,607	86.0	TRH	15	53.4	0	-----	15
065289	TRH	2001	10/10-16/02	230,055	13.5	TRH	75	47.5	0	-----	75
065290	TRH	2001	06/3-10/02	10,234	126.0	TRH	1	49.0	0	-----	1
065291	TRH	2001	06/3-10/02	8,269	126.0	TRH	0	-----	0	-----	0
No CWT c/ e/							136	73.7	148	72.8	284
				Fall-run chinook salmon totals:			3,925		3,673		7,598

a/ CWT = Coded-wire tag.
b/ FL = Mean fork length in cm.
c/ No CWT found or it was lost during recovery.
d/ Assigned as spring-run chinook based on their entry dates into Trinity River Hatchery.
e/ Assigned as fall-run chinook based on their entry dates into Trinity River Hatchery.

Run-size, angler harvest, and escapement of coded-wire tagged salmon

Spring-run Chinook salmon

Based on estimated total Chinook run-size above JCW, the AD-clip rate of spring Chinook at JCW, the estimated angler harvest rate, and recovery of spring-run CWT fish at TRH, we estimated that 8,440 CWT'ed spring Chinook salmon returned to the Trinity River above JCW during the 2003-04 season. An estimated 364 of these fish were harvested by anglers during the season. Escapement of CWT'ed spring Chinook was divided between 3,320 fish recovered at TRH and 4,754 estimated to have spawned in natural areas (Table 2).

The year's run of CWT'd spring Chinook was composed of 73 (0.9%) age 2, 4,733 (56.1%) age 3, 3,617 (42.9%) age 4 and 15 (0.2%) age 5 fish (Table2).

1998 brood year

Four spring Chinook CWT groups from the 1998 BY completed their life cycle this season, having reached the age of five. Estimated in-river age five returns only occurred for the yearling release group, CWT group 065250. We estimated fifteen fish returned from this group (Table 3). Spring Chinook released as fingerlings, CWT groups 065247, 065248, and 065249, were not recovered at TRH this season, thus we estimated no age five returns from these groups. Cumulative return rates, expressed as a percentage of release numbers, ranged from 0.44% to 0.52% for the groups released as fingerlings and 1.59% for the group released as yearlings (Table 3). Thus, yearlings returned at a rate approximately three times that of their fingerling released counterparts. The fingerling groups experienced their best returns as age three fish, while the yearling group returned at its highest rate as age four fish.

1999 brood year

Spring Chinook from the 1999 brood year will complete their life cycle next year. To date, fish from this brood have returned through age four. Chinook from this brood have experienced good return rates thus far. The fingerling release groups, 065251, 065252, and 065253 have all surpassed return rates of 1.4% through age four (Table 3). The yearling group, 065258, has also performed well, returning at a rate over 3%. Similar to BY 1998 releases, fingerlings have experienced their highest returns at age three and yearlings at age four.

2000 brood year

Seven fingerling release groups, 065260, 065261, 065262, 065263, 065264, 065269 and 065270 and one yearling release group, 065279, have returned as age two and three-year-old fish thus far. Both the fingerling and yearling groups are performing well, surpassing 1% returns through age three (Table 3). Spring Chinook from these groups will be returning as four- and five-year-olds during 2004 and 2005 respectively.

Table 2. Run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery produced, coded-wire tagged, spring and fall Chinook salmon returning to the Trinity River during the 2003-04 season.

Run-size estimates a/		Harvest rates b/ Grilse	Adults	TRH Ads With CWTs c/	% Weir Ads d/	Ad+CWT Run-size estimates e/
Spring Chinook (JCW)	47,795	0.0%	4.3%	0.9713	18.18%	8,440
Fall Chinook (WCW)	64,362	10.0%	3.0%	0.9761	21.23%	13,337

CWT code	BY	Age	TRH Total No.	% of Total	Run-size	Angler harvest	Spawning escapement TRH	Natural	Total
Spring-run chinook salmon									
065250	98	5	6	0.2%	15	1	6	8	14
065251	99	4	137	4.1%	348	15	137	196	333
065252	99	4	87	2.6%	221	10	87	124	211
065253	99	4	88	2.7%	224	10	88	126	214
065258	99	4	1,111	33.5%	2,824	123	1,111	1,590	2,701
065260	00	3	179	5.4%	455	20	179	256	435
065261	00	3	186	5.6%	473	21	186	266	452
065262	00	3	133	4.0%	338	15	133	190	323
065263	00	3	218	6.6%	554	24	218	312	530
065264	00	3	152	4.6%	386	17	152	217	369
065269	00	3	328	9.9%	834	36	328	470	798
065270	00	3	223	6.7%	567	25	223	319	542
065279	00	3	443	13.3%	1126	49	443	634	1,077
065281	01	2	2	0.1%	5	0	2	3	5
065282	01	2	8	0.2%	20	0	8	12	20
065283	01	2	2	0.1%	5	0	2	3	5
065288	01	2	17	0.5%	43	0	17	26	43
			3,320	1	8,438	364	3,320	4,754	8,074
Fall-run chinook salmon									
065254	99	4	67	0.9%	122	4	67	51	118
065255	99	4	40	0.5%	73	2	40	31	71
065256	99	4	55	0.8%	100	3	55	42	97
065257	99	4	55	0.8%	100	3	55	42	97
065259	99	4	2,766	37.8%	5,044	150	2,766	2,128	4,894
065265	00	3	131	1.8%	239	7	131	101	232
065266	00	3	115	1.6%	210	6	115	89	204
065267	00	3	135	1.8%	246	7	135	104	239
065268	00	3	60	0.8%	109	3	60	46	106
065271	00	3	259	3.5%	472	14	259	199	458
065272	00	3	165	2.3%	301	9	165	127	292
065273	00	3	227	3.1%	414	12	227	175	402
065274	00	3	117	1.6%	213	6	117	90	207
065275	00	3	211	2.9%	385	11	211	163	374
065276	00	3	125	1.7%	228	7	125	96	221
065277	00	3	89	1.2%	162	5	89	68	157
065278	00	3	61	0.8%	111	3	61	47	108
065280	00	3	2,424	33.1%	4420	131	2,424	1,865	4,289
065643	00	3	82	1.1%	150	4	82	64	146
065284	01	2	13	0.2%	24	2	13	9	22
065285	01	2	13	0.2%	24	2	13	9	22
065286	01	2	13	0.2%	24	2	13	9	22
065287	01	2	15	0.2%	27	3	15	9	24
065289	01	2	75	1.0%	137	14	75	48	123
065290	01	2	1	0.0%	2	0	1	1	2
			7,314	1	13,337	413	7,314	5,610	12,924

a/ Run-size estimates are upstream of either Willow Creek weir (WCW) or Junction City weir (JCW) and are inclusive of the entire run (hatchery produced and naturally produced).
b/ In-river angler harvest rates are based on the return of reward tags.
c/ A portion of all chinook released from Trinity River Hatchery (TRH) are coded-wire tagged and identified with an adipose (Ad) fin-clip. The fraction shown are those fish with an adipose fin-clip that also contained a coded-wire tag (CWT).
d/ The observed percentage of Ad-clipped Chinook at respective weir sites.
e/ The estimated run of chinook that were coded-wire tagged.

Table 3. Run-size, percent return, in-river sport catch and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire-tagged spring-run Chinook salmon returning to the Trinity River upstream of Junction City Weir during the period 2000 through 2003.

Release data					Estimated returns						
CWT a/ code	Brood year	Date b/	Number	Site	Age	Run-size	% of release	River harvest	Spawning escapement TRH c/	Spawning escapement Natural	Spawning escapement Total
065247	1998	06/1-7/99	54,378	TRH	2	35	0.064	5	19	11	30
					3	187	0.344	10	93	84	177
					4	63	0.116	3	25	35	60
					5	0	0.000	0	0	0	0
				Totals:		285	0.524	18	137	130	267
				Total Adults:		250	0.460	13	118	119	237
065248	1998	06/1-7/99	61,516	TRH	2	27	0.0439	4	15	8	23
					3	191	0.310	10	95	86	181
					4	76	0.1235	4	30	41	71
					5	0	0.000	0	0	0	0
				Totals:		294	0.478	18	140	135	275
				Total Adults:		267	0.434	14	125	127	252
065249	1998	06/1-7/99	61,074	TRH	2	29	0.0475	4	16	9	25
					3	171	0.280	9	85	77	162
					4	66	0.1081	3	26	36	62
					5	0	0.000	0	0	0	0
				Totals:		266	0.436	16	127	122	249
				Total Adults:		237	0.388	12	111	113	224
065250	1998	10/4-13/99	137,602	TRH	2	144	0.1046	22	79	43	122
					3	842	0.6119	44	419	379	798
					4	1,185	0.8612	59	470	652	1122
					5	15	0.0109	1	6	8	14
				Totals:		2,186	1.5886	126	974	1,082	2,056
				Total Adults:		2,042	1.484	104	895	1,039	1,934
065251	1999	06/1-7/00	49,421	TRH	2	56	0.1133	7	28	21	49
					3	1,006	2.0356	50	399	554	953
					4	348	0.7042	15	137	196	333
065252	1999	06/1-7/00	51,993	TRH	2	50	0.0962	6	25	19	44
					3	878	1.6887	44	348	483	831
					4	221	0.4251	10	87	124	211
065253	1999	06/1-7/00	46,966	TRH	2	18	0.0383	2	9	7	16
					3	567	1.2073	28	225	312	537
					4	224	0.4769	9	88	126	214
065258	1999	10/3-6/00	129,919	TRH	2	114	0.0877	14	57	43	100
					3	1,322	1.0176	66	524	727	1,251
					4	2,824	2.1737	123	1,111	1,590	2,701
065260	2000	06/6-13/01	33,049	TRH	2	28	0.0847	1	11	16	27
					3	455	1.3767	20	179	256	435
065261	2000	06/6-13/01	32,621	TRH	2	43	0.1318	1	17	25	42
					3	473	1.45	21	186	266	452
065262	2000	06/6-13/01	24,480	TRH	2	13	0.0531	0	5	8	13
					3	338	1.3807	15	133	190	323
065263	2000	06/6-13/01	34,385	TRH	2	38	0.1105	1	15	22	37
					3	554	1.6112	24	218	312	530
065264	2000	06/6-13/01	31,587	TRH	2	33	0.1045	1	13	19	32
					3	386	1.222	17	152	217	369
065269	2000	06/6-13/01	52,491	TRH	2	73	0.1391	2	29	42	71
					3	834	1.5888	36	328	470	798
065270	2000	06/6-13/01	52,580	TRH	2	45	0.0856	1	18	26	44
					3	567	1.0784	25	223	319	542
065279	2000	10/1-10/01	99,304	TRH	2	45	0.0453	1	18	26	44
					3	1,126	1.1339	49	443	634	1,077
065281	2001	06/3-10/02	89,482	TRH	2	5	0.0056	0	2	3	5
065282	2001	06/3-10/02	89,978	TRH	2	20	0.0222	0	8	12	20
065283	2001	06/3-10/02	73,788	TRH	2	5	0.0068	0	2	3	5
065288	2001	10/10-16/02	104,627	TRH	2	43	0.0411	0	17	26	43

a/ CWT = coded-wire tag.
b/ Chinook salmon released during June were smolts, those released in October were yearlings.
c/ TRH = Trinity River Hatchery.
d/ Totals are presented only for brood year 1998. These fish have reached five years of age and are considered to have completed their life cycle.
e/ The term "adults" includes chinook aged three through five.

2001 brood year

Four release groups (3 fingerling and 1 yearling) from the 2001 BY returned as two-year-olds this season. The one yearling release group, 065279, has returned at approximately twice the rate as the best fingerling group (Table 3). Spring Chinook from this BY are expected to return as three through five-year-olds during the next three years.

Fall-run Chinook salmon

Based on estimated total Chinook run-size above WCW, the ad-clip rate of fall Chinook at WCW, the estimated angler harvest rate, and recovery of fall-run CWT fish at TRH, we estimated that 13,337 CWT'ed fall Chinook salmon returned to the Trinity River above WCW during the 2003-04 season. We estimated that anglers harvested 413 CWT'ed fall Chinook. Escapement of CWT'ed fall Chinook was divided between 7,314 fish recovered at TRH and 5,610 estimated to have spawned naturally this season (Table 2).

The fall Chinook CWT run was composed of 238 (1.8%) age 2, 7,660 (57.4%) age 3, and 5,439 (40.8%) age 4 fish. No age 5 fall Chinook CWT's were recovered (Table 2).

1998 brood year

The BY 1998 releases were composed of four fingerling and two yearling groups and have completed their life cycle this season, having reached the age of five. However, we did not recover any five-year-old fall Chinook at TRH based on CWT reading this year, therefore we estimated no five-year-olds returned from BY 1998 fall Chinook hatchery releases. Return rates for fingerling releases has to be considered poor at less than 0.25% for any of the CWT groups (Table 4). The two yearling groups, 062641 and 065642, experienced estimated return rates of close to 8 times that of the fingerling groups (2.1% and 1.7 % respectively). All Chinook from the 1998 BY experienced their highest returns as three-year-old fish (Table 4). It must be noted that a large adult fish kill in the lower Klamath River in 2002 may have severely limited the returning number of our age four fall Chinook from 1998 BY groups (CDFG, 2003).

1999 brood year

The 1999 BY is represented by five CWT groups, of which four are fingerling groups and one a yearling group. Through age four returns, the yearling group, 065259 has returned at rate of 1.95%, approximately 4 times that of the best fingerling return group. The fingerling groups have returned at a rate ranging between 0.31 and 0.54%. Returns of both release types were greatest this year as age four fish. As with BY 1998 returns, the fish kill also affected this BY, except that age three fish were lost, which may explain the high returns as age four as opposed to age three fish. Fish released from this BY are expected to return as five-year-olds during the 2004 season.

Table 4. Run-size, percent return, in-river sport catch, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire-tagged fall-run chinook salmon returning to the Trinity River upstream of Willow Creek Weir during the period 2000 through 2003.

Release data					Estimated returns						
CWT a/ code	Brood year	Date b/	Number	Site	Age	Run-size	% of release	River harvest	Spawning escapement TRH c/	Spawning escapement Natural	Spawning escapement Total
062641	1998	10/4-13/99	334,726	TRH	2	366	0.109	20	234	112	346
					3	6,057	1.810	194	2,906	2,957	5,863
					4	510	0.152	20	215	274	489
					5	0	0.000	0	0	0	0
				Totals: d/		6,933	2.071	234	3,355	3,343	6,698
				Total adults: e/		6,567	1.962	214	3,121	3,231	6,352
065242	1998	06/1-7/99	46,399	TRH	2	22	0.047	1	14	7	21
					3	73	0.157	2	35	36	71
					4	17	0.037	1	7	9	16
					5	0	0.000	0	0	0	0
				Totals: d/		112	0.241	4	56	52	108
				Total adults: e/		90	0.194	3	42	45	87
065243	1998	06/1-7/99	42,659	TRH	2	11	0.026	1	7	3	10
					3	50	0.117	2	24	24	48
					4	7	0.016	0	3	4	7
					5	0	0.000	0	0	0	0
				Totals: d/		68	0.159	3	34	31	65
				Total adults: e/		57	0.134	2	27	28	55
065244	1998	06/1-7/99	49,332	TRH	2	0	0.000	0	0	0	0
					3	42	0.085	1	20	21	41
					4	9	0.018	0	4	5	9
					5	0	0.000	0	0	0	0
				Totals: d/		51	0.103	1	24	26	50
				Total adults: e/		51	0.103	1	24	26	50
065245	1998	06/1-7/99	46,391	TRH	2	5	0.011	0	3	2	5
					3	50	0.108	2	24	24	48
					4	7	0.015	0	3	4	7
					5	0	0.000	0	0	0	0
				Totals: d/		62	0.134	2	30	30	60
				Total adults: e/		57	0.123	2	27	28	55
065642	1998	10/4-13/99	16,673	TRH	2	5	0.030	0	3	2	5
					3	248	1.487	8	119	121	240
					4	24	0.144	1	10	13	23
					5	0	0.000	0	0	0	0
				Totals: d/		277	1.661	9	132	136	268
				Total adults: e/		272	1.631	9	129	134	263
065254	1999	06/1-7/00	44,654	TRH	2	17	0.038	1	8	8	16
					3	104	0.233	4	44	56	100
					4	122	0.273	4	67	51	118
065255	1999	06/1-7/00	42,549	TRH	2	4	0.009	0	2	2	4
					3	64	0.150	2	27	35	62
					4	73	0.172	2	40	31	71
065256	1999	06/1-7/00	43,565	TRH	2	2	0.005	0	1	1	2
					3	40	0.092	2	17	21	38
					4	100	0.230	3	55	42	97
065257	1999	06/1-7/00	50,533	TRH	2	10	0.020	1	5	4	9
					3	47	0.093	2	20	25	45
					4	100	0.198	3	55	42	97
065259	1999	10/3-6/00	296,892	TRH	2	27	0.009	2	13	12	25
					3	721	0.243	28	304	388	692
					4	5,044	1.699	150	2,766	2,128	4,894

a/ CWT = coded-wire tag.
b/ Chinook salmon released during June were smolts, those released in October were yearlings.
c/ TRH = Trinity River Hatchery.
d/ Totals are presented only for brood year 1998. These fish have reached five years of age and are considered to have completed their life cycle.
e/ The term "adults" includes chinook aged three through five.

Table 4. (continued) Run-size, percent return, in-river sport catch, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire-tagged fall-run Chinook salmon returning to the Trinity River upstream of Willow Creek Weir during the period 2000 through 2003.

Release data					Estimated returns						
CWT a/ code	Brood year	Date b/	Number	Site	Age	Run-size	% of release	River harvest	Spawning escapement TRH c/	Natural	Total
065265	2000	06/06-13/01	32,795	TRH	2	43	0.131	2	18	23	41
					3	239	0.729	7	131	101	232
065266	2000	06/06-13/01	33,806	TRH	2	43	0.127	2	18	23	41
					3	210	0.621	6	115	89	204
065267	2000	06/06-13/01	34,852	TRH	2	19	0.055	1	8	10	18
					3	246	0.706	7	135	104	239
065268	2000	06/06-13/01	33,240	TRH	2	14	0.042	1	6	7	13
					3	109	0.328	3	60	46	106
065271	2000	06/06-13/01	54,867	TRH	2	111	0.202	5	47	59	106
					3	472	0.860	14	259	199	458
065272	2000	06/06-13/01	36,035	TRH	2	43	0.119	2	18	23	41
					3	301	0.835	9	165	127	292
065273	2000	06/06-13/01	57,444	TRH	2	50	0.087	2	21	27	48
					3	414	0.721	12	227	175	402
065274	2000	06/06-13/01	32,096	TRH	2	33	0.103	1	14	18	32
					3	213	0.664	6	117	90	207
065275	2000	06/06-13/01	64,250	TRH	2	55	0.086	2	23	29	52
					3	385	0.599	11	211	163	374
065276	2000	06/06-13/01	27,159	TRH	2	26	0.096	1	11	14	25
					3	228	0.840	7	125	96	221
065277	2000	06/06-13/01	56,582	TRH	2	12	0.021	1	5	6	11
					3	162	0.286	5	89	68	157
065278	2000	06/06-13/01	34,183	TRH	2	24	0.070	1	13	13	26
					3	111	0.325	3	61	47	108
065643	2000	06/06-13/01	25,007	TRH	2	7	0.028	0	3	4	7
					3	149	0.596	4	82	63	145
065280	2000	10/01-10/01	216,593	TRH	2	130	0.060	6	55	69	124
					3	4,420	2.041	131	2,424	1,865	4,289
065284	2001	06/03-10/02	119,555	TRH	2	24	0.020	2	13	9	22
065285	2001	06/03-10/02	114,119	TRH	2	24	0.020	2	13	9	22
065286	2001	06/03-10/02	126,135	TRH	2	24	0.019	2	13	9	22
065287	2001	06/03-10/02	121,607	TRH	2	27	0.022	3	15	9	24
065289	2001	10/10-16/02	230,055	TRH	2	137	0.060	14	75	48	123
065290	2001	06/03-10/02	10,234	TRH	2	2	0.020	0	1	1	2

a/ CWT = coded-wire tag.
b/ Chinook salmon released during June were smolts, those released in October were yearlings.
c/ TRH = Trinity River Hatchery.
d/ Totals are presented only for brood year 1998. These fish have reached five years of age and are considered to have completed their life cycle.
e/ The term "adults" includes chinook aged three through five.

2000 brood year

Returns of 2000 BY fall Chinook are complete through age 3 only. Fourteen release groups (13 fingerling and 1 yearling) have returned to date as two and three-year-old fish (Table 4). The yearling group, 065280, has experienced the best returns to date. The fingerling groups are also returning at a good rate so far, most exceeding 0.5%. Fish from both release groups should return as four and five-year-old fish in 2004 and 2005, respectively.

