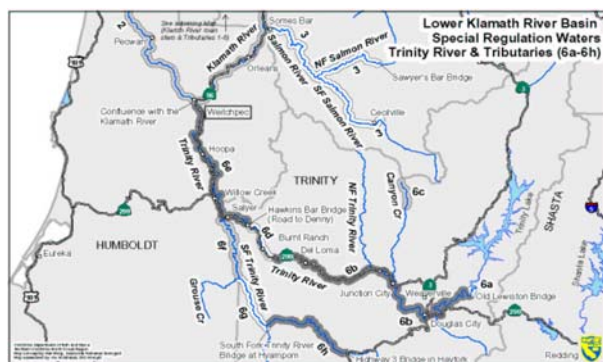


State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD
MONITORING PROJECT
2004-2005 SEASON



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TRINITY RIVER BASIN SALMON AND STEELHEAD
MONITORING PROJECT
2004-2005 SEASON

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May 2006

Foreward

This is the seventeenth 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, 2004 through September 30, 2005 (FFY 2005). 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 2005. 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.

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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.

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ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2004-05 SEASON

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

by

Morgan Knechtle and Wade Sinnen

ABSTRACT

The California Department of Fish and Game's Trinity River Project conducted tagging and recapture operations from July 2004 through March 2005 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 3,035 Chinook salmon, 1,009 coho salmon, 2,217 fall steelhead and 256 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 16,147 spring Chinook salmon migrated into the Trinity River basin upstream of Junction City Weir this season. We estimate that 889 of these were caught by anglers, leaving 15,258 fish as potential spawners. We estimated 29,534 fall Chinook salmon migrated past Willow Creek Weir and that 708 of these were caught by anglers, leaving 28,826 potential spawners.

The coho salmon run in the Trinity River basin, upstream of Willow Creek Weir, was estimated to be 38,882 fish. We estimated 40 of these were harvested by anglers, leaving 38,842 potential spawners.

An estimated 19,855 (4,817 naturally produced and 15,038 hatchery produced) adult fall run steelhead entered the Trinity River basin upstream of Willow Creek Weir. Anglers harvested an estimated 461 of the adult fall steelhead that migrated past Willow Creek Weir, leaving 19,394 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 continued 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; Reese and Sinnen, 2004; and Sinnen and Knechtle, 2005).

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 July through mid November 2004 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 36.5 km upstream from the Trinity River's confluence with the Klamath River (40° 58' 29.85" N, 123° 38' 8.61" W). The upstream site, Junction City Weir (JCW), was located 132.7 km upstream from the Klamath River confluence (40° 41' 5.51" N, 123° 01' 35.55" W) (Figure 1). Prior to 1995, JCW was operated from May through November. Currently, JCW is operated from late June or mid-July 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 14 through November 22, 2004 and the JCW from July 21 through October 7, 2004. At JCW there was a three week period between August 20 and September 15 when no trapping occurred. The weir was removed due to "fall fishery" flows released from Lewiston Dam. The flows peaked at 1,780 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).