2001 brood year

Six CWT groups (5 fingerling and 1 yearling) from the 2001 BY returned as two-year-olds during the 2003 season (Table 4). Age 2 return rates were highest for the yearling group (0.06%), while the fingerling groups returned at a rate of approximately 0.02%. Chinook from this Brood will be returning as adults the next three years.

The contribution of hatchery produced Chinook to total estimated run-size

The contribution of hatchery-produced spring and fall Chinook to the overall Trinity River basin run-size estimates for the two races of Chinook are presented in Table 5. We estimate that the 2003-04 run of spring Chinook was composed of the 33,546 Chinook of TRH origin. This represents 70.2% (33,546/47,795) of the total estimated run upstream of JCW. The fall run, upstream of WCW, was estimated to be composed of 52,944 TRH-produced Chinook, which represents 82.3% (52,944/64,362) of the total estimated run.

DISCUSSION

Since CWT estimates are based, in part, on the overall run-size estimates for each race of Chinook, CWT estimates are subject to the precision and potential biases associated with the mark-recapture estimates performed under Task 1 of this report. The potential impact of this would be most relevant in regard to the number of fish estimated to have spawned in "natural" areas. This is due to the fact that hatchery recoveries are actual counts, while CWT'd fish estimated to have spawned naturally are the remaining estimated number of fish after hatchery CWT's and angler harvest are subtracted from the overall CWT estimate.

Two other potential biases that could distort our CWT run-size estimates are vulnerability of capture and run-timing. Assumptions of our CWT estimates include equal probability of capture for hatchery and wild fish and capture of Chinook throughout the entire run. The second assumption, due to trapping constraints at JCW which preclude operating our weir there until June, may affect our spring-run Chinook CWT estimates.

Return rates for TRH-produced yearling spring Chinook from the completed 1998 BY were approximately 3 times greater than their fingerling counterparts. For fall Chinook this disparity was even greater, yearlings retuned at a rate approximately 7 to 8 times that of fingerlings. This is typical for the Trinity River, however, the 1996 cohort, which completed returns two years

Table 5. Estimated run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery-produced, spring and fall Chinook salmon expanded for unmarked releases (hatchery multiplier) returning to the Trinity River during the 2003-04 season. a/

CWT code b/	BY c/	Age	TRH expansion factor d/	Run size	Expanded run-size e/	Angler harvest	Expanded angler harvest	Spawning escapement					
								TRH f/	Expanded TRH	Natural	Expanded natural	Total	Expanded total
Spring-run chinook salmon													
065250	98	5	2.9	15	44	1	2	6	17	8	24	14	42
065251	99	4	6.7	348	2,321	15	101	137	914	196	1,306	333	2,220
065252	99	4	6.4	221	1,414	10	61	87	557	124	796	211	1,353
065253	99	4	6.2	224	1,384	10	60	88	544	126	780	214	1,324
065258	99	4	2.9	2,824	8,274	123	360	1,111	3,255	1,590	4,659	2,701	7,915
065260	00	3	4.2	455	1,916	20	83	179	754	256	1,079	435	1,832
065261	00	3	4.2	473	1,991	21	87	186	783	266	1,122	452	1,905
065262	00	3	4.2	338	1,423	15	62	133	560	190	801	323	1,361
065263	00	3	4.1	554	2,244	24	98	218	883	312	1,263	530	2,146
065264	00	3	4.5	386	1,741	17	76	152	686	217	980	369	1,665
065269	00	3	4.1	834	3,378	36	147	328	1,328	470	1,902	798	3,231
065270	00	3	4.5	567	2,557	25	111	223	1,006	319	1,440	542	2,446
065279	00	3	4.1	1126	4,560	49	198	443	1,794	634	2,568	1,077	4,362
065281	01	2	4.1	5	20	0	0	2	8	3	12	5	20
065282	01	2	4.2	20	84	0	0	8	33	12	50	20	84
065283	01	2	4.1	5	20	0	0	2	8	3	12	5	20
065288	01	2	4.1	43	175	0	0	17	69	26	106	43	175
				8,438	33,546	364	1,446	3,320	13,199	4,754	18,902	8,074	32,101
Fall-run chinook salmon													
065254	99	4	10.8	122	1,320	4	39	67	725	51	556	118	1,281
065255	99	4	10.8	73	788	2	23	40	432	31	333	71	765
065256	99	4	10.8	100	1,082	3	32	55	595	42	455	97	1,050
065257	99	4	11.0	100	1,096	3	33	55	603	42	461	97	1,063
065259	99	4	2.9	5,044	14,577	150	433	2,766	7,994	2,128	6,150	4,894	14,144
065265	00	3	4.2	239	997	7	30	131	546	101	421	232	967
065266	00	3	4.1	210	853	6	25	115	467	89	360	204	827
065267	00	3	4.1	246	996	7	30	135	547	104	420	239	967
065268	00	3	4.1	109	449	3	13	60	247	46	189	106	436
065271	00	3	4.2	472	1,964	14	58	259	1,077	199	828	458	1,905
065272	00	3	4.2	301	1,255	9	37	165	688	127	530	292	1,218
065273	00	3	4.1	414	1,677	12	50	227	919	175	708	402	1,627
065274	00	3	4.0	213	861	6	26	117	473	90	362	207	835
065275	00	3	4.1	385	1,563	11	46	211	857	163	660	374	1,517
065276	00	3	4.1	228	926	7	28	125	508	96	391	221	898
065277	00	3	4.1	162	666	5	20	89	366	68	280	157	646
065278	00	3	4.1	111	457	3	14	61	251	47	192	108	444
065643	00	3	4.5	4,420	19,846	131	590	2,424	10,884	1,865	8,372	4,289	19,256
065280	00	3	4.0	150	605	4	18	82	330	64	256	146	587
065284	01	2	4.1	24	98	2	10	13	53	9	35	22	88
065285	01	2	4.3	24	104	2	10	13	56	9	37	22	93
065286	01	2	4.0	24	97	2	10	13	53	9	35	22	87
065287	01	2	4.1	27	111	3	11	15	62	9	38	24	100
065289	01	2	4.0	137	551	14	55	75	302	48	194	123	496
065290	01	2	4.1	2	8	0	1	1	4	1	3	2	7
				13,337	52,944	389	590	7,184	10,895	2,395	8,375	5,509	19,270

a/ Estimates are upstream of Junction City and Willow Creek weirs for spring and fall estimates respectively.
b/ CWT=coded-wire tag code. Fish are of the same race and release type (smolt or yearling).
c/ BY=brood year.
d/ Expansion factor used to account for untagged releases of the same BY and release type for each CWT group.
e/ Run-size times TRH expansion factor.
f/ TRH=Trinity River Hatchery.

ago, experienced relatively equal return rates for both fingerling and yearling release types. The estimated hatchery contribution rates to overall spring and fall Chinook run-sizes are relatively high. As mentioned previously, run-size estimates may have potential bias (see TASK I), which under most scenarios would tend to be positive. However, this bias should not affect hatchery contribution rates since total CWT run-size is based on AD clip rates observed at either JCW or WCW, times total estimated runs above these sites. Thus, even if total run-size was adjusted lower, the AD clip rate would remain the same, resulting in the same hatchery contribution rates. If, however, hatchery produced fish are more vulnerable to capture than their wild counterparts at the weirs, the estimated contribution of hatchery fish would be positively biased.

Another rough method to validate hatchery-produced Chinook contribution rates is to examine AD clip rates at TRH and the weirs. If it is assumed that the AD clip rate at TRH is representative of the hatchery population, then the AD clip rates observed at the weirs would theoretically represent a fraction of the TRH population. Therefore, simple division of the AD clip rates observed at both weir sites by the AD rate at TRH would produce a hatchery contribution rate. The AD clip rates observed at the weirs and TRH during the 2003-04 season are the following: spring Chinook (JCW) .18.2%; fall Chinook (WCW) 21.2%; TRH springs 24.3%; TRH falls 24.7%. Performing the calculations results in a contribution rate of 74.8% for spring Chinook and 86.0% for fall Chinook. These are slightly higher than our reported rates, but within 7%.

RECOMMENDATIONS

1. Coded-wire tagging and release of smolt and yearling Chinook salmon, and the monitoring of adult salmon returns at Trinity River Hatchery should be continued in 2004-05.

2. Monitor the annual TRH-produced Chinook salmon contribution rates to the overall runs to determine the relative status of naturally produced Chinook salmon in the Trinity basin.

3. Continue spawner carcass surveys (Task IV) in the upper Trinity River to evaluate straying of TRH produced fish.

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ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2003-2004 SEASON

TASK 3
SURVIVAL AND SPAWNER ESCAPEMENTS MADE BY COHO SALMON PRODUCED AT TRINITY RIVER HATCHERY

by

Wade Sinnen

ABSTRACT

Project personnel marked 516,906 coho salmon (*Oncorhynchus kisutch)* from the 2002 brood year with a right maxillary (RM) clip prior to their release from Trinity River Hatchery (TRH) in March of 2004. These fish are expected to return as two and three-year-old fish during the 2004-05 and 2005-06 seasons respectively.

An estimated 28,152 coho returned to the Trinity River, upstream of the Willow Creek Weir (WCW), during the 2003-04 season. We estimated the TRH-produced component of this run to be 24,059 (85.5%) coho. There was no angler harvest reported this season. Spawning escapement of TRH-produced coho was divided between 11,179 fish which entered TRH and 12,880 fish estimated to have spawned outside of the hatchery facility.

TRH-produced coho from the 2000 brood year are considered to have completed their life cycle this year. An estimated 22,292 coho from the 2000 brood year returned to the Trinity River basin, upstream of Willow Creek weir, the past two seasons. This represents 4.25% of the 524,238 marked coho yearlings released from TRH in March of 2002. Estimated TRH-produced coho returns from the 2001 brood year are complete for age two returns only. An estimated 3,338 coho have returned thus far, representing 0.80% of the number released.

TASK OBJECTIVES

To determine the relative return rates and contributions to spawning escapement and the fisheries made by naturally and hatchery-produced coho in the Trinity River basin.

INTRODUCTION

Coho salmon are propagated at Trinity River Hatchery (TRH) by the California Department of Fish and Game (CDFG) as mitigation for lost habitat/coho production upstream of Lewiston Dam. The Trinity River Project, an element of CDFG, is responsible for marking coho prior to their release from the hatchery facility and estimation of the naturally- and hatchery-produced components of coho salmon returning to the Trinity River basin, upstream of Willow Creek Weir (WCW). Beginning with the 1994 brood year, all coho salmon reared at TRH have received a right maxillary (RM) clip prior to release. Prior to the 1994 brood year, a portion of the coho production was coded-wire tagged similar to the Chinook marking program at TRH. With the advent of coho becoming listed as a threatened species pursuant to the Endangered Species Act (ESA) in 1994, the CDFG began a program to mark 100% of the hatchery production so that a more thorough analysis of hatchery and natural stocks could be accomplished.

METHODS

There are two phases involved in this task; marking all coho produced at TRH and estimating coho run-size, harvest, and escapement of TRH- and naturally-produced coho salmon returning to the Trinity basin. The latter phase is partially accomplished under TASK 1 of this report. In this section we present release and recovery data that is used to estimate the hatchery- and naturally-produced component of the 2003-04 coho run above WCW. Data compilation and analysis is reliant upon previously reported data in Sinnen and Null, 2002, Sinnen and Moore, 2000, and Sinnen, 2004a, 2004b.

Marking at Trinity River Hatchery

Marking of coho is performed by CDFG personnel in marking sheds which are placed on top of the raceways at TRH. The sheds are moved along raceways with a fork lift, utilizing slots in each shed for this purpose. Raceways are segregated with removable barriers to isolate clipped coho from un-marked fish.

Coho are anaesthetized with carbon dioxide and their have their right maxillary (RM) bone removed with a pair of sharp surgical scissors. Marked fish are tallied with a manual counter and returned to hatchery ponds. Observed mortalities of marked coho are counted and subtracted from the daily effectively tagged total.

To determine overall marking accuracy, we examine a sample of the marked coho just prior to their release into the river. These fish are anaesthetized with carbon dioxide, measured to the nearest millimeter (mm) fork length (FL), and checked for quality of the maxillary clip. If more than 3/4 of the bone was excised it is considered a good clip; less than that is considered a poor clip. We estimate the total number of coho effectively marked by multiplying the percent of fish with good clips by the total number we tallied as marked.

TRH-produced coho run-size, escapement, and in-river harvest

To estimate the contribution of TRH-produced coho to run-size, escapement and in-river angler harvest above Willow Creek Weir (WCW), the following information is required:

1. Marking of coho production released from TRH.
2. Recovery totals of marked and unmarked coho returning to TRH.
3. Total coho run-size above WCW.
4. The percentage of marked coho salmon observed at WCW.
5. In-river angler harvest rates on coho above WCW.
6. Specific age class determinations.

The assumptions underlying the validity of run-size estimates are discussed under TASK 1 of this report. Additionally, we assume that coho right-maxillary-marks do not regenerate and that the mark is recognizable.

To estimate the TRH-produced component of the run above WCW, we used the equation:

$$N_{RM} = \frac{NW_{RM}}{NW} \times N_{Cohorun}$$

where N_{RM} = The estimated number of coho salmon above Willow Creek weir with a right maxillary clip; NW_{RM} = The number of coho salmon observed at Willow creek weir that were right-maxillary clipped; NW = The total number of coho salmon observed at Willow creek weir; $N_{Cohorun}$ = Total estimated run of coho salmon above Willow Creek weir. To estimate the number of un-marked coho salmon above the weir we used the equation:

$$N_N = N_{Cohorun} - N_{RM}$$

where, N_N = The estimated number of naturally produced coho above Willow Creek weir.

The size separating grilse and adult coho is determined using length frequency analysis. The number of grilse and adults in the coho run was determined by multiplying the proportion of each observed at WCW and TRH combined times the total run-size estimate. We combined

TRH and WCW data since we trapped less than 500 coho at WCW and the majority of the run was TRH produced. The number of right maxillary-clipped coho for each age strata is estimated by multiplying the ratio of marked to unmarked coho observed at Willow Creek weir times the total age stratified run-size estimate. The remaining coho are considered naturally produced. Coho harvest rate estimates are developed using angler tag return data presented in Task 1. Harvest rates are multiplied times the age stratified coho run to produce a harvest estimate. The estimate is apportioned to both RM clipped and naturally produced fish. Coho escapement is determined by the following equation:

$$N_{escapement} = N_{Cohorun} - H_{coho}$$

where, H_{coho} = The estimated number of coho salmon harvested by anglers upstream of Willow Creek weir. Escapement is divided into Trinity River Hatchery escapement and natural escapement. Hatchery escapement is a direct count of RM clipped and unmarked coho that entered TRH, while natural escapement is estimated by the following equation:

$$N_{Naturalescapement} = N_{escapement} - N_{TRHescapement}$$

where $N_{Naturalescapement}$ = The estimated number of coho salmon above Willow Creek weir estimated to have spawned in natural areas; $N_{TRHescapement}$ = the number of coho salmon that entered TRH. All estimates are stratified by grilse and adults and by RM marked and unmarked coho salmon.

RESULTS

Marking

Staff personnel marked (RM clips) approximately 517,797 BY 2002 coho, representing the entire production at TRH. We began marking coho in late December, 2003 and finished in early March, 2004.

We performed a quality control check to determine our clipping effectiveness for coho in each raceway on March 4-5, 2004. We measured and examined approximately 1% of the coho in each raceway . The percentage of coho with proper clips ranged from 99.6% to 100% and averaged 99.9% for the 5,408 fish examined. We also recorded 462 post clip mortalities. Therefore, we estimate that 516,906 coho were effectively clipped and released (Table 1). These fish ranged in size from 102 to 278 mm, fork length (FL), with a range of mean lengths from 148 to 176 mm, FL. All BY 2002 coho were volitionally released from TRH March 15-18, 2004.

Table 1. Quality control data for 2002 brood year coho salmon reared at Trinity River Hatchery and released March 15-21, 2004.

Pond number	Number counted/ clipped	Post-Clipping mortalitites	Number examined post clip	Number without clip	QC % unclip	number effectively clipped	Number not clipped at release	Total number released	FL (mm) range	FL (mm) Mean
I1&I2	62,494	167	741	0	0.00%	62,327	0	62,327	102-278mm	155.1
I3&I4	68,668	1	720	1	0.14%	68,572	95	68,667	110-245mm	149.9
H1&H2	67,377	1	708	0	0.00%	67,376	0	67,376	111-240mm	153.1
H3&H4	66,769	98	688	1	0.15%	66,574	97	66,671	118-229mm	152.3
G1&G2	51,226	0	537	0	0.00%	51,226	0	51,226	115-252mm	154.8
G3&G4	69,137	75	728	0	0.00%	69,062	0	69,062	118-241mm	154.9
J1&J2	67,313	0	737	0	0.00%	67,313	0	67,313	115-255mm	154.9
J3&J4	64,813	120	549	2	0.36%	64,457	236	64,693	116-261mm	150.8
Totals:	517,797	462	5,408	4	0.07%	516,906	429	517,335		**153.2**

Contribution of TRH-produced coho salmon to escapement and in-river sport fisheries

Total (natural and TRH-produced) coho run-size for the 2003-04 season, above WCW, was estimated at 28,152 fish (TASK 1), of which 3,501 were grilse (age 2) and 24,651 were adults (age 3). Age classes were determined using length frequency analysis. The size separating grilse and adults was 53 cm, FL (TASK 1). Therefore all coho $\leq$ 53 cm, FL were considered grilse and larger fish adults.

The percentage of right maxillary-clipped (RM) coho observed at WCW was 95.3% (41/43) for grilse salmon and 84.1% (174/207) for adults. The overall marked coho total observed at WCW for the 2003-04 season was 86.0% (215/250). Therefore, we estimate that the 2003-04 coho run was composed of 4,093 naturally-produced fish and 24,059 TRH-produced fish (Table 2.).

Since none of the project tags applied to coho salmon at WCW were returned by anglers, we estimated that anglers did not harvest any coho during the 2003-04 season. The sport take of coho, a federally threatened species, has been prohibited since 1995; however, some fish are occasionally harvested by unknowledgeable anglers due to mistaken identity or a lack of knowledge concerning the closure.

Table 2. Run-size, in-river sport catch, and spawner escapement estimates for naturally- and TRH-produced coho salmon, upstream of Willow Creek Weir for the 2002-03 return year.

					Spawning escapement	
Strata	BY a/	Age b/	Run-size	Angler harvest	TRH c/	Natural
Naturally	01	2	163	0	14	149
Produced	00	3	3,930	0	666	3,264
		Totals:	4,093	0	680	3,413
TRH	01	2	3,338	0	1,449	1,889
Produced	00	3	20,721	0	9,730	10,991
		Totals:	24,059	0	11,179	12,880
		Grand totals:	28,152	0	11,859	16,293

a/ BY=Brood year
b/ Age classes are determined using fork length frequency analysis.
c/ TRH=Trinity River Hatchery

Based on age three coho run-size estimates presented above (Table 2) and age two estimates provided last year, the percent return for BY 2000, TRH-produced coho was 4.25%. Coho from the 2000 BY have reached three years of age and are considered to have completed their life cycle. The estimated return of two- year-old 2001 BY coho was 0.80%. These fish will return during the 2004-05 season as three-year-olds.

Spawning escapement of 2000 BY, TRH-produced coho consisted of 10,418 (46.7%) fish that entered TRH and 11,874 (53.3%) fish estimated to have spawned in natural areas (Table 3).

Estimated escapement of TRH-produced, two-year-old coho from the 2001 brood year was 1,449 (43.4%) hatchery spawners and 1,889 (56.6%) fish estimated to have spawned in natural areas (Table 3).

Table 3. Run-size, percent return, in-river angler harvest and spawner escapement estimates for Trinity River Hatchery-produced coho salmon returning to the Trinity River upstream of the Willow Creek Weir during the period 2002 through 2003.

Release Data					Estimated Returns						
									Spawning Escapement		
Clip a/	Brood Year	Date	Number b/	Site	Age c/	Run-size	% of release	River harvest	TRH d/	Natural	Total
RM	00	3/15-22/02	524,238	TRH	2	1,571	0.30	0	688	883	1,571
					3	20,721	3.95	0	9,730	10,991	20,721
					Totals:	22,292	4.25	0	10,418	11,874	22,292
RM	01	3/17-19/03	416,201	TRH	2	3,338	0.80	0	1,449	1,889	3,338

a/ Identifying clip. Beginning with the 1994 brood year, all coho salmon released from Trinity River Hatchery received right maxillary (RM) clips.
b/ Number of marked (RM) coho estimated released.
c/ Age classes are determined using length frequency analysis.
d/ TRH= Trinity River Hatchery.