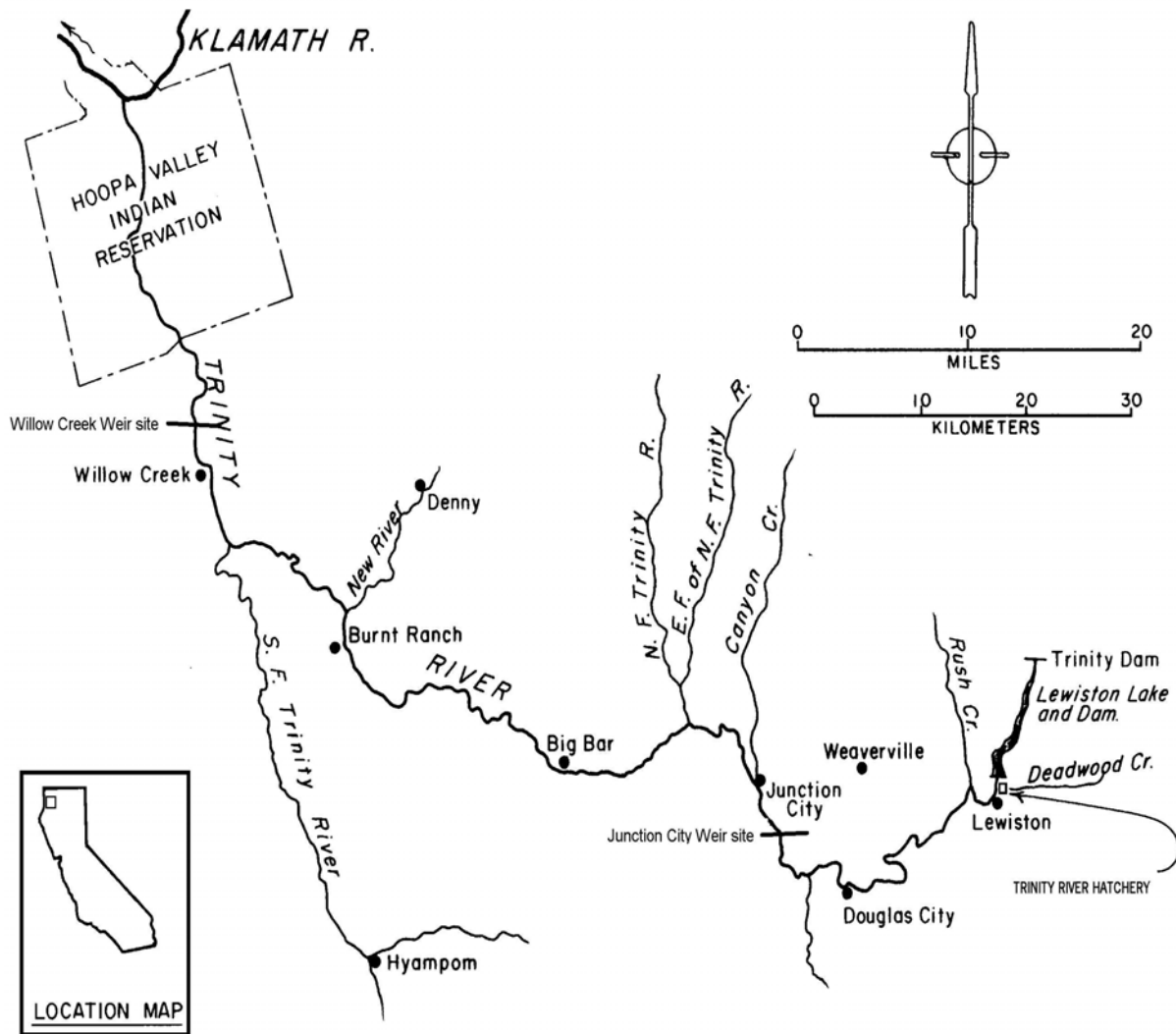


Figure 1. Location of trapping and tagging weirs for anadromous salmonids near Willow Creek and Junction City in the mainstem Trinity River, 2004-05 season.

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° 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 3/4-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 (taken downstream) of Alaskan weir. Note the boat gate (right side of picture).



Figure 4. Photograph of Alaskan weir showing the trapping boxes 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. To allow boat passage, at both weirs, gates approximately 6m were inserted between two weir panels. The gate at JCW was constructed of welded conduit panels with 2.5-cm spacing between conduits and was perpendicular to the stream substrate. The gate at WCW was constructed of chain-link fencing supported by a livestock gate with 4.0 cm mesh spacing and was sloped even with the weir.

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 un-spawned 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

^{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.

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 were tagged with serially numbered FD-94 anchor tags. All brown trout tagged during 2004 received non-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 (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 CWT's 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 ≤ 41 cm FL captured at the weirs were assumed to be half-pounders (assumed to have migrated to the ocean). Steelhead ≤ 41 cm FL that entered TRH were not counted and were classified as sub-adults. We did not know whether these fish 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 ≤ 21 days after tagging. Tagged fish recovered dead more than 21 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 June 1, 2005 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 03 September 2004 through 15 March 2005. 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. At TRH we are unable to distinguish between large rainbow trout and small steelhead trout therefore, *O. mykiss* ≤ 41 cm FL were not counted and were returned to the river

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 tag 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 tags. 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 $\pm 10\%$ 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 $\pm 10\%$ 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 received adipose-fin clips. 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

^{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).

tags from caught and released fish by the number of fish effectively 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 37, after which fall Chinook became predominate (Figure 5). No trapping was attempted during JW's 35 and 36 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 75.5 fish/night. Chinook catch declined thereafter to a low of 1 fish/night in JW 34. Twenty nine percent of spring Chinook caught (151/518) during the season was in the first week of trapping, indicating that the trap was installed during a pulse of migration. After this initial pulse of fish moved upstream, two additional pulses of fish were trapped peaking in JW's 32 and 37 with 30.6 and 26.0 fish/night trapped. (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 38 fish between JW's 37 and 42, with the peak observed during JW 39 when 123 fish/night were trapped. Thirteen percent of the fall Chinook caught (274/2,137) during the season was in the first week of trapping, indication that the trap was installed during a pulse of upstream migration. During JW 42 daily catch of Chinook dropped to 0.5 fish per night. Chinook catch stayed below 8 fish per night for the remainder of the season and only one Chinook was caught the last week of trapping, JW 47 (Table 2, Figure 7).

Fall Chinook run timing 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 1780 cfs on August 24 and gradually receded to below 500 cfs, on

September 13th (Appendices 19-20). 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. These increased flows also impacted our ability to trap JW's 34-37 at JCW.