DISCUSSION

Since estimation of TRH-produced contribution rates to overall coho run-size, escapement and harvest are directly related to the total coho run-size estimates produced under Task 1 of this report, it must be noted that the information presented under Task 3 is only moderately rigorous, statistically speaking. The total coho run-size estimate of 28,152 fish, produced under task 1 of this report, was based on only 234 effectively tagged fish. Confidence intervals (1-p=0.95) for this estimate are in the 17- 23% range. Additionally, the WCW was only fished until November 14th this season. If coho salmon run timing past WCW occurs after this date or the ratio of naturally to hatchery-produced coho changes temporally our estimates may contain some unknown bias. Coho trapping data at WCW for the season indicated that the peak of the coho run occurred during Julian week 41 (Oct. 8-14) and that coho migration past WCW was waning at the time of removal. Since our efforts represent the majority of work to quantify the hatchery vs. wild runs and survival and contribution rates of returning adult coho, we feel it is important to present the available information.

The percent return of 2000 BY coho, estimated at 4.25%, is the second highest return rate over the last seven years (Appendix 1). Return rates have ranged from 1.30% for BY 1996 coho to

6.22% for BY 1998 coho. Since coho are raised to slightly larger than yearling size (spawned in late November through early January and released in March of the following year) it would seem reasonable that survival rates could potentially be high. Return rates of coho to the Trinity basin, unlike chinook salmon, are in theory minimally affected by ocean and in-river commercial and sport harvest, since the take of coho has been prohibited in these fisheries since 1994. The Native American gill-net fisheries may harvest substantial numbers of coho, but it is doubtful that this harvest rate approaches historical harvest rates for all combined fisheries (ocean, commercial, in-river and gill-net).

In all but two years the estimated the number of hatchery-produced coho that have spawned in natural areas has surpassed those that entered TRH (Appendix 1). This indicates that TRH-produced coho stray at substantial rates. Our mainstem carcass surveys (Task 4) have demonstrated that, similar to TRH-produced Chinook, TRH-produced coho do spawn outside of the facility and that coho carcass recoveries are greatest in areas near TRH. This season we recovered 468 coho in the mainstem Trinity River. Of these, 375 (80.1%) were RM clipped and 304 of the total were recovered in section 1, nearest the hatchery. It must be noted that any bias in coho run-size estimates would be reflected in natural areas since the number entering the hatchery are actual counts.

Despite the potential bias, coho trends, based on trapping data at Willow Creek weir, indicate that coho runs returning to the upper Trinity basin are heavily supported by TRH production. The past seven seasons of trapping data (years in which all TRH-produced coho have been 100% marked) have consistently shown that the marked percentage of coho observed at the weir has been substantial, 84 to 94% of the total observed (appendix 2). This season we estimated that approximately 84% of the run was composed of TRH-produced coho.

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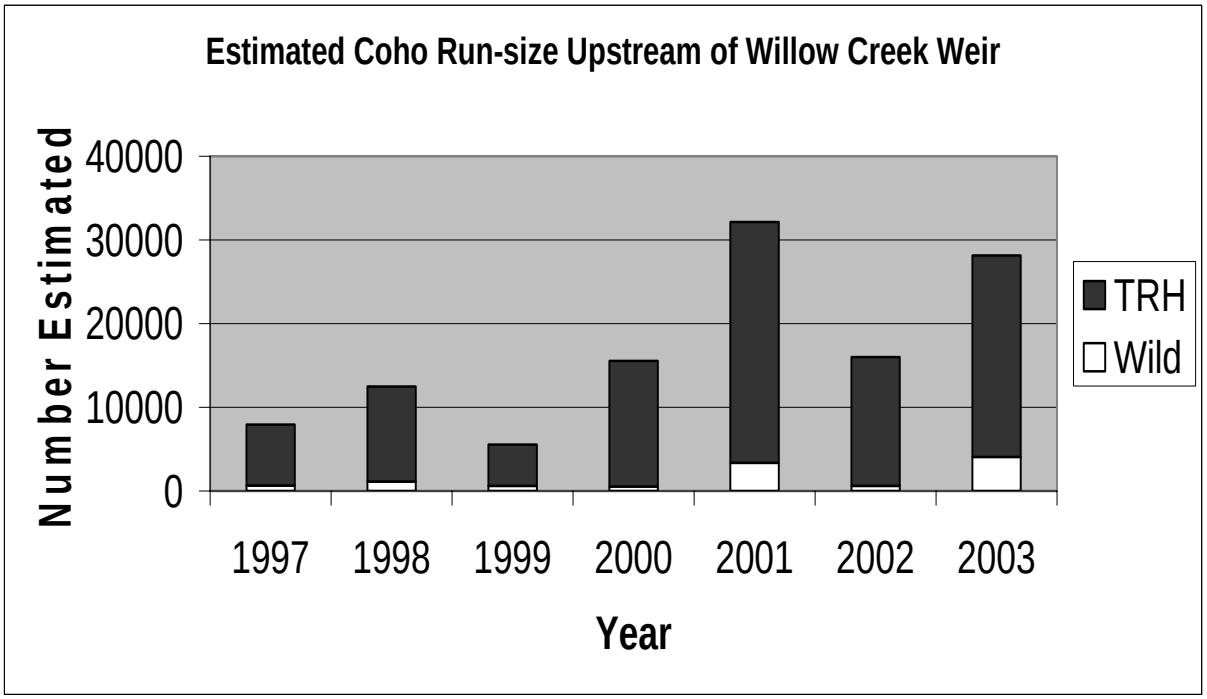
Appendix 1. Run-size, harvest and spawner escapement estimates for right maxillary clipped, Trinity River Hatchery-produced coho salmon returning to the Trinity River, upstream of Willow Creek weir, brood years 1994-2000.

Release data				Return data						
Brood		Effective				% of	In-river	Spawner Escapement		
year	Date	Number	Site	Age	Run-size	release	harvest	TRH	Natural	Total
1994	3/17-21/96	72,311	TRH	2	970	1.34%	0	105	865	970
			TRH	3	1,732	2.40%	0	867	865	1,732
				Totals:	2,702	3.74%	0	972	1,730	2,702
1995	3/17-21/97	580,880	TRH	2	5,552	0.96%	39	858	4,655	5,513
			TRH	3	9,008	1.55%	0	3,899	5,109	9,008
				Totals:	14,560	2.51%	39	4,757	9,764	14,521
1996	3/16-20/98	513,663	TRH	2	2,340	0.46%	0	969	1,371	2,340
			TRH	3	4,357	0.85%	86	3,015	1,256	4,271
				Totals:	6,697	1.30%	86	3,984	2,627	6,611
1997	3/15-22/99	517,196	TRH	2	592	0.11%	0	381	211	592
			TRH	3	9,704	1.88%	0	3,407	6,297	9,704
				Totals:	10,296	1.99%	0	3,788	6,508	10,296
1998	3/15-20/00	493,233	TRH	2	5,289	1.07%	0	916	4,373	5,289
			TRH	3	25,395	5.15%	0	9,625	15,770	25,395
				Totals:	30,684	6.22%	0	10,541	20,143	30,684
1999	3/15-22/01	512,986	TRH	2	3,373	0.66%	0	1,024	2,349	3,373
			TRH	3	13,849	2.70%	0	6,409	7,440	13,849
				Totals:	17,222	3.36%	0	7,433	9,789	17,222
2000	3/17-19/02	524,238	TRH	2	1,571	0.30%	0	688	883	1,571
			TRH	3	20,721	3.95%	0	9,730	10,991	20,721
				Totals:	22,292	4.25%	0	10,418	11,874	22,292

Appendix 2. Naturally and Trinity River Hatchery-produced coho salmon run-size, in-river angler harvest and spawner escapment estimates for the Trinity River upstream of Willow Creek Weir for 1997-2003.

					Spawner Escapement								
		Run-size Estimate			Natural			Trinity River Hatchery			Angler harvest		
Year	Strata	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults	Total
1997	Natural	399	252	651	383	232	615	13	20	33	3	0	3
	TRH	5,552	1,732	7,284	4655	865	5520	858	867	1725	39	0	39
1998	Natural	131	1,001	1,132	123	886	1,009	8	115	223	0	0	0
	TRH	2,340	9,008	11,348	1,371	5,109	6,480	969	3,899	4,868	0	0	0
1999	Natural	31	555	586	23	440	463	8	103	111	0	12	12
	TRH	592	4,357	4,949	211	1,266	1,477	381	3,015	3,396	0	86	86
2000	Natural	197	342	539	187	288	475	10	54	64	0	0	0
	TRH	5,289	9,704	14,993	4,373	6,297	10,670	916	3,407	4,323	0	0	0
2001	Natural	298	3,075	3,373	296	2,945	3,241	2	130	132	0	0	0
	TRH	3,373	25,395	28,768	2,349	15,770	18,119	1,024	9,625	10,649	0	0	0
2002	Natural	138	458	596	123	372	495	15	86	101	0	0	0
	TRH	1,571	13,849	15,420	883	7,440	8,323	688	6,409	7,097	0	0	0
2003	Natural	163	3,930	4,093	149	3,264	3,413	14	666	680	0	0	0
	TRH	3,338	20,721	24,059	1,889	10,991	12,880	1,449	9,730	11,179	0	0	0



ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2003-04 SEASON

TASK 4
SALMON SPAWNER SURVEYS IN THE UPPER TRINITY RIVER

by

Monty Currier and Wade Sinnen

ABSTRACT

Employees of the California Department of Fish and Game's (CDFG) Trinity River Project (TRP), in cooperation with the Yurok Tribe, the U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS) conducted a salmon spawner survey of the Upper Trinity River from September 9th through December 23rd, 2003. The survey focused on the mainstem Trinity River from the upper most available anadromous spawning area at Lewiston Dam (river section #1) and continued down stream to the Cedar Flat recreation area (river section #10), a total of 101.6 rkms. The survey did not include any tributaries that may have been used for spawning by anadromous fish species. We examined 15,572 chinook salmon (Oncorhynchus tshawytscha) and 468 coho salmon (O. kisutch) carcasses during our survey. Carcass numbers and density were the most numerous in the uppermost reach. Carcass numbers and density generally decreased in a downstream progression.

Spring- and fall-run Chinook salmon carcasses were both recovered during the spawning season. Recovery of spring-run Chinook carcasses out numbered fall-run Chinook salmon until the week of October 22nd. After this time, fall-run Chinook became the dominate run recovered during the survey. Coho salmon were recovered starting on October 22nd and peaked the week of December 10th.

Chinook fork lengths averaged 75.5cm (range: 35-112 cm) for spring-run and 74.6 cm (range: 38-112 cm) for fall-run. Adult Chinook made up 98.6% of the spring and 97.6 % of the fall chinook. Coho salmon fork lengths averaged 65.0cm (range: 37-83 cm). Coho adults composed 91.5 % of all coho recovered during our surveys.

Recovered spring chinook salmon had a male: female sex ratio of approximately 0.48: 1, while fall Chinook salmon had a sex ratio relationship of male: female; 0.55: 1 respectively. Coho salmon had a male: female sex ratio of approximately 0.76:1

We estimated female pre-spawn mortality of spring and fall Chinook at 6.4% and 13.2 %, respectively. Coho female pre-spawn mortality was estimated to be 13.6 %.
Based on the recovery of adipose-fin-clipped Chinook salmon carcasses, we estimated that 25.2% of the spring-run and 28.2 % of the fall-run salmon spawners observed in the mainstem

survey were of hatchery origin. Based on the recovery of right-maxillary clipped coho, we estimate that 80.1 % of the mainstem spawners were of hatchery origin.

OBJECTIVES

1. To determine the size, sex composition, and hatchery component among the naturally spawning populations in the mainstem Trinity River.

2. To determine the incidence of pre-spawning mortality among naturally spawning chinook and coho salmon in the mainstem Trinity River.

3. To determine the distribution of the naturally spawning populations of chinook and coho salmon within the mainstem Trinity River.

INTRODUCTION

The California Department of Fish & Game's (CDFG) Trinity River Project (TRP) in cooperation with the Yurok Tribe (YT) and the U.S. Fish and Wildlife Service (USWFS) conducted a carcass and redd survey in the mainstem Trinity River. The survey was funded through the Trinity River Restoration Program (TRRP). The U.S. Forest Service (USFS) also participated in the survey using internal funding. Their participation was limited to enumerating redds in the uppermost reach (Lewiston Dam area).

Reporting responsibilities for the project were divided into two parts; CDFG was responsible for reporting on the carcass survey portion of the study and the USFWS and YT for the redd enumeration part of the study. Redd survey information included in this report was summarized by the Yurok Tribe and USFWS.

Spawner surveys have been conducted intermittently on the Trinity River since 1955. Spawning surveys prior to 1964 included river sections located above river mile (RKM 180.1), the site of present day Lewiston dam.

The redd/carcass surveys are intended to improve our understanding of the pre- and post-treatment effectiveness of flow and habitat manipulations being implemented by the TRRP. We aim to document any changes in spawner density, spawner distribution, and prespawn mortality rates that may occur. Additionally, our surveys aid in the evaluation of hatchery effects within the basin.

METHODS

The study area included the main stem Trinity River from its upstream limit to anadromous fish

migration at Lewiston Dam to Cedar Flat Recreational Area. The study area was divided into 10 sections (Table 1, Figure 1). Sections were surveyed between September 9 and December 23, 2003. CDFG and YT crews attempted to survey sections 1-5 on a consecutive basis with each section surveyed at least once a week, however manpower and logistical constraints caused some sections to be excluded on occasion. USFWS surveyed sections 6-10. Sections 6 and 7 were surveyed once a week, while sections 8-10 were only surveyed on a bi-weekly basis. The reason for this was a result of limited staff available and limited spawning activities in these sections.

Table 1. Description and Lengths of river zones used in the 2003 mainstem Trinity River carcass and redd survey.

River Zone	Length (km)	Zone Description
1	3.2	Lewiston Dam - Old Lewiston Bridge
2	7.9	Old Lewiston Bridge - Browns Mountain Bridge
3	10.2	Browns Mountain Bridge - Steel Bridge
4	10.4	Steel Bridge - Douglas City Camp
5	15.7	Douglas City Camp - Sky Ranch Road
6	7.2	Sky Ranch Road - Junction City Campground
7	8.8	Junction City Campground - Mouth of North Fork Trinity River
8	9.7	Mouth of N. Fork Trinity River - Big Flat Public Boat Launch
9	14.8	Big Flat Public Boat Launch - Del Loma
10	13.7	Del Loma - Cedar Flat Recreation Area

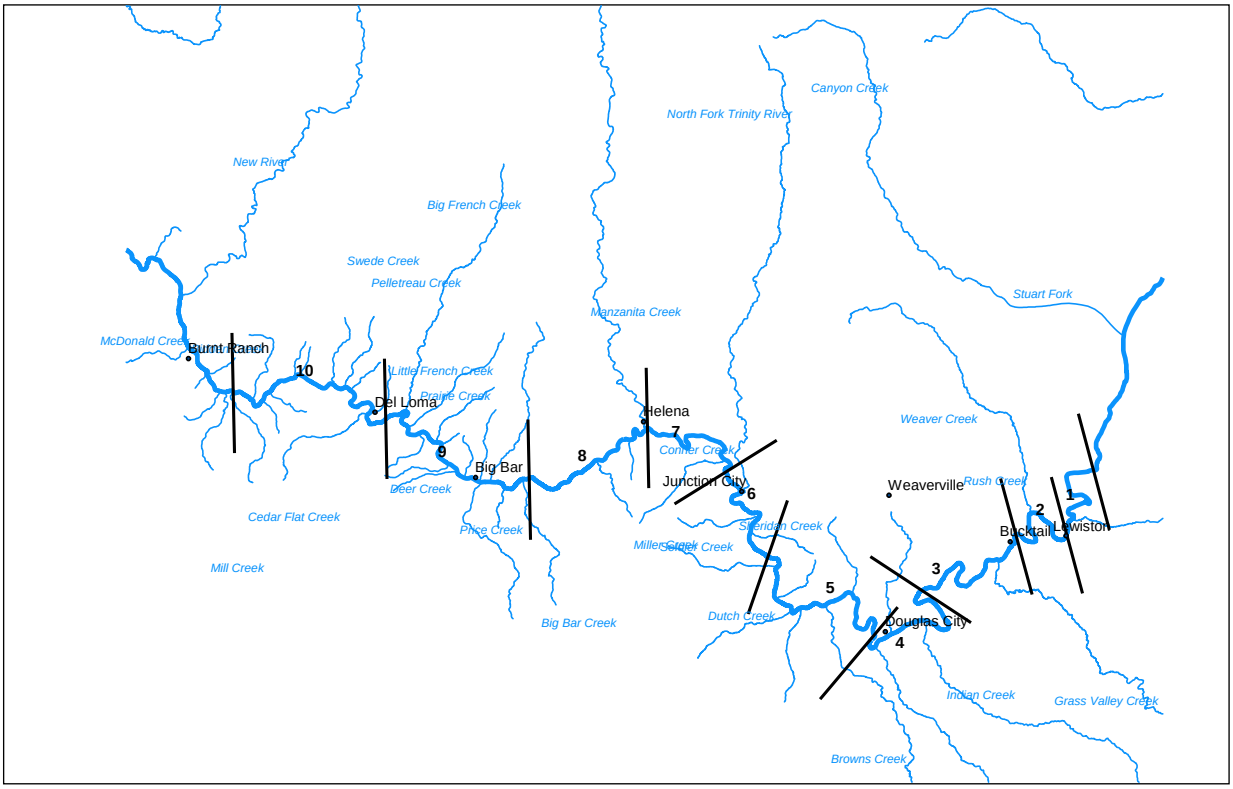


Figure1. Survey sections for 2003 Trinity River main stem spawner survey.

Surveys were conducted using 12-ft Avon™ and Otter™ inflatable rafts equipped with rowing frames. Each raft was staffed by two crew members, one rower-recorder and one person responsible for recovering carcasses. Two rafts in tandem cover either side of the river as the crews proceeded down stream. Carcasses were recovered from all accessible areas in the river and on the bank. Fish in deeper areas were recovered using telescoping poles with attached gigs.

In the Trinity River, there is a temporal and spatial overlap in the spring and fall Chinook runs. Since there is variation in the run timing each year, a date separating the two races was determined based on two factors. First, some of the Chinook carcasses recovered during the survey contained Coded Wire Tags (CWT's), which are implanted in their snouts prior to release from Trinity River Hatchery (TRH). CWT's are currently implanted in approximately 25% of all TRH Chinook salmon as juveniles. The code on each tag indicated whether each fish was of spring or fall-run salmon origin. Second, a portion of the carcasses recovered were marked with spaghetti tags placed on fish at CDFG fish trapping weirs located near the towns of Junction City and Willow Creek. Race was assigned to each fish tagged based on the times they were captured and tagged at the weirs. We separate the two runs of Chinook when the percent recovery of fall Chinook became greater than that of the spring Chinook during the survey week.

Carcasses were given a condition rating in order to classify the stage or degree of decomposition at any given period of time. During the survey, carcasses were separated into three categories as

follows: one clear eye (condition 1), both eyes cloudy (condition 2), and skeletal remains (condition 3).

Carcasses that were recovered during the survey were identified to species, gender, and examined for hatchery clips and/or program tags (spaghetti tags). We measured each fish to the nearest cm fork length (FL). Hatchery clips included adipose-fin clips (Ad) on salmon and steelhead and right maxillary clips (RM) on coho salmon. Ad-clips on Chinook salmon indicated the presence of a coded-wire tag (CWT). All Trinity River Hatchery (TRH) produced steelhead are clipped prior to release, however no CWT's are implanted. Similar to steelhead, all TRH coho are marked, except that coho are marked with a right maxillary (RM) clip.. Heads of all recovered Ad-clipped Chinook were removed and retained for later CWT tag recovery. The CWT's are extracted and decoded by TRP staff. Spaghetti tags, applied at the two main stem weirs to complete Task 1 of this report, were removed and the unique number associated with each was recorded.

Spawning condition in all female salmon was determined by direct observation of the ovaries. Fish were classified as either spawned or un-spawned based on their egg retention. Females retaining over 50 percent of their eggs were classified as un-spawned. We made the assumption that all females were adult fish. Male spawning condition was not assessed, as its determination was considered to be too subjective. All carcasses were cut in half, using a machete, to prevent processing of the same carcass in the future.

RESULTS

Spring / fall chinook separation

Overlap of spring and fall chinook occurred primarily during Julian weeks 42 - 46. Spring Chinook carcass recoveries were predominant through Julian week 43 (Oct. 22-Oct 28), after which, fall Chinook recoveries were most numerous. For the purpose of analysis, all Chinook recoveries prior to Julian week 44 were classified as spring Chinook and all subsequent carcass recoveries were classified as fall Chinook (Figure 2).

Carcass distribution

We recovered 15,572 Chinook carcasses during a 16 week period in our 10 survey sections (Table 2). The majority of the Chinook carcasses (12,488) were recovered in sections 1- 2. Recovery of Chinook was greatest during Julian week 44 (Oct 29th.-Nov.4th) when crews recovered 1,923 Chinook.