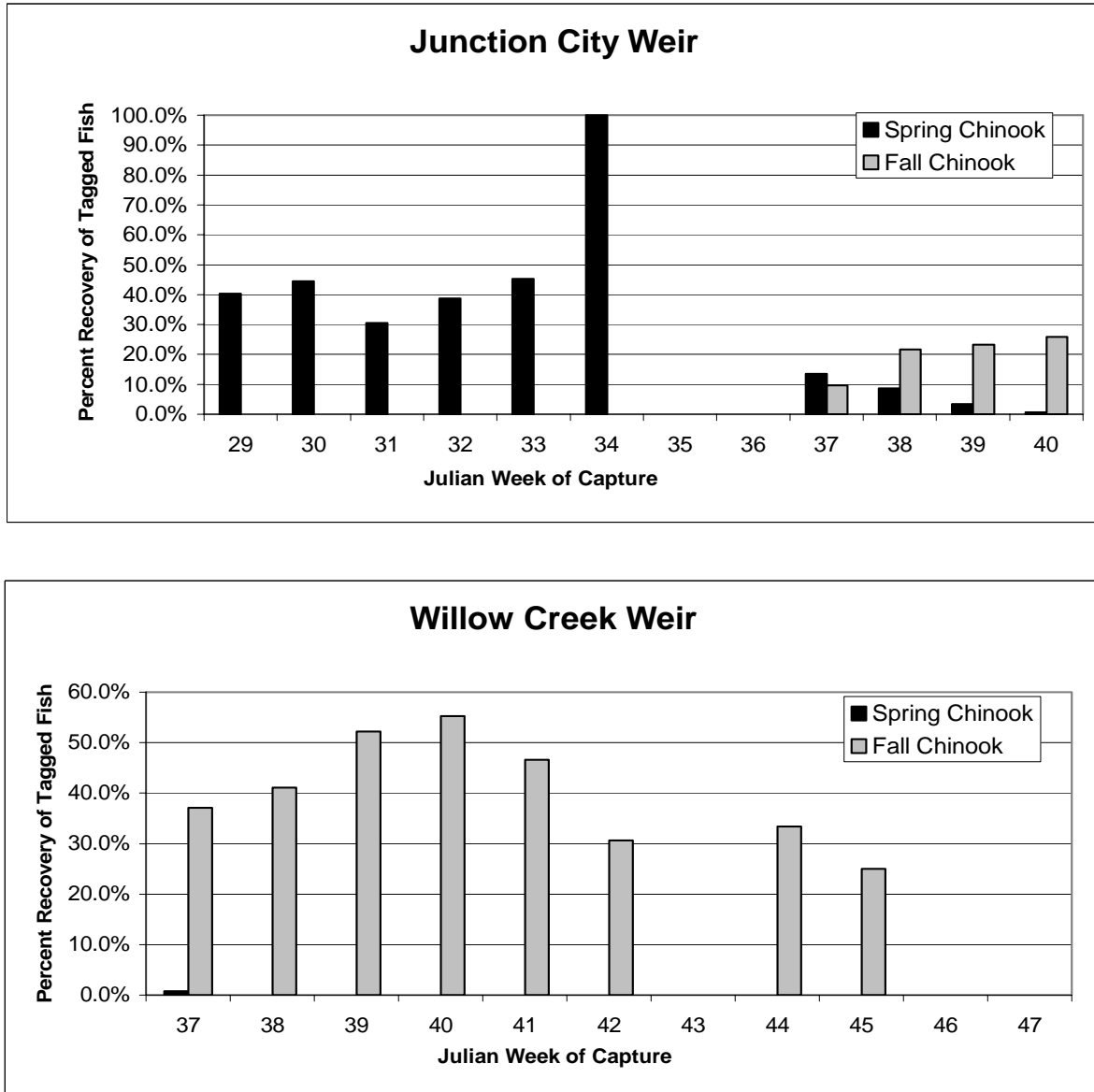


Figure 5. Percent recovery of Junction City and Willow Creek Weir marked Chinook at Trinity River Hatchery during the 2004-05 season. Chinook salmon were designated as either spring or fall-run based on recoveries of coded-wire tags or entry timing into Trinity River Hatchery. For the purposes of analysis, all Chinook salmon captured at Willow Creek Weir were considered fall-run and Chinook salmon captured prior to Julian week 38 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 2004. a/

Julian Week	Inclusive dates			Nights Trapped	Number Trapped			fish/night
					Grilse b/	Adults	Total	
Spring Chinook								
29	16-Jul	-	22-Jul	2	87	64	151	75.5
30	23-Jul	-	29-Jul	5	39	45	84	16.8
31	30-Jul	-	5-Aug	5	11	12	23	4.6
32	6-Aug	-	12-Aug	5	61	92	153	30.6
33	13-Aug	-	19-Aug	5	26	28	54	10.8
34	20-Aug	-	26-Aug	1	0	1	1	1.0
37	10-Sep	-	16-Sep	2	16	36	52	26.0
Sub-total:				25	240	278	518	
Sub-mean:								23.6
Fall Chinook c/								
38	17-Sep	-	23-Sep	5	24	47	71	14.2
39	24-Sep	-	30-Sep	5	49	74	123	24.6
40	1-Oct	-	7-Oct	5	56	130	186	37.2
Sub-total:				15	129	251	380	
Sub-mean:								25.3
Grand total:				40	369	529	898	
Combined mean:								24.1

a/ Trapping at Junction City took place from 21 July (Julian week 29) through 20 August (Julian week 34) and 15 September (Julian week 37) through 7 October (Julian week 40) of 2004.

b/ Spring-run Chinook <57 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 37, 38, and 39. 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.

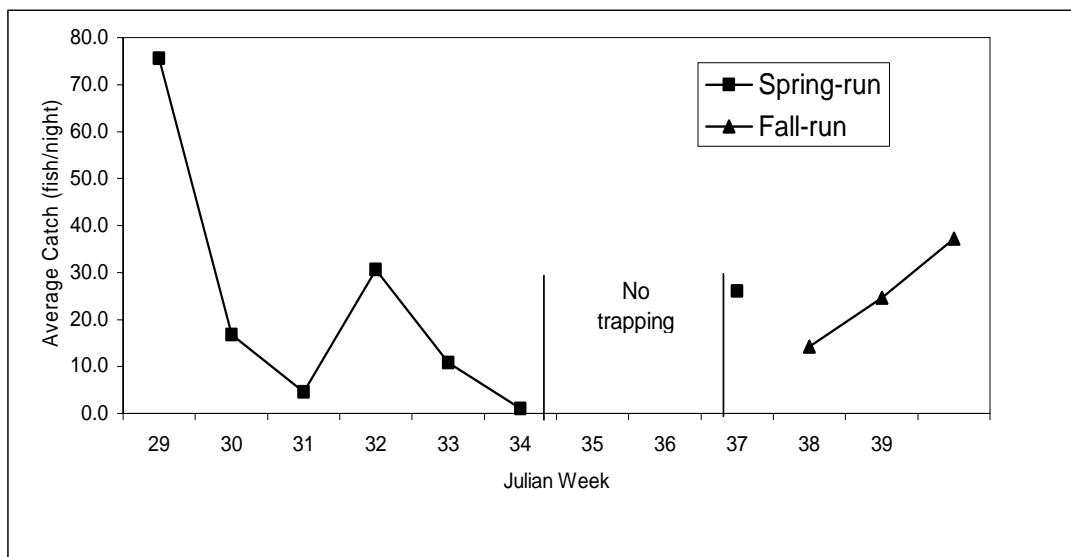


Figure 6. Average catch of spring- and fall-run Chinook salmon in the Trinity River at Junction City Weir during 2004.

Table 2. Weekly summary of fall-run Chinook salmon trapped in the Trinity River at Willow Creek Weir during 2004. 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	
37	10-Sep - 16-Sep	3	76	198	274	91.3
38	17-Sep - 23-Sep	5	102	311	413	82.6
39	24-Sep - 30-Sep	5	106	509	615	123.0
40	1-Oct - 7-Oct	5	50	288	338	67.6
41	8-Oct - 14-Oct	5	23	240	263	52.6
42	15-Oct - 21-Oct	4	8	146	154	38.5
43	22-Oct - 28-Oct	4	0	2	2	0.5
44	29-Oct - 4-Nov	5	2	15	17	3.4
45	5-Nov - 11-Nov	5	8	31	39	7.8
46	12-Nov - 18-Nov	5	3	18	21	4.2
47	19-Nov - 25-Nov	2		1	1	0.5
Total:		48	378	1,759	2,137	
Mean:						42.9

a/ Trapping at Willow Creek took place from 14 September (Julian Week 37) through 22 November (Julian Week 47) of 2004.