Similar to carcass recovery results, Chinook redds were encountered most frequently in section 1 (Table 3). A total of 3,318 redds were enumerated in section 1, approximately half of the total

(3,318 / 6,868) for all sections combined. The fewest redds (78) were observed in section 8. The peak period for redd eneumeration was Julian weeks 40-43 when 3,908 redds were counted, representing 57% of the total for the season.

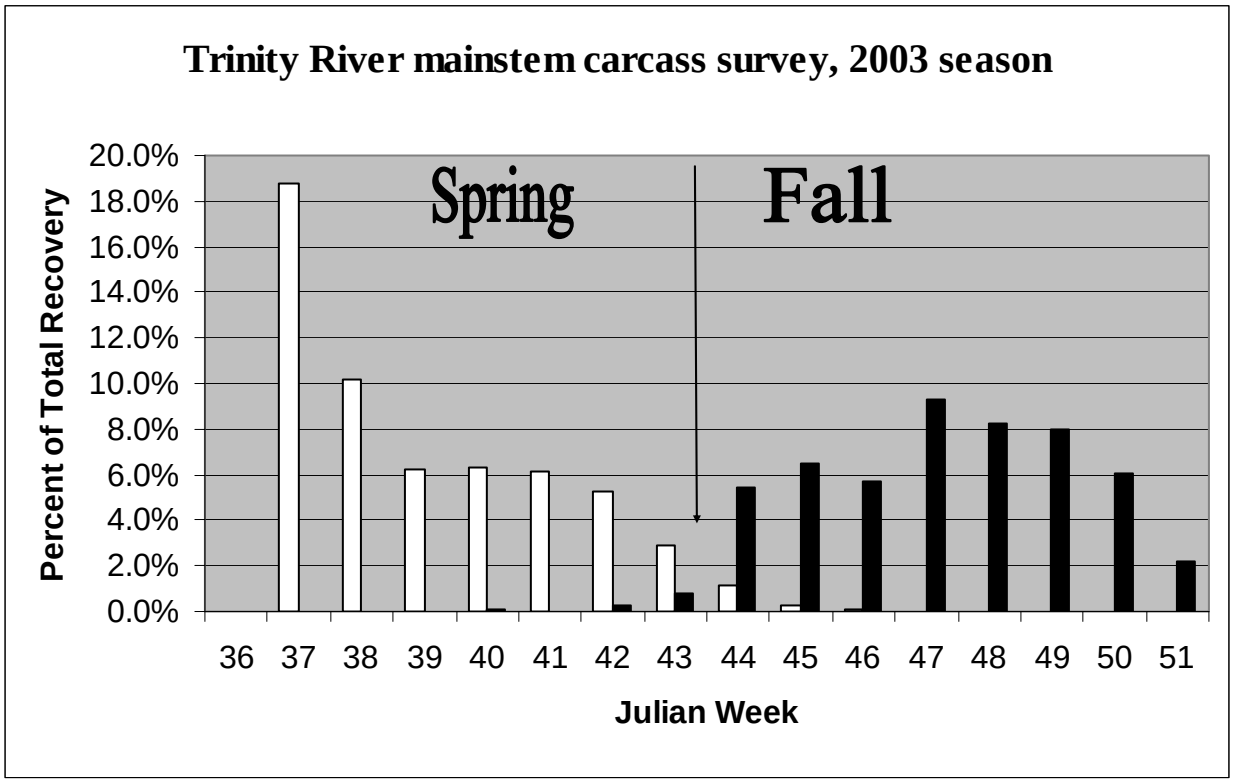


Figure 2. Weekly proportions of coded-wire tagged and Program-marked spring and fall-run chinook Observed in the 2003 main stem Trinity River spawner survey. The arrow expresses the designated seperation between the spring and fall runs.

Table 2. Recovery of all Chinook salmon by Julian week and section in the main stem Trinity River spawner survey during the 2003-2004 season.

		Julian week of Chinook recovery																
		36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
		Week ending																
		Sept. 9	Sept. 16	Sept. 23	Sept. 30	Oct. 7	Oct. 14	Oct. 21	Oct. 28	Nov. 4	Nov. 11	Nov. 18	Nov. 25	Dec. 2	Dec. 9	Dec. 16	Dec. 23	
Section	Number of Surveys	Number of Chinook recovered																Section totals:
1	16	3	17	43	136	613	695	592	544	701	878	1,210	1,173	1,009	572	367	140	8,693
2	16	3	5	13	80	NS	380	658	NS	877	422	384	394	349	112	91	27	3,795
3	14	NS	10	10	62	146	NS	165	158	180	207	160	153	86	64	27	9	1,437
4	13	NS			17	78	75	NS	115	120	88	102	30	NS	35	7	3	670
5	11	NS			11	38	72	69	77	NS	36	NS	37	NS	11		NS	351
6	16	NS		2	10	44	85	48	50	29	NS	41	18	2		1	NS	330
7	13	NS	NS	1	5	10	NS	56	21	16	NS	18	10	2	2	2	NS	143
8	7	NS	NS	NS		NS		NS	9	NS	16	NS	3	NS	4		NS	32
9	6	NS	NS	NS	1	NS	2	NS	18	NS	26	NS	33	NS	12	NS	1	93
10	8	NS	NS	NS	1	NS	1	NS	2	NS	7	NS	12	NS	5			28
	Weekly Totals:	6	32	69	323	929	1,310	1,588	994	1,923	1,680	1,915	1,863	1,448	817	495	180	15,572

a/ NS indicates that a survey was not performed that week.

Table 3. Summary of weekly redd enumeration, mainstem Trinity River carcass/redd survey, 2003-04 season. a/

Section	Section Start/End	Julian week of redd enumeration															Total Redd Count
		37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
1	Lewiston Dam-Old Lewiston Bridge	7	32	201	382	430	335	262	226	418	373	387	157	83	25		3,318
2	Old Lewiston Bridge-Browns Mt. Bridge		3	40	178	251	132	133	112	43	17	18	36	4	1		968
3	Browns Mt. Bridge Steel Bridge			43	137	190	118	151	69	47	12	35	5	4			811
4	Steel Bridge-Douglas City Campground			87	95	113	NS	124	32	9	28	18	NS				506
5	Douglas City Campground-Sky Ranch road (Jct. City)			67	150	133	78	43	NS	24	NS	13	NS				508
6	Sky Ranch road (Jct. City) Jct. City Campground	NS	8	26	51	51	48	35	21	3	6	9	3				261
7	Jct. City Campground-N.F. Trinity River	NS	2	5	14	34	34	29	11	12	8	0	5	2			156
8	N.F. Trinity River-Big Flat	NS	NS	1	NS	4	NS	36	NS	27	NS	7	NS	3	NS		78
9	Big Flat-Del Loma	NS	NS		NS	23	NS	72	NS	61	NS	14	NS	10	NS	2	182
10	Del Loma-Cedar Flat Rec. area	NS	NS		NS	12	NS	30	NS	29	NS	7		2	NS		80
	Weekly totals:	7	45	470	1,007	1,241	745	915	471	673	444	508	206	108			6,868

a/ Data provided by U.S. Fish and Wildlife Service.

b/ NS-No survey was conducted.

Spring chinook salmon

There were 5,251 chinook classified as spring-run examined during the survey (Table 4), of those, 2,271(43.2 %) Chinook were classified as condition-one. The largest number (2,643) and greatest density (825.9 fish/km) of spring Chinook carcasses were recovered in section 1, followed by section 2 with a density of 144.2 fish/km. Sections 3 and 6 had a density greater then 30, (54.0 and 33.2 fish/ km). In contrast, sections 8-10 had densities less than 2 fish/km. Section 10 had the lowest density (0.3 fish/ km) of spring-run carcasses observed during the survey. Section 10 is located between Del Loma and the Cedar Flat Recreation Area.

Table 4. Number, density, incidence of Ad clips, project tags, and condition of spring Chinook salmon recovered during the 2003-2004 main stem Trinity River spawner survey.

Section	length (km)	Number observed a/	Density (fish/km)	Cond 1 b/	Cond 2 c/	Ad-clips d/ Total	Ad-clips d/ C-1	Project tags e/ Total	Project tags e/ C-1
1	3.2	2,643	825.9	1,096	1,483	262	132	40	15
2	7.9	1,139	144.2	432	683	77	36	20	12
3	10.2	551	54.0	262	269	17	11	18	7
4	10.4	285	27.4	146	124	6	3	4	2
5	15.7	267	17.0	154	102	1	1	3	3
6	7.2	239	33.2	122	106	4	2	2	
7	8.8	93	10.6	43	40	1	1	2	
8	9.7	9	0.9	3	6				
9	14.8	21	1.4	12	8	2	2		
10	13.7	4	0.3	1	2				
Totals:	101.6	5,251	51.7	2,271	2,823	370	188	89	39

a/ For the purpose of analysis we considered all Chinook recovered prior to Julian week 44 (Oct 29) as spring Chinook.

b/ Condition-1 fish are those with at least one clear eye and considered to have died within one week.

c/ Condition-2 fish are those with both eyes cloudy and considered to have died more than a week previous to recovery.

d/ Adipose fin clipped chinook salmon. Total and condition-1(C-1) recoveries shown.

e/ Spaghetti tags applied at Willow Creek and Junction City weirs. Total and condition-1 (C-1) recoveries sho

Fall Chinook

There were 10,321 chinook classified as fall-run examined during the survey (Table 5), of which, 3,691 (35.8%) were classified as condition-one. The largest number (6,050) and the greatest density (1890.6 fish/ km) of all fall carcasses were recovered in section 1, followed by section 2, (336.2 fish/km). Sections 3-4 had considerable lower densities of (86.9 and 37.0 fish/km). The remaining sections (5-9) had much lower carcass concentrations, less than 13.0 fish/km. Resembling the spring chinook, the lowest density of fall chinook carcasses occurred in section 10 at a density of (1.8 fish/ km).

Coho Salmon

Coho salmon carcasses were recovered starting in late October and peaked in mid-December. A total of 468 coho were recovered during the survey, of which 281 were classified as condition-1 and 187 as condition-2 (Table 6). The highest density of coho salmon were recovered in section 1 (95.0 fish/km). Carcass recovery of coho salmon remained relatively low in the remaining sections.

Table 5. Number, density, incidence of Ad clips, project tags, and condition of fall Chinook salmon recovered during 2003-04 mainstem Trinity River spawner survey.

Section	length (km)	Number observed a/	Density (fish/km)	Cond 1 b/	Cond 2 c/	Ad-clips d/ Total	Ad-clips d/ C-1	Project tags e/ Total	Project tags e/ C-1
1	3.2	6,050	1890.6	2,309	3,600	578	304	72	23
2	7.9	2,656	336.2	794	1,728	161	77	30	8
3	10.2	886	86.9	295	542	37	15	9	4
4	10.4	385	37.0	144	201	10	6	1	
5	15.7	84	5.4	30	47	1	1	2	
6	7.2	91	12.6	35	47	9	3	1	
7	8.8	50	5.7	25	19	4	1	1	1
8	9.7	23	2.4	13	8	3	3		
9	14.8	72	4.9	34	21	1	1		
10	13.7	24	1.8	12	12				
Totals:	101.6	10,321	101.6	3,691	6,225	804	411	116	36

a/ For the purpose of analysis we considered all Chinook observed after Julian week 43 (Oct. 28) as fall Chinook.
b/ Condition-1 fish are those with at least one clear eye and considered to have died within one week.
c/ Condition-2 fish are those with both eyes cloudy and considered to have died more than a week previous to recover
d/ Adipose fin clipped chinook salmon. Total and condition-1(C-1) recoveries shown.
e/ Spaghetti tags applied at Willow Creek and Junction City weirs. Total and condition-1 (C-1) recoveries shown.

Size Composition

Only condition-1 and condition-2 fish that were measured are included in our analysis. Condition-3 fish were not included due to potential inaccuracies in measuring fish in various decomposed states. The size separating grilse and adults was determined using length frequency analysis of fish trapped at two mainstem weirs and TRH (Task 1 of this report).

Spring chinook

Fork lengths of 5,094 of spring Chinook averaged 75.5 cm and ranged between 35-112 cm (Figure 3). Grilse accounted for 1.4 % (69 / 5,094) of the measured spring chinook. Grilse were considered fish < 52 cm, FL.

Fall chinook

Fork lengths obtained from 9,907 fall chinook averaged 74.6 cm and ranged between 38-112 cm (Figure 3). Grilse accounted for 2.4% (240/9,907) of measured fall chinook. Grilse were considered fish < 55 cm, FL.

Table 6. Number, density, incidence of right maxillary (RM) clips, project tags, and condition of Coho salmon rec during the 2003-04 mainstem Trinity River spawner survey.

Section	Length (km)	Number observed	Density (fish/km)	Cond 1 c/	Cond 2 d/	RM-clips a/ Total	RM-clips a/ C-1	Project tags b/ Total	Project tags b/ C-1
1	3.2	304	95.0	174	130	255	142	6	2
2	7.9	106	13.4	64	42	78	47	1	
3	10.2	37	3.6	27	10	28	19		
4	10.4	8	0.8	6	2	4	3		
5	15.7	2	0.1	1	1	1			
6	7.2		0.0						
7	8.8	1	0.1		1	1			
8	9.7		0.0						
9	14.8	4	0.3	3	1	3	2	1	1
10	13.7	6	0.4	6		5	5		
Totals:	101.6	468	4.6	281	187	375	218	8	3

a/ Right-maxillary clipped coho salmon. Total and condition-1(C-1) recoveries shown.

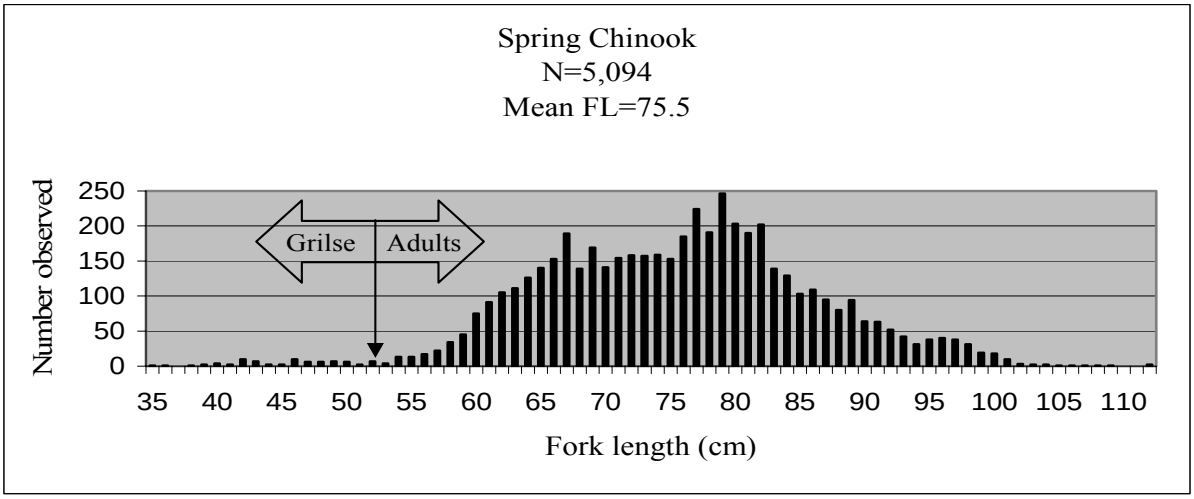
b/ Spaghetti tags applied at Willow Creek and Junction City weirs. Total and condition-1 (C-1) recoveries shown.

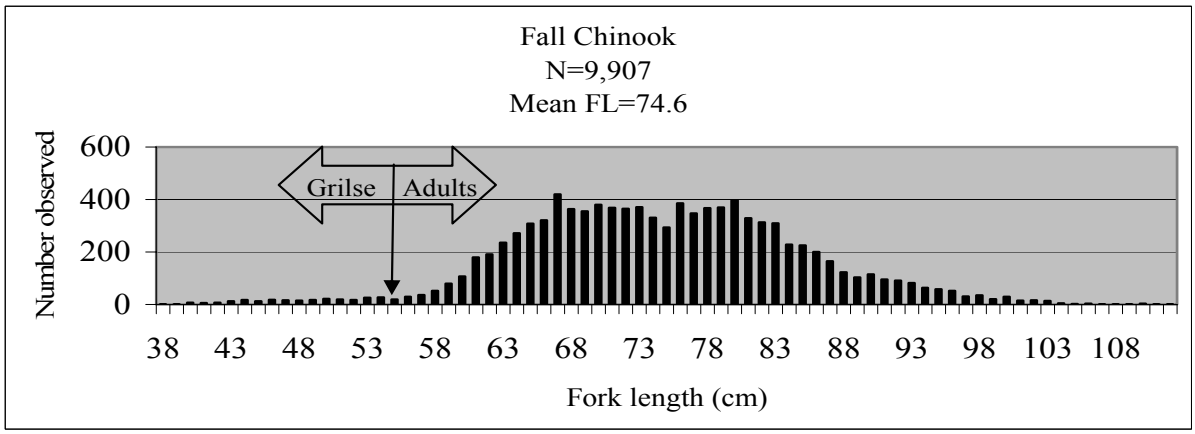
c/ Condition-1 fish are those with at least one clear eye and considered to have died within one week.

d/ Condition-2 fish are those with both eyes cloudy and considered to have died more than a week previos to recov

Coho

Fork lengths of 468 coho salmon were examined (Figure 3). The average size of coho examined was 65.0 cm and the range was from 37-83 cm. Grilse accounted for 7.9% (37/468) of measured coho. Grilse were considered fish < 54cm, FL.





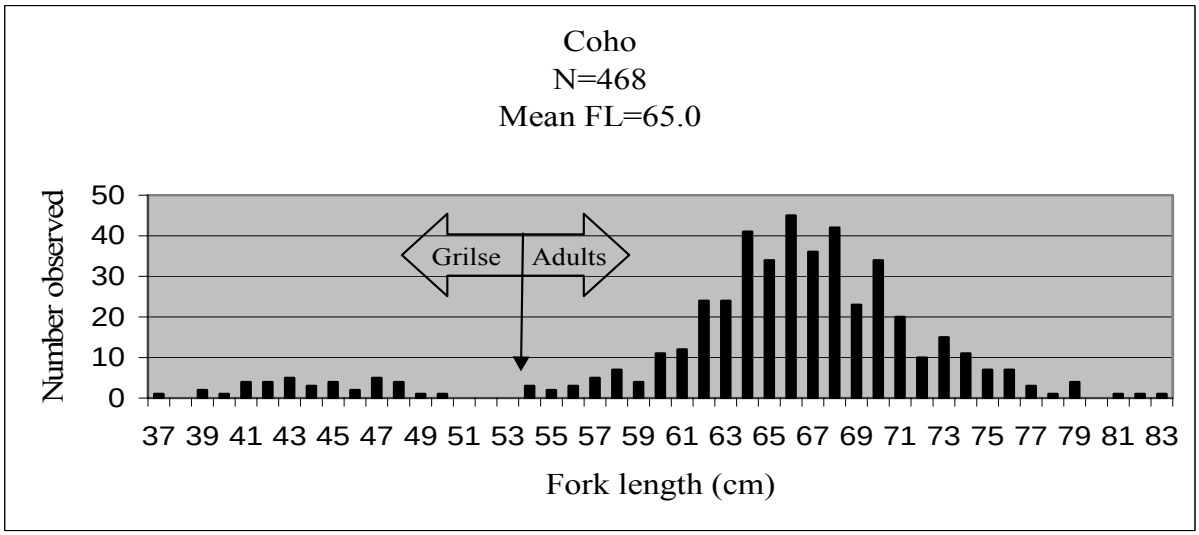


Figure 3. Length frequency histograms for Chinook and coho salmon measured during the 2003-04 mainstem Trinity River spawner survey.

Adult sex composition and female pre-spawn mortality

All identifiable, measured chinook and coho salmon carcasses recovered during this survey were examined for sexual identity. Adult female ovaries were examined for spawning completeness to determine a pre-spawn mortality rate. Fish were considered pre-spawn mortalities if they retained over 50 percent of their eggs.

Spring chinook

Of the adult spring chinook recovered that were sexed, 1,646 were sexed as males and 3,394 as females, a male to female ratio of 0.3:1. Of all "springers" measured, 6 adult fish could not be reliably sexed.

During the survey we examined 3,394 adult female spring-chinook salmon, of which 18 were unclassified and 216 were classified as pre-spawn mortalities, a rate of 6.5 %.

Fall chinook

Of the 9,685 adult fall chinook that were sexed, 3,412 were sexed as males and 6,269 were as females, a male: female ratio of 0.5 :1. The gender of 4 adult chinook could not be reliably determined.

Of the 6,269 adult female fall chinook carcasses examined, thirteen were unclassified and 730 were classified as un-spawned, a rate of 11.7 %.

Coho salmon

We measured 428 adult coho during the survey, of which 185 were males and 243 were females. All coho were able to be classified by gender. The male: female ratio was approximately 0.8:1.

A total of 243 female coho carcasses were examined for spawning success and 33 were classified as un-spawned, a rate of 13.6%.