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

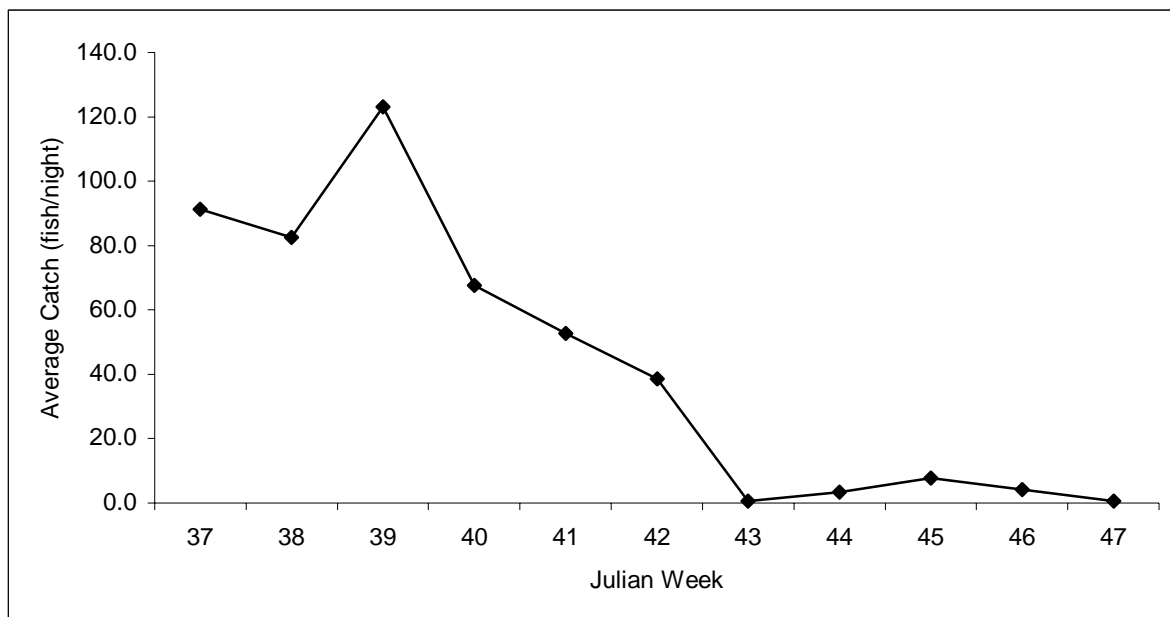


Figure 7. Average catch of fall-run Chinook salmon in the Trinity River at Willow Creek Weir during 2004.

Sizes of Trapped Fish. Spring Chinook trapped this season at JCW and TRH averaged 59.7 and 69.6 cm FL, respectively. The combined average of the two sites was 68.6 cm, FL (Figure 8). The nadir between grilse and adult spring Chinook indicated a maximum grilse size of 56 cm FL. Data from known-age, hatchery-marked spring Chinook that entered TRH, reinforced a minimum adult length of 57cm FL. Although, there was some overlap between sizes of age 2 (fingerling releases) and age 3 (yearling releases) spring Chinook (Appendix 2). Applying this size to observed populations, we estimate that grilse comprised 46.3% and 15.8% of the spring Chinook observed at JCW and TRH, respectively. Based on fork length and CWT analysis the age composition of spring Chinook trapped at JCW was different than at TRH. Spring Chinook age composition based on CWT analysis alone at TRH was 14.7, 35.2, 49 and 1.2 percent 2, 3, 4 and 5 year old fish respectively. While the age composition of CWT'ed spring Chinook that were trapped at JCW and were recovered at TRH was 37.5, 42.5, 20 and 0 percent 2, 3, 4 and 5 year old fish respectively.

Fall Chinook trapped at WCW averaged 64.7 cm, FL and 66.8 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 supported this size separation, however there was some overlap between sizes of age 2 (fingerling releases) and age 3 (yearling releases) fall Chinook (Appendix 3). Based on a maximum grilse size of 54 cm, fall Chinook grilse comprised 17.7% and 7.9% of the run observed at WCW and TRH respectively.

Effectively Tagged Fish. We trapped 518 spring Chinook at JCW, of which 509 (238 grilse and 271 adults) were effectively tagged (Appendix 4). There were 2 tagging mortalities and 4 caught-and-released spring Chinook from which anglers reported removing tags that were not considered effectively tagged. We reward-tagged 168 (33.0 %) spring Chinook (87 grilse and 81 adults). The remaining fish received non-reward tags.

We trapped 2,137 fall Chinook at WCW and 2,075 of them (363 grilse and 1,712 adults) were effectively tagged (Appendix 5). Due to poor condition we did not tag 43 fall-run Chinook, anglers removed the tags from 15 caught and released fish, and there were two tagging mortalities. We placed reward tags on 686 (112 grilse and 574 adults), or 33.1%, of the effectively tagged fall Chinook at WCW.