Incidence of Program marked salmon

Spring Chinook

A total of 89 project spaghetti tags were recovered from spring Chinook, of which, 39 were recovered from condition-1 fish (Table 4). One tag was applied at the Willow Creek weir and the remaining 88 at Junction City weir. Slightly under half (44.9 %) of all project tags were recovered in section 1. Project tags were observed on 1.7% (89/5,251) of the spring Chinook we examined.

Fall Chinook

A total 116 of project spaghetti tags were recovered from fall Chinook, of which, 36 were recovered from condition-1 fish (Table 5). Forty-four of the tags recovered were applied at the Junction City weir and the remaining 72 tags originated from the Willow Creek weir. Of the

project tags recovered, 62.0% were recovered in section 1. Project tags were observed on 1.1% (116/10,321) of the fall Chinook we examined.

Coho salmon

Eight project spaghetti tags were recovered in a coho salmon during our surveys this season (Table 6). Three of these project tagged coho were classified as a condition-1 fish. The incidence of project tagged fish was 1.7 % (8/468).

Incidence of hatchery produced Chinook and coho salmon

Spring Chinook

One hundred and Eighty-eight (8.3%) of the condition-one and 370 (7.0 %) of all spring Chinook bore Ad-clips. The majority (339/370) of the Ad-clipped Chinook were recovered in sections 1 and 2 (Table 4). Coded-wire tags (CWT's) were recovered from 287 of the total Chinook recovered during the spring Chinook recovery period (Table 7), of which eleven CWT's were from fall Chinook and 276 were of spring Chinook origin. We did not recover CWT's from eighty three Ad-clipped Chinook recovered during the period associated with spring Chinook. Two release groups, 065258 and 065270 comprised 28.2% of the total.

Based on expansion of all CWT codes recovered during the spring period (Table 7), we estimated that 1,258 (24.0%) of the total 5,251 fish recovered during the spring period were of TRH origin. Based on expansions of all spring CWT groups, we estimate that the age structure of TRH spring Chinook recovered in the mainstem Trinity carcass survey was 0.7% age 2, 54.0% age 3, and 45.4% age 4.

Fall Chinook

Four hundred and eleven (11.1 %) of the condition-one and 804 (7.8 %) of all fall Chinook bore Ad-clips. The majority (578/804) of the Ad-clipped fish were found in section-1 (Table 5). CWT's were extracted from 719 the 804 Ad-clipped fish (Table 7), of which 27 were spring Chinook and 692 were fall Chinook. CWT's were not extracted from 85 Chinook. Based on expansion of all CWT codes recovered during the fall period (Table 7), we estimate that 2,904 (28.1%) of the total 10,321 Chinook recovered during the fall period were of TRH origin. The yearling release group, 065259, comprised 33.6% of the expanded total.

Based on the expansion of all fall Chinook CWT codes, we estimate that the age structure of TRH fall Chinook recovered in the mainstem Trinity carcass survey was 0.7 % age 2, 54.0 % age 3, and 45.3% age 4.

Coho Salmon

The occurrence of right maxillary clips (RM) was found on 375 of the 468 (80.1%) coho examined (Table 6). We combined condition-1 and -2 fish in this analysis because RM clips, unlike adipose fin-clips, remain recognizable long after the fish has died and are therefore

subject to less observer error. Based on the fact that all TRH-produced coho salmon are marked prior to release, we estimate that 80.1% of coho recovered during the survey were of TRH origin.

Table 7. Release and recovery data for coded-wire tagged, Trinity River Hatchery-produced Chinook salmon, recovered during the mainstem Trinity River carcass survey, 2003-04 season. a/

Release data					Recovery data				
CWT code	Brood year	Age	Release type b/	Production multiplier c/	Recovery period d/ Spring	Recovery period d/ Fall	Total	% of sub-total	Expanded total
Spring Chinook									
065251	1999	4	Sf	6.67	16		16	4.1%	106.72
065252	1999	4	Sf	6.4	19		19	4.9%	121.6
065253	1999	4	Sf	6.19	22	1	23	6.0%	142.37
065258	1999	4	Sy	2.93	62	3	65	16.8%	190.45
065260	2000	3	Sf	4.51	11		11	2.8%	49.61
065261	2000	3	Sf	4.21	11	1	12	3.1%	50.52
065262	2000	3	Sf	4.21	8		8	2.1%	33.68
065263	2000	3	Sf	4.05	22	1	23	6.0%	93.15
065264	2000	3	Sf	4.05	21	6	27	7.0%	109.35
065269	2000	3	Sf	4.05	36	1	37	9.6%	149.85
065270	2000	3	Sf	4.51	31	13	44	11.4%	198.44
065279	2000	3	Sy	4.05	15	1	16	4.1%	64.8
065281	2001	2	Sf	4.03	1		1	0.3%	4.03
065282	2001	2	Sf	4.09	1		1	0.3%	4.09
No CWT recovered e/					83		83	21.5%	
				Sub-totals:	359	27	386		1318.66
Fall Chinook									
065254	1999	4	Ff	10.83		15	15	1.9%	162.45
065255	1999	4	Ff	10.8		6	6	0.8%	64.8
065256	1999	4	Ff	10.95	2	12	14	1.8%	153.3
065257	1999	4	Ff	10.96		13	13	1.6%	142.48
065259	1999	4	Fy	2.89	3	262	265	33.6%	765.85
065265	2000	3	Ff	4.17		12	12	1.5%	50.04
065266	2000	3	Ff	4.06		24	24	3.0%	97.44
065267	2000	3	Ff	4.05	1	21	22	2.8%	89.1
065268	2000	3	Ff	4.49		7	7	0.9%	31.43
065271	2000	3	Ff	2.93	1	29	30	3.8%	87.9
065272	2000	3	Ff	4.17		19	19	2.4%	79.23
065273	2000	3	Ff	4.05	1	36	37	4.7%	149.85
065274	2000	3	Ff	4.04		22	22	2.8%	88.88
065275	2000	3	Ff	4.06		31	31	3.9%	125.86
065276	2000	3	Ff	4.06	1	13	14	1.8%	56.84
065277	2000	3	Ff	4.11		9	9	1.1%	36.99
065278	2000	3	Ff	4.12		7	7	0.9%	28.84
065280	2000	3	Fy	4.05	2	141	143	18.1%	579.15
065643	2000	3	Ff	4.04		8	8	1.0%	32.32
065284	2001	2	Ff	4.09		1	1	0.1%	4.09
065285	2001	2	Ff	4.08		2	2	0.3%	8.16
065286	2001	2	Ff	4.33		1	1	0.1%	4.33
065287	2001	2	Ff	4.05		1	1	0.1%	4.05
No CWT recovered e/						85	85	10.8%	
				Sub-totals:	11	777	788		2,843.38
				Grand totals:	370	804	1,174		4,162.04
				Expanded grand totals:	1,258	2,904			

a/ Survey was conducted from Lewiston Dam downstream to Cedar Flat between September 9 through December 23, 2003.
b/ Release types: Sf-Spring Chinook fingerling, Sy-Spring Chinook yearling; Ff-Fall Chinook fingerling, Fy-Fall Chinook yearling.
c/ Hatchery production multiplier used to account for untagged releases of the same brood year, race, and release type.
d/ Spring Chinook recovery period was September 9 through October 28. Later recoveries were considered fall Chinook.
e/ CWT was not present or was lost during recovery.

Discussion

Chinook carcass recoveries this season surpassed last year's total by a margin of 11,357 fish (Appendix 1). This in part can be attributed to last year's fish kill in the lower Klamath River. The fish kill significantly reduced the number of fall Chinook spawners returning to the Trinity River in 2002. We also recovered 291 more Coho this season than last (Appendix 2).

It is important to note that with the increased number of retuning spawners this season, the task of recovering carcasses became increasingly difficult. During this year's survey, crews on two occasions did not completely collect all AD-clipped heads they encountered. The reason for not collecting heads that possibly contained coded-wire tags was they did not carry a sufficient number of "head bags". As a result, our hatchery component estimate based on expanding CWT's, is not complete. The increase in returning salmon runs may be contributed to several factors. Factors that aided the large runs include favorable ocean conditions while the fish were maturing.

The spawner survey conducted this year included both carcass recovery and redd enumeration and mapping. Prior to 1996, CDFG conducted carcass recovery operations which entailed flagging carcasses for subsequent recapture to estimate recovery efficiency. This allowed us to estimate the total number of spawners in each surveyed section. With the addition of the redd mapping, crews did not have enough time to perform mark-recapture efficiency estimates. Therefore, sectional carcass density estimates prior to 1996 for the main stem Trinity River may not be directly comparable to current findings.

Carcass distribution

As in past years, Chinook carcasses were most frequently recovered in the upper two sections this season (Appendix 1). Eighty percent (12,488/15,572) of all Chinook were recovered from Lewiston Dam downstream to Browns Mountain Bridge, a length of approximately 11 kms. The remaining sections (3-10), a length of approximately 90 kms, yielded a combined 3,084 (20.0%) of all Chinook carcasses. The high density of Chinook carcasses in the upper two sections appears primarily to be due to "short distance straying" of hatchery- produced Chinook at TRH. Other potential reasons that Chinook heavily utilize the upper 11 kms are the availability of quality spawning habitat, suitable water temperatures, suitable holding and spawning flow regimes or natal homing (i.e. the large number of Chinook spawned in these sections perpetuate returns to the same areas. Coho recoveries, similar to Chinook, were also greatest in the upper two sections (Appendix 2). Sectional recovery trends for both Chinook and coho appear relatively consistent for the four years presented. We hypothesize that both Chinook and coho in the upper Trinity are partially or fully integrated with the TRH population, i.e. hatchery and natural fish are interbreeding in the wild and hatchery environment.

Size composition

The proportion of grilse in this year's run of Chinook and coho observed in the carcass survey and at three fixed locations (either Willow Creek or Junction City weir and Trinity River Hatchery) in the main stem Trinity River are presented in appendix 3. The proportion of Chinook grilse found during the surveys was intermediate compared to TRH and the weirs. This suggests that the wild grilse component was agreater percentage of the run compared to the hatchery componet. The proportion of grilse coho (9.4%) observed in the spawner survey was significantly different than the other two fixed sites (appendix 2), however, this may be a product of the recovery extended period for coho salmon this season. Had surveys continued into January when a majority of coho would have died, the grilse proportion may have changed. Additionally, increased river flows and poor water visibility conditions may have affected recovery of grilse. Of concern is the very high grilse rate observed at Willow Creek weir (17.2%), which suggests that trapping of grilse and adults there was not in proportion to the population, trapping did not extend long enough into the season or differential capture efficiency existed. Willow Creek weir trapped only through November the 14th (Julian week 46), due to high water flows.

Adult sex composition and female pre-spawn mortality

For both races of Chinook salmon, female adults out numbered male adults. Previous studies on the Trinity presented in Aguilar (1996), suggest this is common for Chinook salmon. It is generally assumed that adult females would compose a higher percentage of adults than their male counterparts due to the fact that a percentage of males return as grilse.

Reported Trinity River Chinook salmon pre-spawn mortalities have ranged from 0 to 71% for spring Chinook and 0.7 to 43.7% for fall Chinook for the 1987-2002 period (Appendix 4). This year's pre-spawn mortality rates of 6.5 % and 11.7 % for spring and fall Chinook respectively are typical of average run years. It has been noted, most recently by Zuspan (1998), that pre-spawn mortality may be density dependent in the Trinity system. In years of high Chinook abundance, pre-spawn mortality increases.

Incidence of Program marked salmon

One important aspect of our surveys is to recover Program marks (spaghetti tags) from Chinook and coho salmon. These fish, tagged at Willow Creek and Junction City weirs, are used to validate population estimates reported under Task 1 of this report. It is assumed that fish tagged at the weirs are representative of both the hatchery and naturally spawning populations within the Trinity. Therefore, we expect that salmon found during carcass surveys would have approximately the same percentage of tags as fish which enter Trinity River Hatchery.

During the 2003 season, the percentage of tags found on both spring and fall Chinook and coho salmon during carcass surveys was lower than observed at the hatchery (appendix 5). Factors

that may account for differences in program marked percentages between the hatchery and natural areas include: 1) Sample size. Our sample sizes are much greater at TRH versus natural areas. 2) Weir trapping schedules. If a portion of the run is not trapped as efficiently as other segments of the run we would expect that the recovery percentages of marked fish may vary. This may explain the difference between spring Chinook marked recovery percentages at TRH versus spawner surveys. Since the JCW was not operational until July 21st, we may have missed a portion of the run. If this portion of the run had a higher percentage of wild fish than latter segments, we would expect lower tag recovery percentages in natural areas, which was observed this year. 3) Tag loss. It can be reasonably expected that tags may be lost during decomposition or that anglers or other people on the river may be removing tags. It is well known that some of our tags offer $10.00 rewards.

Incidence of hatchery produced Chinook

Another important aspect of our surveys is document the magnitude and distribution of hatchery strays. Ad-clip and RM-clip rates observed at 3 fixed sites and in the carcass survey are presented in appendix 6. Only condition-1 and 2 Chinook carcass recoveries were used for this analysis, while all coho found during carcass surveys were used. This was done because of the subjectivity of determining the presence or absence of Ad-clips on deteriorating Chinook and the more easily identified RM-clip on coho.

A rough estimate of the incidence of hatchery produced Chinook found in the main stem Trinity can be obtained by comparing the ratios of Ad-clipped salmon observed at various locations within the river. If the assumption is made that fish which enter TRH are very close to 100% hatchery origin, division of river recovery clip rates divided by TRH clip rates will produce a percentage of fish observed at off-site areas composed of hatchery produced fish

The Ad-clip rate (7.1%) of spring Chinook found in the main stem Trinity River was lower than at either JCW (18.2%) and TRH (24.3%). Using the above estimation method and assumption, we estimate that hatchery-produced spring Chinook, upstream of Junction City weir composed 74.9 % (18.2/24.3) of the total run and 29.2 % (7.1/24.3) of the spring Chinook observed in the main stem carcass survey. We estimated that 1,258 of 5,251 (24.0%) spring Chinook recovered during carcass surveys were of hatchery origin based on expansion of coded-wire tags (Table 7). Due to some heads not being collected and CWT's which could not be read, approximately 22% of CWT's collected during the spring period did not yield valid codes. Shed rates at TRH for CWT's are generally less than 10%, therefore we would expect a slightly higher percentage of hatchery fish to be estimated from our CWT recovery sample in the carcass survey had all heads been recovered.

The Ad-clip rate (7.8%) of fall Chinook found in the mainstem spawner survey (appendix 6) was also lower than that observed at WCW (21.2%) and TRH (24.7%). Using the previous estimation methods, we estimate that 85.8 % (21.2/24.7) of the fall Chinook, upstream of Willow Creek weir, were of hatchery origin and that 31.6 % (7.8/24.7) of main stem spawners were of

hatchery origin. We estimated that 2,904 of 10,321 (28.1%) fall Chinook recovered during carcass surveys were of hatchery origin based on expansion of coded-wire tags (Table 7). In addition, 10.6% of our CWT sample were shed tags, lost heads or unreadable. This rate is slightly higher than we typically observe at TRH.

The incidence of coho RM-clips varied from a rate of 80.1% in the main stem spawner survey to 94.2% at TRH. The observed rate at WCW was intermediate at 86.0%. These high rates of hatchery produced coho in all sample sites indicate that the Trinity River coho population, upstream of Willow Creek weir, is heavily supported by hatchery produced fish. However, sampling at the weir (through mid November) and in the main stem Trinity spawner survey (through mid December) did not include the complete temporal scale of coho migration and their ultimate death. The potential exists that naturally produced coho have a later run-timing, spawn and die later, or spawn primarily in tributary streams which were not surveyed.

RECOMMENDATIONS

1.) Annual spawner survey activities should be continued, with current or modified objectives, in future years.

2.) In future years, the entire survey area, sections one through ten, should be surveyed on a consistent temporal basis (e.g. once each week) if possible.

3.) We should attempt to measure all identifiable fish and make all efforts to collect CWT's when possible.

4.) If recovery of coho salmon becomes a high priority, the length of the surveys will need to be extended into January.

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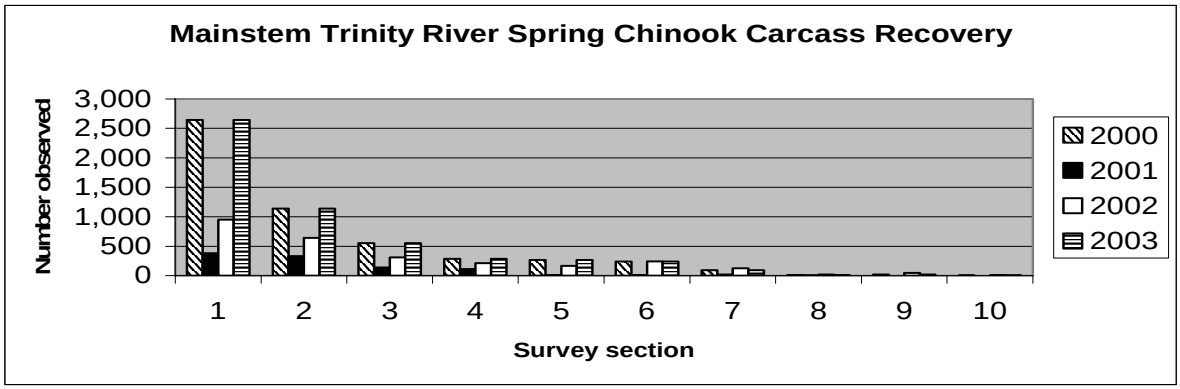
Appendix 1. Chinook carcass recovery in the mainstem Trinity River, 2000-2003. a/

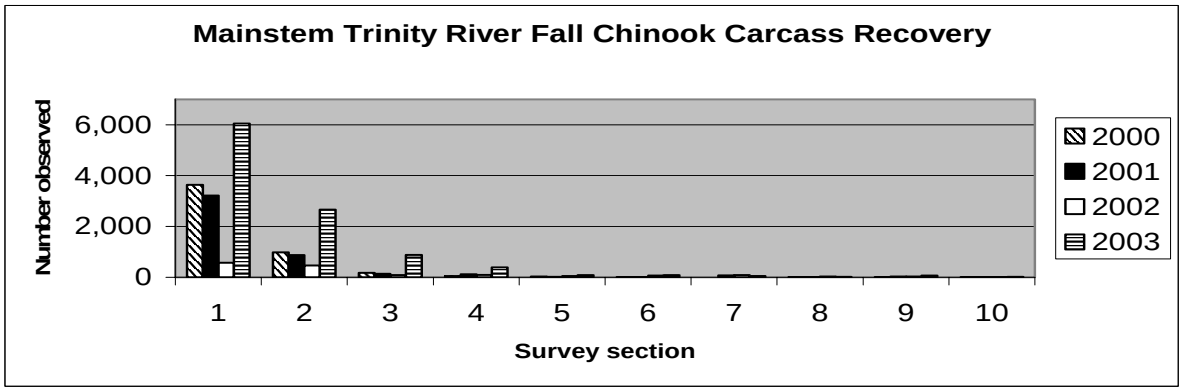
Spring Chinook

	Recovery totals by section										
Year	1	2	3	4	5	6	7	8	9	10	Total
2000	695	368	101	52	11	5	4	1	2	2	1,241
2001	383	331	137	113	8	12	19	3	2	2	1,010
2002	951	641	311	214	169	245	124	20	46	8	2,729
2003	2,643	1,139	551	285	267	239	93	9	21	4	5,251

Fall Chinook

	Recovery totals by section										
Year	1	2	3	4	5	6	7	8	9	10	Total
2000	3,644	979	174	50	25	10	1	7	13	6	4,909
2001	3,217	872	136	118	23	14	75	12	32	6	4,505
2002	569	462	89	100	46	66	84	25	32	13	1,486
2003	6,050	2,656	886	385	84	91	50	23	72	24	10,321

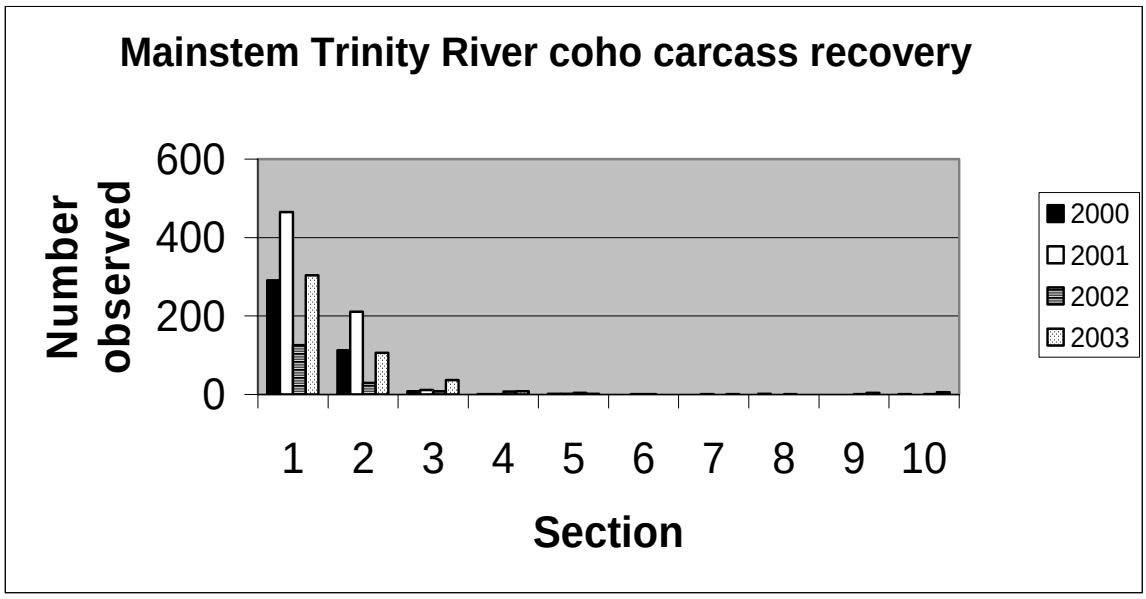




a/ Surveys conducted on the upper mainstem Trinity River from Cedar Flat to Lewiston Dam.

Appendix 2. Coho carcass recovery in the mainstem Trinity River, 2000-2003. a/

	Recovery totals by section										
Year	1	2	3	4	5	6	7	8	9	10	Total
2000	291	112	8	1	2	0	0	2	0	1	417
2001	465	211	11	1	2	1	1	0	0	0	692
2002	125	29	8	7	4	1	0	1	1	1	177
2003	304	106	37	8	2	0	1	0	4	6	468



Appendix 3. Size composition of chinook and coho salmon observed in the mainstem spawner survey and at the three fixed locations in theTrinity River basin during the 2003-2004 season.

Spring Chinook

	Recovery site			
Size strata	Junction City Weir	Trinity River Hatchery	Spawner survey b/	Total
Grilse a/	22	130	69	221
Adults	990	14,512	5,025	20,527
% Grilse	2.17%	0.89%	1.35%	1.07%

a/ Spring Chinook grilse were < 52 cm, FL; larger fish were adults.
b/ Measured condition 1 and 2 fish only.

Fall Chinook

	Recovery site			
Size strata	Willow Creek Weir	Trinity River Hatchery	Spawner survey b/	Total
Grilse a/	30	634	240	904
Adults	1,218	29,752	9,667	40,637
% Grilse	2.40%	2.09%	2.42%	2.18%

a/ Fall Chinook grilse were < 55 cm, FL; larger fish were adults.
b/ Measured condition 1 and 2 fish only.

Coho

	Recovery site			
Size strata	Willow Creek Weir	Trinity River Hatchery	Spawner survey b/	Total
Grilse a/	43	1,463	37	1543
Adults	207	10,396	431	11,034
% Grilse	17.20%	12.34%	7.91%	12.27%

a/ Coho grilse were < 54 cm, FL; larger fish were adults.
b/ Measured condition 1 and 2 fish only.

Appendix 4. Female chinook salmon pre-spawning mortality rates observed during the mainstem Trinity River spawner surveys from 1955 through 2003.

		Spring-run chinook			Fall-run chinook			Total chinook		
Study year	Literature source	Spawned	Unspawned	Percent unspawned	Spawned	Unspawned	Percent unspawned	Spawned	Unspawned	Percent unspawned
1955 a/	Gibbs (1956)							2,076	32	1.5
1956 a/	Weber (1965)							3,438	219	6.0
1963 a/	LaFaunce (1965)							4,953	328	6.2
1968 a/	Rogers (1970)							1,494	124	7.7
1969 a/	Smith (1975)							1,889	23	1.2
1970 a/	Rogers (1973)							632	34	5.1
1971 b/	" (1982)									
1972 a/	Miller (1972)							791	110	12.2
1973 a/ c/	" (1973)									12.0
1974 a/ c/	" (1974)									9.1
1976 a/ c/	" (1976)									8.4
1978 a/ c/	" (1978)									7.2
1979 a/ c/	" (1979)									6.0
1980 a/ c/	" (1980)									36.5
1981 a/ c/	" (1981)									2.6
1982 a/ c/	" (1982)									1.5
1984 b/	" (1984)									
1985 b/	" (1985)									
1987 c/	Stempel (1988)			49.9			18.8			30.8
1988	Zuspan (1991)	11	27	71.1	479	372	43.7	490	399	44.9
1989	Zuspan (1992a)	194	327	62.8	1,546	464	23.1	1,740	791	31.3
1990	Zuspan (1992b)	76	21	21.6	104	6	5.5	180	27	13.0
1991	Zuspan (1994)	22	0	0.0	162	2	1.2	184	2	1.1
1992	Aguilar / Zuspan (1995)	48	3	5.9	133	1	0.7	181	4	2.2
1993	Aguilar (1995)	115	5	4.2	180	12	6.3	295	17	5.4
1994	Aguilar/Davis (1995)	202	2	1.0	380	12	3.1	582	14	2.3
1995	Zuspan (1997)	2,711	517	19.0	8,502	3,188	27.3	11,213	3,705	24.8
1996	Zuspan (1997)	1,243	42	3.3	1,058	90	7.8	2,301	132	5.4
1997	Zuspan (1998)	1,263	34	2.6	491	28	5.4	1,754	62	3.4
2000	Sinnen / Null (2002)	559	17	2.9	1,940	146	7.0	2,499	163	6.1
2001	Sinnen (2004)	327	22	6.3	963	98	9.2	1,290	120	8.5
2002	Sinnen/ Currier (2004)	1,117	67	5.7	625	11	1.7	1,742	77	4.2
2003	Current Study	3,173	220	6.5	5,526	730	11.7	8,699	950	9.8

a/ Spring-run and fall-run chinook salmon were not separated during these years.

b/ Pre-spawning mortality rate was not reported during these years.

c/ Overall pre-spawning mortality rates were reported but not numbers of carcasses observed.

Appendix 5. Proportions of recovered Program-marked (spaghetti tagged) salmon carcasses in the mainstem Trinity River spawner survey, 2003-2004 season.

	Mainstem spawner survey b/								
	Spring chinook			Fall chinook			Coho		
Tag site a/	Program marks	Total observed	% Program marks	Program marks	Total observed	% Program marks	Program marks	Total observed	% Program marks
JCW	85	5,251	1.62%	44	10,321	0.43%	-----	-----	
WCW	1	5,251	0.02%	72	10,321	0.70%	8	468	1.71%
Totals:	86	5,251	1.64%	116	10,321	1.12%	8	468	1.71%
	Trinity River Hatchery								
JCW	214	14,643	1.46%	40	30,385	0.13%	-----	-----	
WCW	1	14,643	0.01%	366	30,385	1.20%	97	11,859	0.82%
Totals:	215	14,643	1.47%	406	30,385	1.34%	97	11,859	0.82%

a/ JCW=Junction City weir; WCW=Willow Creek weir.

Appendix 6. Comparison of the proportion of adipose fin-clipped (Ad-clip) chinook salmon and right maxillary-clipped (RM-clip) coho slamon in the mainstem Trinity River spawner survey to proportions observed at the three fixed locations in the Trinity River basin during the 2003-2004 season.

	Spring chinook			Fall chinook			Coho		
Site a/	Ad-clips	Total	% Ad-clips	Ad-clips	Total	% Ad-clips	RM-clips	Total	% RM-clips
JCW	184	1,012	18.2%	50	316	15.8%	5	5	100.0%
WCW	-----	-----	-----	265	1,248	21.2%	215	250	86.0%
TRH	3,563	14,643	24.3%	7,494	30,385	24.7%	11,169	11,859	94.2%
TR b/	370	5,251	7.0%	804	10,321	7.8%	375	468	80.1%

a/ JCW=Junction City weir; WCW=Willow Creek weir; TRH=Trinity River Hatchery; TR=Trinity River mainstem spawner survey.

ANNUAL REPORT
2003-04 SEASON

ANGLER CREEL SURVEYS IN THE LOWER KLAMATH RIVER

By
Sara Borok

ABSTRACT

During August 6th through November 4th, 2003, a creel census was conducted in the lower (Mouth to Coon Creek Falls) Klamath River to determine numbers of upstream migrating Chinook salmon, coho salmon and steelhead trout harvested by sport anglers. The adult fall-run Chinook lower river quota of 5,400 (or 10,800 for the basin) was not met this season. A total of 5,548 (4,812 adults and 736 grilse) Chinook salmon and 189 (162 adults and 27 half-pounders) steelhead were harvested during our sampling period. We did not start counting fish toward the quota until August 13th. During the first week of the creel 70 (57 adult and 13 grisle) spring-run Chinook salmon were harvested. The total of fall-run Chinook harvested was 5,478 (4,755 adults and 723 grilse) fish. Seasonal summaries and comparisons of angler effort and catch, catch timing, length frequencies, species composition, hatchery fin clips and tag recoveries are presented.

INTRODUCTION

The Klamath River system is the second largest river system in California (the Sacramento system is the largest). It drains over 40,000 sq km in northern California and southern Oregon. The Trinity River is its largest tributary and empties into the Klamath River at Weitchpec (river mile (rm) 43). Other major tributaries of the Klamath River are the Salmon River (rm 66), Scott (rm 143) and the Shasta River (rm 177).

The upper limit of anadromous fish migration in the main Klamath River is at Iron Gate Dam (rm 98). Iron Gate Hatchery, at the base of the dam, mitigates for fish loss above the dam. The upper limit of fish migration in the Trinity River is at Lewiston Dam (rm 111). Trinity River Hatchery is located at the base of Lewiston Dam and mitigates for fish loss above the dam. Both Hatcheries are operated by California Department of Fish and Game.

The Klamath River system is one of the state's primary producers of Chinook salmon (Oncorhynchus tshawytscha) and steelhead trout (Oncorhynchus mykiss). These two species support popular sport fisheries throughout the Klamath River system with most of the concentrated effort and catch occurring in the lower 30 miles of the mainstem Klamath River.

although sport angling has been popular throughout the Klamath River for many decades, angler

harvest data of anadromous salmonids within the Klamath River system prior to 1978 is limited. The earliest report found that mentions angling in the Klamath River is by Snyder (1931) where he briefly describes methods, mean length and sex of a two day creel sample at the mouth of the Klamath River in August 1921. Coots (1952) reports on angler harvest of anadromous salmonids during a year long creel census from the mouth of Salmon River to Copco Dam during 1949 and 1950. Gibbs and Kimsey (1955) provide angler effort and harvest estimates for the boat fishery in the Klamath River estuary during 1951. Bailey (1952) reported on a creel census of the riffle fishery in the lower Klamath River above the Highway 101 Bridge conducted during the fall 1951 adult steelhead and Chinook salmon immigration.

Other earlier creel census reports on the mainstem Klamath River conducted upstream of the Salmon River deal with angler catches during the summer trout season. Some adult steelhead and juvenile coho salmon are reported in the catches (Coots 1950, 1951, 1953, 1954; Wales 1948; Wales and Coots 1949). More harvest data was reported by Lanse (1970) in an area of the upper Klamath River and by Miller (1971) working in an area of the middle Klamath River. Steelhead comprised the majority of the sampled catches.

Creel census studies prior to 1978 consisted primarily of angler effort, species composition and catch per hour information. Some provided harvest and effort estimates within the sampled area. However, not until 1978 was and attempt made to estimated chinook harvest by anglers throughout the Klamath River basin (Boydstun,1979).

The Fishery Conservation and Management Act of 1976 declared a fishery conservation zone in ocean waters surrounding the United States from 3 to 200 miles. As a result the Pacific Fisheries Management Council (PFMC) was established in 1976. The PFMC soon recognized the need for salmon resource management and implemented the Fishery Management Plan (FMP) in 1977 for commercial and recreational salmon fisheries off the coasts of Washington, Oregon and California. The Klamath River is regarded as one of the more important producers of fall Chinook to California commercial and sport fisheries; PFMC management objectives included measures to rebuild and protect depressed Klamath River fall Chinook stocks (PFMC 1983). PFMC management practices focused on harvest restrictions for ocean troll and sport fisheries that were impacting Klamath River Chinook stocks. The State of California, with management jurisdiction of fisheries in coastal waters from shore out 3 miles and of in-river sport fisheries, implemented Chinook salmon management practices and regulations supporting PFMC objectives. Thus, Klamath River adult fall Chinook run-size data has been a critical component, since 1978, for management of fall Chinook resource and its fisheries in northern California and southern Oregon.

The numbers of fall Chinook salmon entering the Klamath Basin (run-size) is determined by accumulating the numbers harvested in-river, the numbers returning to the two hatcheries and the numbers spawning naturally. Since 1978 the angler harvest of Klamath River fall Chinook has been monitored by CDFG to provide data for fall Chinook run-size estimates. Annual reports summarizing these activities have been written through the 2002 season (Boydstun 1979, 1980; Lee 1984a,1984b, 1985, Lau 1992-1997; Pisano 1998; Borok 1999-2002).

This report covers the period July 1, 2003 through June 30, 2004. It provides data and a description of the CDFG fall Chinook angler harvest monitoring program in the Mainstem Klamath River from the mouth to the falls at Coon Creek excluding the Trinity River. Trinity River fall Chinook angler harvest data during the corresponding time is contained in a separate CDFG report.

The Klamath River Project (KRP) divides the Klamath River in to three Areas to determine angling effort and catch for the entire river. California Department of Fish and Game (DFG) needs this information to determine when sport anglers have reached the in-river sport harvest quota of fall-run adult Chinook salmon for the entire river (excluding the Trinity River).

The Klamath River Chinook quota works in the following manner; One half the total in-river quota is dedicated to the lower river (Area 1 and Area 2). The other half is dedicated to the upper river (Area 3) and Trinity River. We monitor each of the areas for the fall-run Chinook harvest and determine when the quota of each portion has been met. Once met, an adult Chinook closure goes into effect in the river. Anglers are still permitted to fish, but must release any adult Chinook salmon caught. Meanwhile, anglers in the other portions of the river are still permitted to harvest adult Chinook until their individual quotas are met. Afterwards, fishing is allowed, but the entire river is closed to the harvest of any adult Chinook. However, once Iron Gate Dam has received enough adult salmon for an egg take, a special fishery for adult Chinook was permitted from Iron Gate Dam to where Interstate 5 crosses the Klamath River. Once the river is closed to adult Chinook harvest in any area, fishing for grilse Chinook and other legal species is still permitted

The Fish and Game Commission establishes all angling regulations and quotas for the Klamath River. These regulations are enforced by the CDFG. The Commission adopts the quota recommendations made by the Pacific Fishery Management Council. Typically, the in-river sport Chinook quota was 7.5% of the overall allowable harvest, or 15% of the non- tribal fisheries harvest. This year was different, a large run was forecast and it was believed the ocean commercial and recreational fishermen would not be able to catch their portion of the allocation due to fishing constraints on ESA stocks listed as threatened. The portion that the commercial and recreational fishermen would not be able to catch was given to the in-river sport anglers. Instead of the in-river sport being allocated 15% of the non-tribal, they received 26% of the non-tribal harvest allocation or 10,800 fish.

Starting in 1999 an “impact quota” was implemented for the Klamath and Trinity Rivers. From this impact quota a ten percent hooking mortality factor was accounted for within the quota and this number was used as the trigger quota. This trigger closure was to account for increased hook and release mortalities when the quota was met early in the season. The impact quota was further divided among the areas in the following manner: 50% Lower Klamath River and 50% Upper Klamath and Trinity River. The Upper Klamath River and Trinity River further divided the quota with 17 % going to the Upper Klamath and 16.5% to each of the two sections on the Trinity River (upper Trinity; above Cedar Flat to Trinity Hatchery and lower Trinity; confluence

with Klamath to below Cedar Flat). For the 2003 season these percentages worked out to 5,400 fish for the Lower Klamath River, 1,836 for the upper Klamath River and 1,782 for each section on the Trinity River (3,564 total for Trinity River).

During the 2003 season, fishing regulations allowed anglers to harvest three Chinook salmon per day (up to one adult Chinook) and one hatchery trout or one hatchery steelhead per day in the Klamath and Trinity Rivers. A total length (tip to tip) of 22 inches was used in the regulations to determine the adult/grilse cutoff. No harvest of Coho salmon was permitted. Regulations stated: one "hatchery" trout or one "hatchery" steelhead could be harvested. This eliminated cutthroat fishery in the lower river as there are no facilities raising cutthroat trout in the Klamath Trinity Basin.

METHODS

Description of Fishery and Creel Sample Area

The mainstem Klamath River from the mouth to Iron Gate Dam was divided into three areas for estimating angler catch and effort. Areas 1 and 2 are included in this report. Area 3 was not surveyed this season. Methods and results for the estimated number of fish harvested are included in another report.

AREA 1: This area consisted of 4.5 rkm (2.8 mi) of river from the mouth of the Klamath to the Highway 101 bridge and is referred to as the estuary. Virtually all shore angling effort took place at the mouth of the river. River mouth configuration which changed between years, determined which side (north or south) afforded better angling. A creel sample of shore anglers was conducted at the mouth location. During the 2003 season fishing at the mouth was not closed. The 15% (1,620 adult Chinook salmon) of the basin quota was not met below the Hwy 101 bridge. This area was not the busy fishing area this season.

All boat angling effort in the estuary originated from ten resort boat docks in the estuary area. Two resort docks (Chinook RV Park and Riverside RV Park) and the public launch ramp (Old Townsite Boat Ramp) were sampled this season for angler effort and catch.

AREA 2: This area extended from the Highway 101 bridge upstream to the falls at Coon Creek (54.4 rkm, 34 rm) near the community of Johnsons (Pecwan Creek) and consisted primarily of riffle type fisheries. Shore angling effort was generally confined to two popular riffles (Lower Klamath Glen and Blakes) located in the lower 5 km of this area and were easily accessible to the shore angler. One resort boat dock (Klamath Glen) and a public boat launch (Roy Rook), also located in the lower 5 km, were the principal boat facilities in the area. Creel sampling occurred at these locations.

Shore angling access above Blakes Riffle to Johnsons was limited to about three areas: the

mouth of Blue Creek (rkm 26.3, 16.4 rm), Ah Pah Creek (rkm 27.5, 17.2 rm) and Bear Riffle (rkm 29.8, 18.6 rm) were accessible by vehicle but accounted for an estimated less than one percent of angling effort in the entire sample area.

Virtually all boat angling effort that took place within Area 2 originated from the one boat dock or public launching ramp, therefore, all boat angling effort was accounted for in the daily creel samples.

Angler access routes at Lower Klamath Glen and Blakes riffles were limited to specific routes in and out enabling a complete accounting of angler effort and catch during a sample day at these locations. Boat anglers were also confined to access at the launching ramp or resort boat dock enabling a complete sample of angler effort and catch for each sample day.

Waukel Riffle, located one-quarter mile upstream of the Highway 101 Bridge, has two principal access points each on opposite sides of the river. This sight has not been used by anglers in the last five years. It is checked sporadically, but no effort was recorded.

Creel Census Methods

Study methods and procedures used in the Lower Klamath Creel (Area 1 and 2) during the 2003 season was essentially the same as those described for the 1983 -1987 seasons (Hopelain 2001). Data is presented in Standard Julian Week (JW) format throughout this report (Appendix 1).

The weekly sampling schedule in the Lower Klamath River was sampling each site three days per Julian week and in the Upper Klamath creel each site was sampled twice per Julian week. For weeks that were sampled other than above, the data is expanded accordingly. Each angling acess site is sampled throughout the day to account for total catch and effort for that particular site. Scientific aids interviewed anglers as they departed the fishing site and recorded the following information:

1) Was the angler finished fishing at this time?
2) Total hours spent fishing (to the nearest half hour).
3) The first three numbers of their Zip Code (to find their general area of residence).
4) The scientific aid processed any fish harvested (species, fork length, fin clips, tags, and unusual conditions were recorded, and a scale sample collected).
5) If the chinook (or coho) salmon had a missing adipose fin, (possessed a CWT) the scientific aid collected the head.
6) The number and kind of fish caught and released (actually released not lost) by the angler (recorded as juveniles, grilse or adults).
7) In Area 1 only, where was the angler fishing (mouth or from boat)?

Harvest and Effort Estimating Procedures

Data was stratified for each creel census location by Julian week (Appendix 1). Angler catch and effort estimates are then calculated for each week. The catch-effort estimate formula used was:

$$\text{Estimate total} = \sum_{I=1}^{n} \text{Daily total } (N/n)$$

where: Estimate total = estimates of catch or effort
Daily total = Daily counts of catch or effort
N = Number of fishing days in week
n = number of sample days

Area 2: Harvest estimates for the area above Highway 101 to Coon Creek Falls is calculated by multiplying the observed catch and effort by a sampling ratio. This ratio is the weekly expansion value. This value is a simple ratio of the number of days sampled during that Julian week for the site over the number of legal fishing days within the week (7 days week / 3 days sampled = 2.33). All sites are totaled for the week to obtain the weekly harvest estimate for Area 2. This procedure applies to both boat and shore harvest. No additional expansion for the boat harvest in Area 2 is needed since total boat catch and effort were accounted for in the creel sampling.

Area 1: The procedure for the area below 101 is identical with Area 2 except for the addition of a boat expansion factor. The boat expansion factor accounts for the harvest by boat anglers we missed in sampling. Since we sample only some boat anglers, we need to account for the unsampled portion. The boat expansion formula is:

$$\frac{\text{(Boats at the non-sampled docks + Boats at sampled docks)}}{\text{Boats at Sampled docks}}$$

This formula expands the catch and effort from sampled sites by a percentage determined from the number of sampled and non-sampled boats. A scientific aid obtains this percentage by counting the number of boats at all the docks (both sampled and non-sampled) below Hwy 101. This count occurs during a slow time of the day, usually, between 1100 to 1500. At his time, anglers often return to the docks. It is true that not all the boats will be at their docks at this time. However, the assumption that the percentage of boats that do not return to their docks is the same between both the unsampled and sampled docks. I also assume that the effort and catch are equal between the non-sampled boats and sampled boats.

The fish technician obtains the boat count every day we sample in Area 1. This aid does not include any boats used in the Indian gill-net fishery and any un-rented boats in their counts. An average of these daily values is used to arrive at the average boat expansion value for the week. The closer the expansion value is to one, the greater the total coverage we have in the estuary.

Daily Real Time Harvest Estimates and Projections

As in previous seasons, the Klamath River Project thought it necessary to compute harvest and effort estimates daily (real time) as we neared the quota to help prevent any over harvesting. In addition, we estimated one, two, and three day harvest projections to allow lead time to close the adult chinook fishery and to assist with management.

CREEL RESULTS

Rounding numbers to whole numbers may cause some slight addition discrepancies in these results. Spring run Chinook numbers are included in totals.

The creel census for the lower Klamath River began on August 6 and ran through November 4 (JW 32 through 44) of 2003. Chinook salmon harvested in the creel fishery ranged in size from 29 to 108 cm in fork length (FL) and averaged 73.0 cm FL (Figure 1A). From the fork length frequency in the creel survey sample, I found the true grilse-adult separation in length to be at 56 cm (22 inches) FL (Figure 1), the same separation used during the creel season.

This adult-grilse separation was smaller than the 60 cm FL break off observed in the 2002 season. The grilse component of the angler harvest ranged in size from 29 to 55 cm FL and averaged 47.9 cm FL. The adult chinook salmon component of the harvest ranged in size from 56 to 108 cm FL and averaged 75.8 cm FL (Figure1). This separation is the same that was used by Trinity River Hatchery and the Willow Creek Weir. They made the separation at 60 cm FL (personnel communication Wade Sinnen). This separation in the sport fishery is the same as Iron Gate Hatchery (Figure 2).

Steelhead ranged in size from 25 to 70 cm FL and averaged 54.3 cm FL (Figure 3). Any fish less than 42 cm FL is considered to be a half-pounder, and any steelhead larger to be an adult. Any steelhead less than 23 cm FL is considered a resident trout and not anadromous. The half-pounder steelhead ranged in size from 25 to 41 cm FL and averaged 34.2 cm FL. The adult steelhead ranged in size from 42 to 70 cm FL and averaged 58.9 cm FL. This is slightly smaller than the 2002 season.

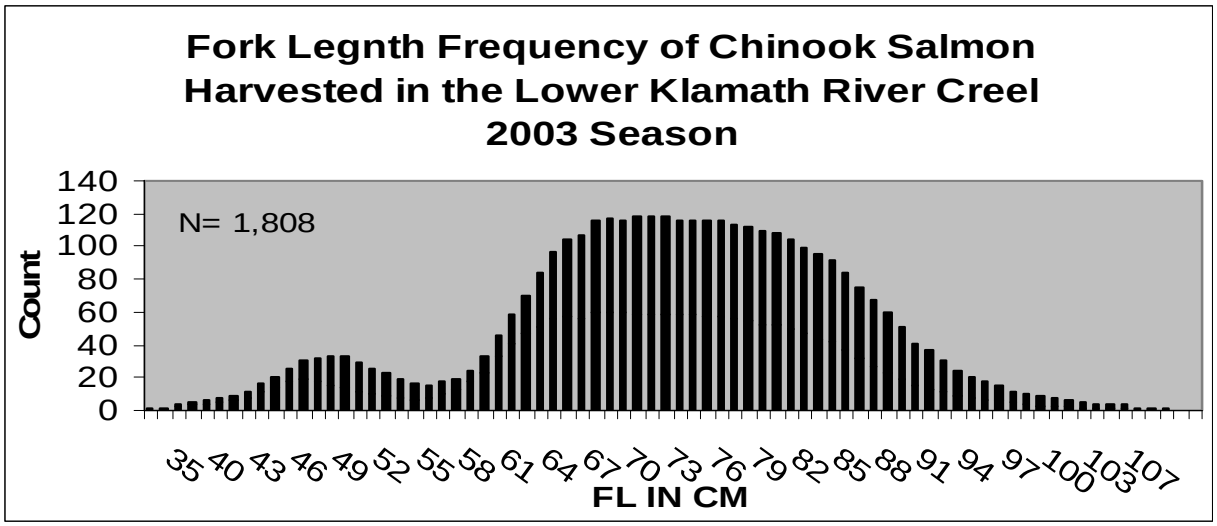


Figure 1. Fork Length Frequency of Chinook Salmon Harvested in the Lower Klamath River Creel During the 2003 Season.

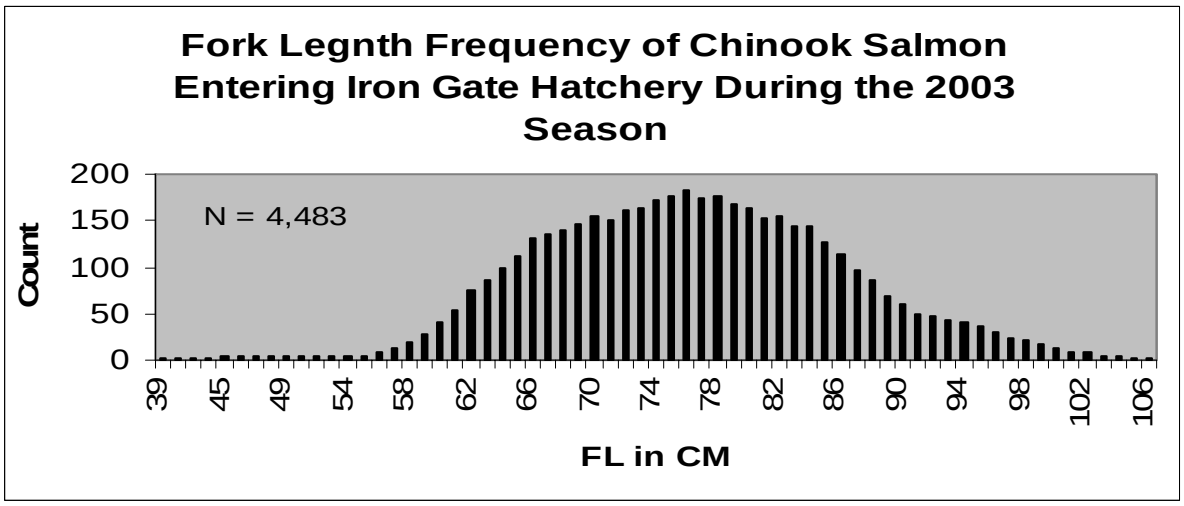


Figure 2. Fork Length Frequency of Chinook Salmon Sampled at Iron Gate Hatchery During the 2003 Season.

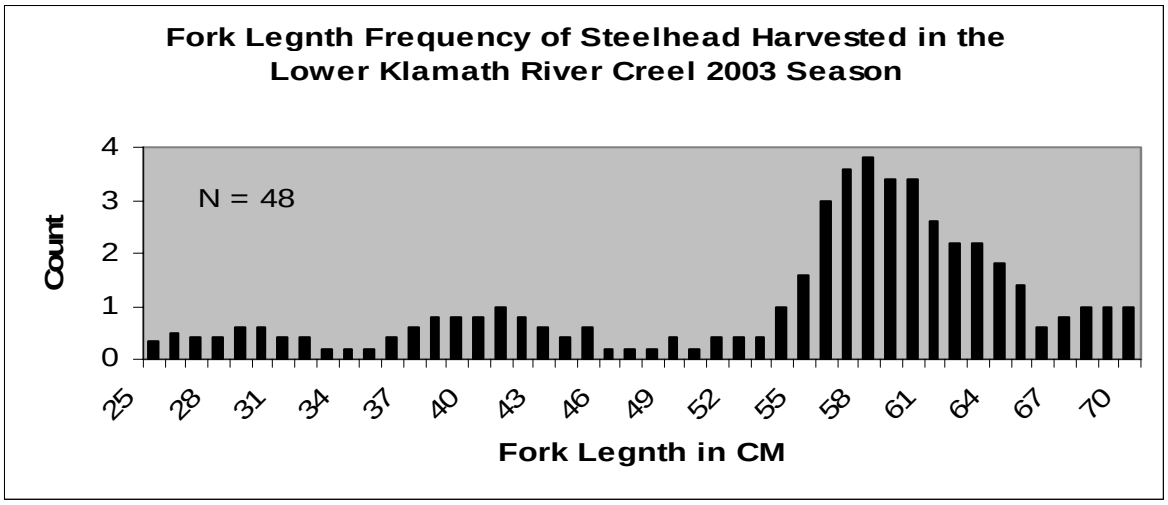


Figure 3. Length Frequency of Steelhead Caught in the Lower Klamath River Creel during the 2003 Season.

Estimated Angler Effort and Harvest

During the 2003 season, I estimate that anglers made a total of 16,514 trips in both Areas combined. Of the 16,514 trips; 8,099 were in Area 1, and 8,747 were in Area 2 (Table 1). These trips resulted in a total of 79,228 fishing hours. As in previous seasons, boat anglers out-numbered shore anglers in both Areas (Table 1). A total of 5,548 (4,812 adults and 736 grilse) Chinook salmon and 189 (162 adults and 27 half-pounders) steelhead were harvested. We did not start counting fish toward the quota until August 13th. During the first week of the creel 70 (57 adult and 13 grisle) spring-run Chinook salmon were harvested. The total of fall-run Chinook harvested was 5,478 (4,755 adults and 723 grilse) fish. Adults composed 86.8 % (4,755/5,478) of the estimated fall-run Chinook harvest. Adult steelhead trout composed 85.7 % (162/189; Table 1) of the steelhead harvest. In addition, eight adult coho salmon were harvested this season.

Table 1. Summary of Estimated Angler Effort and Harvest During the 2003 Lower Klamath River Creel Census.

Site	Angler		Steelhead		Chinook Salmon	
Location	Trips	Hours	½ lbers	Adults	Grilse	Adults
Area 1 -Mouth to Highway 101 Bridge						
Shore	1,902	7,189	11	4	6	237
Boats	6,197	26,511	0	39	180	1,413
Total	8,099	33,700	11	43	186	1,650
Area 2 - Highway 101 to Coon Creek Falls						
Shore	1,915	7,068	6	23	23	146
Boats	6,500	38,460	10	96	527	3,016
Total	8,747	46,693	16	119	550	3,162
Grand Total	16,514	79,228	27	162	736	4,812
2002 Season	18,376	85,925	5	393	638	7,275
2001 Season	20,119	88,053	63	237	1,178	7,285

2002 Harvest and Effort Patterns

The average length of each trip (4.6 hours per trip) stayed the same from the 2002 to the 2003 season. It is our hypothesis that the larger quotas brought the anglers back (Table 2). Daily Bag limit has been suggested as a reason for longer trips, but the last two seasons' bag limit (up to 2 adults per day) was larger than 2003 (only one adult per day) and the trip length remains similar.

During the 2003 season, Area 2 anglers harvested more fish than Area 1 (Table 1). Anglers (boat and shore) in Area 2 accounted for 66.9% (3,712/5,548) of the total Chinook salmon and 71.4% (135/189) of the steelhead harvested. Anglers in Area 1 harvested the remainder. Area 1 anglers accounted for 49.0% (8,099/16,514) of angler trips and only 45.6% of the angler hours (39,232/ 85,925). Of the total Chinook harvest, 4.3 % occurred in Area1 at the mouth this season (Table 1). A portion of the fish recorded for Area 1 were actually caught in Area 2 later in the season. People were launching their boats from the Old Townsite Boat Ramp in Area 1 and fishing up river. These fish were not counted against the 15% of basin quota which would close the mouth/spit fishery.

Table 2. The Number of Angler Trips, Hours, and Average Length of Trip in the Lower Klamath River Sport Fishery for the Last Eleven Seasons, 1992-2003.

Year	Total Trips	Total Hours	Average Trip Length (Hours)
1992	11,190	33,080	3.0
1993	16,081	51,889	3.2
1994	15,100	54,748	3.6
1995	19,881	63,369	3.2
1996	27,929	91,019	3.3
1997	18,402	67,154	3.6
1998	17,606	52,145	3.0
1999	11,852	45,109	3.8
2000	14,150	57,184	4.0
2001	20,116	88,053	4.3
2002	18,376	85,925	4.6
2003	16,514	79,228	4.6

The harvest per hour of Chinook salmon was the fifth highest over the last twenty three years. For the last three years the number of grilse harvested per hour has been below the 24 year average (Figure 4).

Catch and Release

Catch and release numbers were recorded as part of the creel interview. Anglers were specifically asked if these fish were released rather than lost. Numbers should only be used as an estimation for following trends as they can be highly subjective. I estimated anglers released 3,791 half-pounders, 1,553 adult steelhead, 303 grilse, and 3,970 adult Chinook salmon (Tables 3 and 4). The jump in the number of adult Chinook released I believe is related to the regulations allowing anglers to only keep one adult Chinook per day. In addition, 4 grilse and 130 adult coho salmon were released this season. The majority of coho salmon harvested and released occurred in Area 2. Anglers tend to fish later into the season in Area 2, when coho are present.

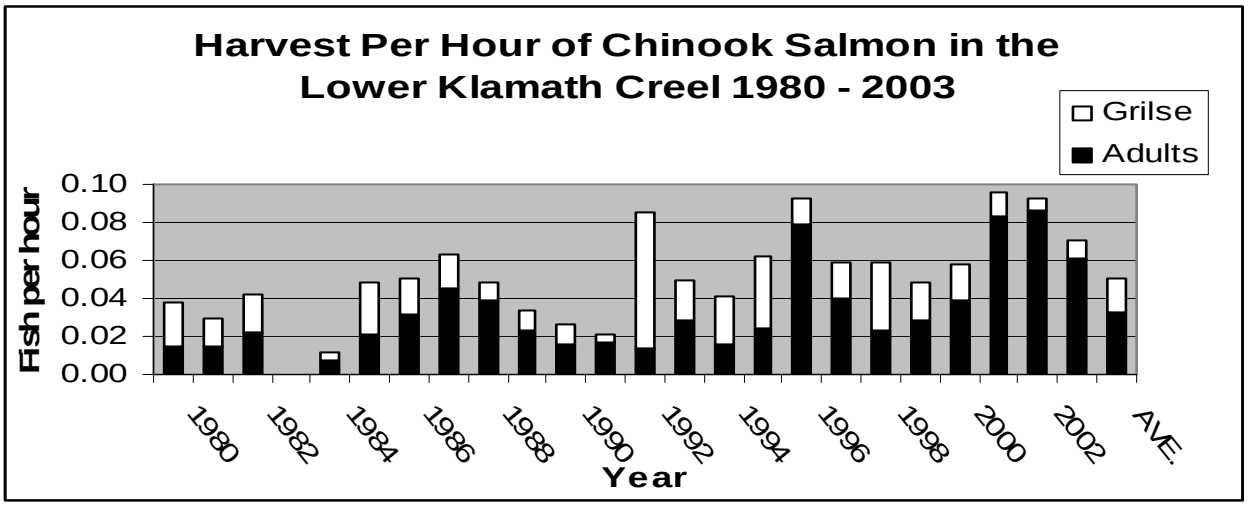


Figure 4. Harvest Per Hour of Chinook Salmon from the Sport Harvest on the Lower Klamath River Creel 1980 – 2003.

Table 3 Number of Chinook and Coho Salmon and Steelhead Caught and Released from the Lower Klamath River Creel for the Last Nine Seasons 1994-2003.

Year	Chinook		Steelhead		Coho	
	Grilse	Adults	<42	>41	Grilse	Adults
1994	290	2,571	4,044	198	0	0
1995	175	14,408	1,049	259	0	33
1996	521	1,438	1,944	256	7	11
1997	34	1,015	1,479	516	0	0
1998	330	1,317	1,738	460	10	19
1999	1,897	1,164	1,189	346	2	5
2000	757	6,253	8,103	1,129	17	43
2001	464	1,720	11,892	2,997	12	242
2002	405	2,985	4,783	6,036	12	243
2003	303	3,970	3,791	1,553	4	130

Table 4. Summary of Estimated Chinook Salmon and Steelhead Catch and Releases During the 2003 Lower Klamath River Creel Census.

Site	Angler		Steelhead		Chinook Salmon	
Location	Trips	Hours	½ lbers	Adults	Grilse	Adults
Area 1 -Mouth to Highway 101 Bridge						
Shore	1,902	7,189	58	22	2	58
Boats	6,197	26,511	125	111	70	582
Total	8,099	33,700	184	133	72	641
Area 2 - Highway 101 to Coon Creek Falls						
Shore	1,915	7,068	2,122	555	34	239
Boats	6,500	38,460	1,485	865	197	3,091
Total	8,747	46,693	3,607	1,420	231	3,330
Grand Total	16,514	79,228	3,791	1,553	303	3,970
2002 Total	18,376	85,925	4,783	6,036	405	2,985
2001 Season	20,119	88,053	11,892	2,997	464	1,720

Run Timing

Adult fall-run Chinook salmon harvest below the falls at Coon Creek (Areas 1 and 2) peaked during Julian week 37. This was a week later than both the 2002 and 2001 season. Grilse Chinook peak harvest occurred during Julian Week 36 for both Areas (Figure 5). Grilse harvest made up 13.2 % of total Chinook harvest.

The peak week of adult Chinook released in Area 1 was Julian Week 36, while the peak week of adult Chinook released in Area 2 was Julian Week 38 (Figure 6). For grilse Chinook the peak releases occurred during Julian Week 36 for both Areas (Figure 6).

More adult steelhead (162) were harvested than half-pounders (27). The peak of the adult steelhead harvested was Julian week 33 in both Areas and a second slight peak in Julian week 35 for Area 1 (Figure 7). The half-pounders harvested in Area 1 were in Julian week 39 and in Area 2 there was no real peak harvest (Figure 7). Anglers start fishing for steelhead usually in July, and creel counts start (Julian Week 32) at the beginning of August, therefore we miss the early portion of the steelhead run.

Regulations allowed anglers to keep only hatchery origin steelhead. Large numbers of steelhead were caught and released this year. Anglers released 1,553 adult and 3,791 half-pounders this season (Table 4). Area 2 is where the majority of steelhead are harvested and released. Julian

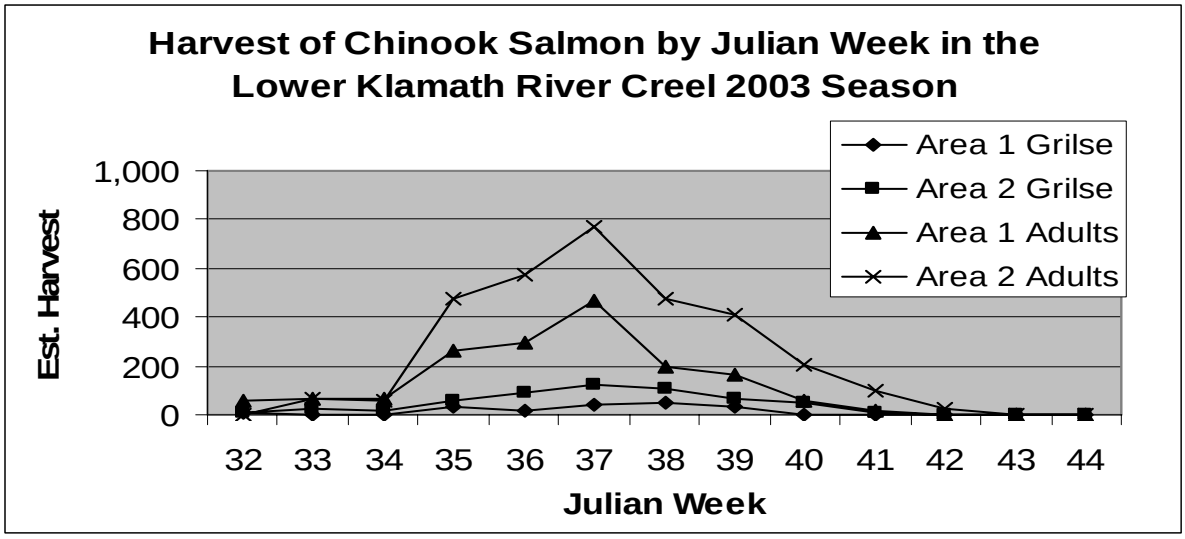


Figure 5. Chinook Salmon Harvest By Julian Week in Lower Klamath River for the 2003 Creel Season.

Table 5. Fish Harvested and Released by Julian Week During the 2003 Lower Klamath River Creel Census.

Julian Week			HARVEST				RELEASED			
	Trips	Hours	Steelhead		Chinook		Steelhead		Chinook	
			½ lb	Adult	Grilse	Adult	½ lb	Adult	Grilse	Adult
32	582	2,708	0	14	13	57	276	319	7	0
33	1,200	4,750	4	51	21	133	360	187	0	12
34	1,969	7,888	4	27	14	124	1,036	140	4	9
35	3,311	14,199	2	24	90	733	470	191	7	260
36	2,392	11,406	2	9	108	877	457	75	46	461
37	2,839	14,232	0	3	158	1,244	195	84	73	1,338
38	1,557	9,077	2	6	159	673	164	76	28	916
39	1,307	7,129	11	13	100	573	183	79	69	608
40	637	3,715	0	5	55	262	66	85	9	219
41	397	2,569	2	5	16	113	252	155	42	105
42	138	665	0	5	2	23	151	79	14	23
43	93	452	0	0	0	0	64	25	2	14
44	93	438	0	0	0	0	117	58	2	5
Total	16,514	79,228	27	162	736	4,812	3,791	1,553	303	3,970

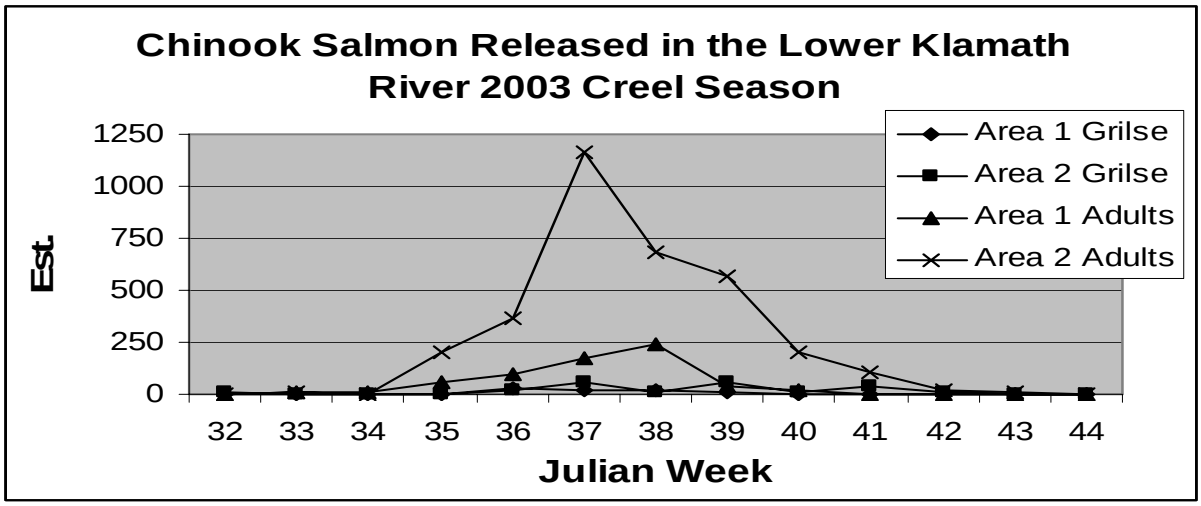


Figure 6. Chinook Salmon Released By Julian Week in the Lower Klamath River for the 2003 Creel Season.

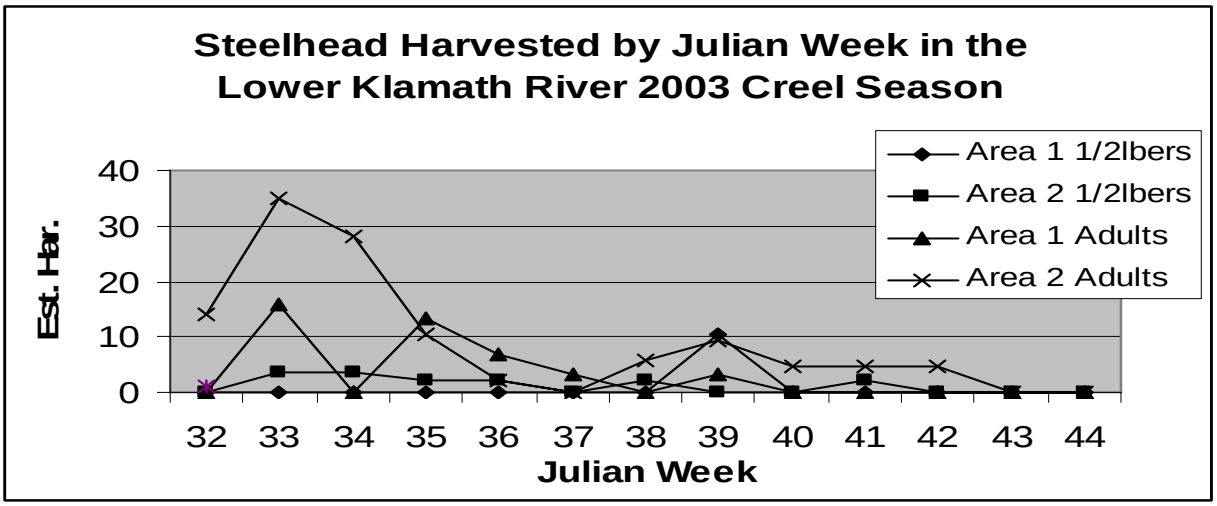


Figure 7. Steelhead Harvested During the 2003 Lower Klamath River Creel Season.

Week 34 was the peak week for half-pounders released in Area 2 (Figure 8). For adult steelhead released Julian Week 32 was the largest peak and then another smaller peak occurred during Julian Week 41 in Area 2 (Figure 8).

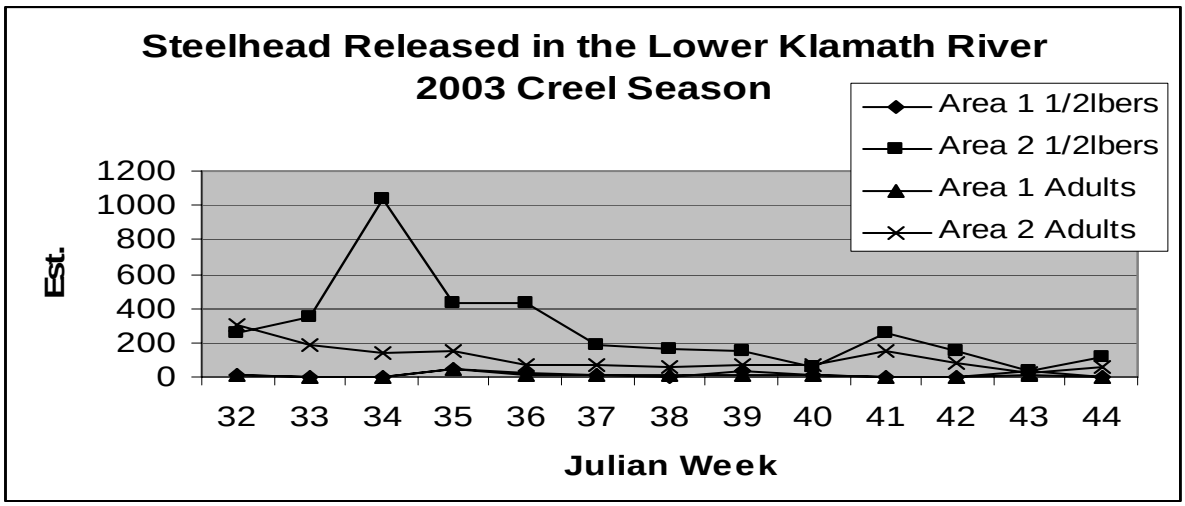


Figure 8. Steelhead Released By Julian Week During the Lower Klamath River 2003 Creel Season.

Coded-Wire Tag Recovery

Klamath River Project personnel recovered 227 heads of adipose fin-clipped (Ad+CWT) Chinook salmon during Julian Weeks 29 through 41 of the 2003 season. Thirteen were from non-random recoveries (NRR) wherein anglers and or resort owners saved their fish heads for our personnel. These NRRs were not used to estimate the harvest of marked hatchery origin (Ad+CWT) Chinook salmon (Table 6). However, they were used to calculate run timing (Figure 9). Of these 227 tags, 218 were adult salmon while 9 were grilse salmon.

Fin-clipped fall run grilse ranged in size from 44 to 52 cm and. Fin-clipped fall-run adults ranged in size from 53 to 97 cm. All fin-clipped fish observed in the angler survey were assigned a head tag which allowed tracking of each adipose clipped fish through the extraction and decoding process.

There are standard codes for tags not recovered; 100000- no tag found, 200000- tag lost, 300000-no head recovered; 400000-tag unreadable; and 700000 tag code unresolved. For the heads recovered this season, nine heads had no tags in them (100000), one was lost during extraction (200000), and one tag was unreadable (400000), while the 216 remaining were all decoded.

Hatchery Contribution

Randomly recovered, marked Chinook composed 10.2 % (214/2,101) of the actual Chinook harvested. With expansions made for sampling and tag code, I estimate 2,509 hatchery fish were harvested (Table 7). Hatchery fish represented an estimated 45.2% (2,509/5,548) of the entire sport harvest in the lower Klamath River. All 214 random recovered tags were from Klamath and Trinity Basin origin Chinook.

In addition to the random recovered tags, we had 13 non-random recovered (NRR) tags. These are heads brought to us from fish with adipose clips that were recovered on days we were not sampling a particular area. These are used for run timing purposes. All 13 of these NRR tags were from adult Chinook based on the estimated size of head at the time of recovery or recorded fork length and 12 were later verified by tag code. One of the 13 NRR did not have a tag in it (100000).

Klamath River Origin Chinook Salmon

We decoded 29 random recovered tags from Klamath River origin Chinook (0 five-year-olds, 6 four-year-olds, 23 three-year-olds and 0 two-year-olds). These Chinook represent eleven marked groups from Iron Gate Hatchery (Table 6). When expanded by sampling and by production, Iron Gate Hatchery origin fish account for 14.8% (820/5,548) of the sport harvest (Table 7).

The peak for Klamath River origin Chinook harvest was Julian Week 35. Personnel recovered Klamath River coded-wire-tagged fish between Julian week 34 and Julian week 40 (Figure 9).

Trinity River Origin Chinook Salmon

We decoded a total of 175 random recovered tags from Trinity River origin Chinook (0 five-year-olds, 51 four-year-olds, 116 three-year-olds and 8 two-year-olds). From those tags 11 were spring-run Trinity River Hatchery origin Chinook (0 five-year-olds, 0 four-year-olds, 10 three-year-olds and 1 two-year-olds, Table 6). Of these tags, 12 fall-run and 7 spring-run Trinity River Hatchery mark groups were represented. Trinity River origin fish represented 30.4% (1,690/5,548) (27.4% fall-run and 3.0% spring-run) of the marked Chinook in the angler survey (Table 7).

Trinity River spring-run Chinook tag recovery began during Julian Week 30 and extended through Julian Week 39. Fall-run fish began to appear in tag recoveries during Julian week 34 and continued through Julian Week 41. Trinity River fall-run tags peaked during Julian week 37 (Figure 9).

During the 2003 season, sport in-river harvest by stock can be described as follows: Trinity River spring-run Chinook were predominate in the harvest up to Julian week 33. Klamath River fall-run Chinook were present and peaked at Julian week 35. The bulk of the Trinity River fall-run tags were collected during Julian week 37. No more coded-wire tagged Chinook were recovered after Julian week 41 (Figure 9).

Table 6. Coded-Wire-Tag Information from Iron Gate Hatchery (IGH) and Trinity River Hatchery (TRH) for Chinook Salmon Obtained from the Lower Klamath River Creel 2003 Season.

	Release Data			Recovery Data			
CWT Codes	Strain	BY	Site	Creel	NRR	FL-Range	Date - Range
Adult Chinook							
06-52-52	SPR	99	TRH	0	1		7/29
06-52-58	SPR	99	TRH	0	2		7/29
06-52-55	Fall	99	TRH	1	0	73	9/28
06-52-59	Fall	99	TRH	50	3	64 - 94	9/5 -10/6
06-63-51	Fall	99	IGH	1	0	83	9/11
06-63-52	Fall	99	IGH	3	0	79 - 85	9/4-9/16
0601020309	Fall	99	IGH	1	0	85	8/31
0601020310	Fall	99	IGH	1	0	97	9/2

06-52-63	SPR	00	TRH	7	1	70 - 80	9/6- 9/26
06-52-69	SPR	00	TRH	2	0	65	8/8
06-52-70	SPR	00	TRH	1	0	67	8/30
06-52-79	SPR	00	TRH	0	1		7/29
06-52-54	Fall	00	TRH	1	0	85	9/14
06-52-65	Fall	00	TRH	5	0	66 - 78	9/2-10/12
06-52-66	Fall	00	TRH	4	0	62 - 79	9/4 -9/20
06-50-67	Fall	00	IGH	4	0	66 - 76	9/14-10/6
06-52-71	Fall	00	IGH	2	1	76, 77	8/22-9/19
06-52-72	Fall	00	IGH	2	0	77, 85	9/16-9/23
06-52-73	Fall	00	TRH	6	0	62 -77	9/6-9/23
06-52-74	Fall	00	TRH	7	0	65 - 81	8/30-10/3
06-52-75	Fall	00	TRH	2	0	64,65	9/13,9/14
06-52-76	Fall	00	TRH	3	0	66 - 81	8/28-9/16
06-52-77	Fall	00	TRH	2	0	66, 72	9/14,9/25
06-52-80	Fall	00	TRH	76	2	53-79	8/30-10/12
06-63-53	Fall	00	IGH	1	0	59	8/28
06-63-54	Fall	00	IGH	11	1	61 - 74	8/31-9/20
0601020305	Fall	00	IGH	1	0	63	9/8
0601020307	Fall	00	IGH	1	0	77	9/6
0601020308	Fall	00	IGH	1	0	67	9/1
100000	no tag found			7	1	70- 86	7/29-9/20
200000	Tag lost			1	0	68	9/26
400000	Tag un-readable			1	0	83	9/18
Total				205	13		
Grilse Chinook							
06-52-88	SPR	01	TRH	1	0	45	9/1
06-52-89	Fall	00	TRH	7	0	44-52	9/13-10/6
100000	no tag found			1	0	50	10/12
Totals				9	0		
Grand Total				214	13		

Table 7. Chinook Salmon Proportioned by Hatchery and Brood Year from Coded-Wire tagged Fish Harvested in the Lower Klamath River Sport Harvest for the 2003 Creel Season. Expanded for sampling and by hatchery production multiplier.

Hatchery Run	Estimated Total By Brood Year			Total	% by Hatchery	% of total harvest
	1999	2000	2001			
TRH SPR	12	143	14	169	6.7	3.0
TRH Fall	402	1,047	72	1,521	60.5	27.4
IGH Fall	289	531	0	820	32.7	14.8
Total	703	1,721	86	2,510		45.2
% by year	28.0	68.6	3.4			

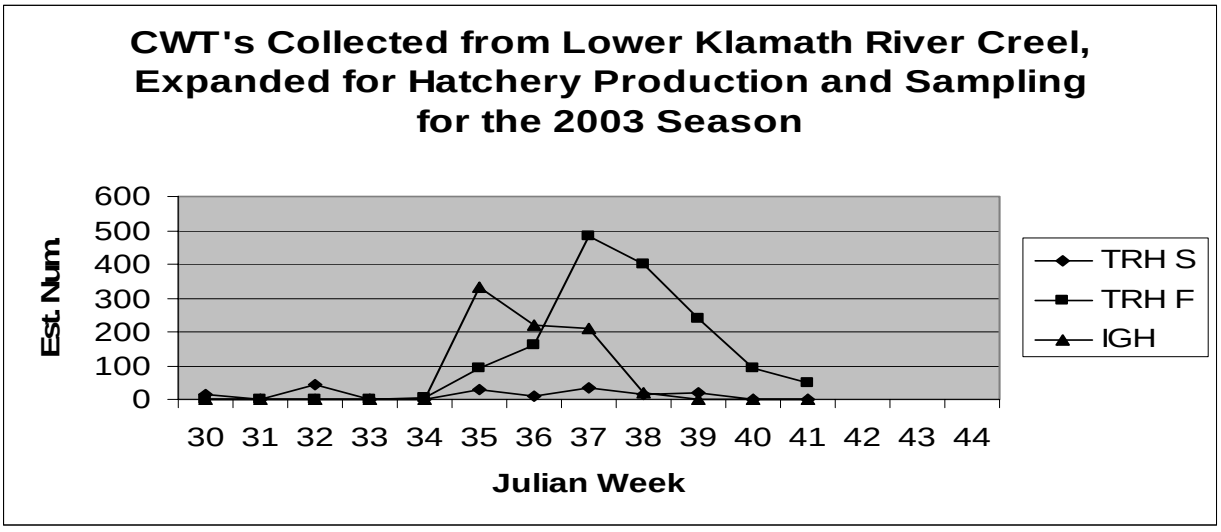


Figure 9. Timing by Julian Week of Coded Wire Tags, Expanded for Sampling and by Individual Tag Code, Recovered from Chinook Salmon in the Lower Klamath River 2003 Creel Season.

DISCUSSION

The mouth configuration (far north) this season vastly reduced harvest on the mouth/spit of the river. Anglers were not happy with the bag limit of one adult per day. Had this regulation been increased to two adult fish per day, I believe the quota would have been met sometime in September and would have reduced releases of adults in the river system. Further consideration

will be given to future regulations with respect to the size of quota and mouth configuration.

An additional 50,000 acre feet of water was released from August 24 through September 16 from Lewiston Dam to provide water for the Hoopa Boat Dance and for Fishery purposes. The Additional water was thought to help keep fish moving through the estuary thus to avert another massive die off of adult upstream migrating fall fish. Similar flows were not released out of Iron Gate Dam. The additional water kept the flows above 3000 cfs at the Terwer Gauge.

CONCLUSION

The 2003 season resulted in the 7th largest run-size for fall-run Chinook salmon in the Klamath Basin over the last 26. This season was lowest ratio for grilse to adult Chinook (1.86% grilse) over the last 26 years in the basin. The harvest rate on grilse was higher because the regulations allow anglers to target grilse.

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Appendix 1. List of Julian weeks and their calender equivalents.

Julian week	Inclusive dates			Julian week	Inclusive dates		
1	01-Jan	-	07-Jan	27	02-Jul	-	08-Jul
2	08-Jan	-	14-Jan	28	09-Jul	-	15-Jul
3	15-Jan	-	21-Jan	29	16-Jul	-	22-Jul
4	22-Jan	-	28-Jan	30	23-Jul	-	29-Jul
5	29-Jan	-	04-Feb	31	30-Jul	-	05-Aug
6	05-Feb	-	11-Feb	32	06-Aug	-	12-Aug
7	12-Feb	-	18-Feb	33	13-Aug	-	19-Aug
8	19-Feb	-	25-Feb	34	20-Aug	-	26-Aug
9 a/	26-Feb	-	04-Mar	35	27-Aug	-	02-Sep
10	05-Mar	-	11-Mar	36	03-Sep	-	09-Sep
11	12-Mar	-	18-Mar	37	10-Sep	-	16-Sep
12	19-Mar	-	25-Mar	38	17-Sep	-	23-Sep
13	26-Mar	-	01-Apr	39	24-Sep	-	30-Sep
14	02-Apr	-	08-Apr	40	01-Oct	-	07-Oct
15	09-Apr	-	15-Apr	41	08-Oct	-	14-Oct
16	16-Apr	-	22-Apr	42	15-Oct	-	21-Oct
17	23-Apr	-	29-Apr	43	22-Oct	-	28-Oct
18	30-Apr	-	06-May	44	29-Oct	-	04-Nov
19	07-May	-	13-May	45	05-Nov	-	11-Nov
20	14-May	-	20-May	46	12-Nov	-	18-Nov
21	21-May	-	27-May	47	19-Nov	-	25-Nov
22	28-May	-	03-Jun	48	26-Nov	-	02-Dec
23	04-Jun	-	10-Jun	49	03-Dec	-	09-Dec
24	11-Jun	-	17-Jun	50	10-Dec	-	16-Dec
25	18-Jun	-	24-Jun	51	17-Dec	-	23-Dec
26	25-Jun	-	01-Jul	52 b/	24-Dec	-	31-Dec

a/ Eight-day week in each leap year (years divisible by 4).
b/ Eight-day week every year.