Incidence of Tags and Fin Clips. 12 of the Chinook tagged at WCW were subsequently recaptured at JCW this year. Ad-clipped fish comprised 17.9% (93/518) of the spring Chinook captured at JCW (Appendix 4). Forty two of the 93 Ad-clipped Chinook designated as Spring Chinook and tagged at JCW were subsequently recovered at TRH (Table 3). These were predominantly from CWT release group code 0625288, three-year-old spring Chinook released as yearlings in October of 2001. Of the 380 Chinook designated as fall-run captured at JCW, 16.3% (62) were Ad-clipped. Twenty one of these fish were subsequently recaptured at TRH.

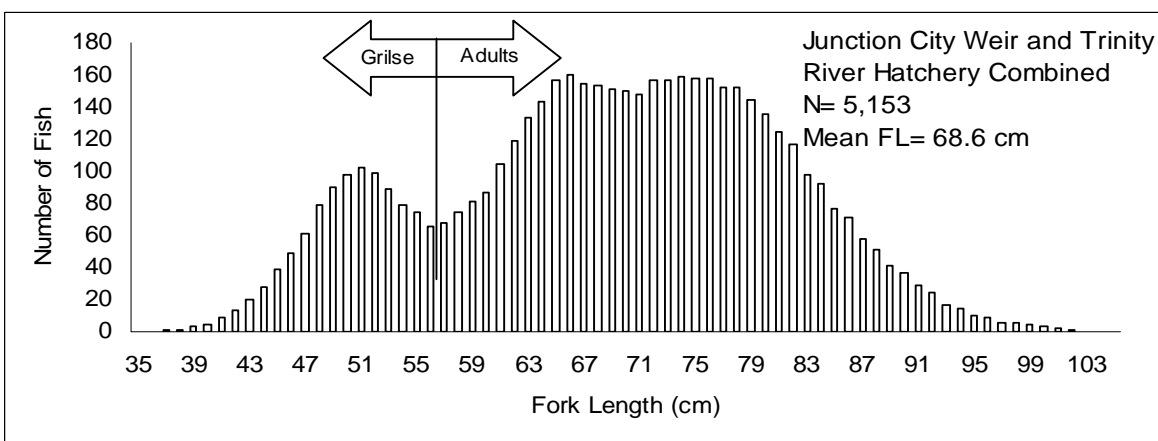
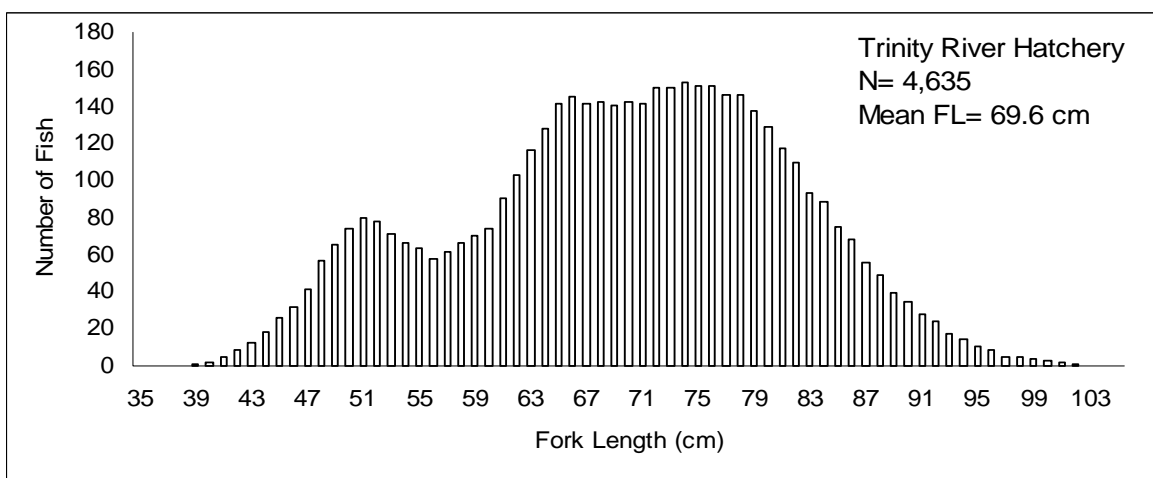
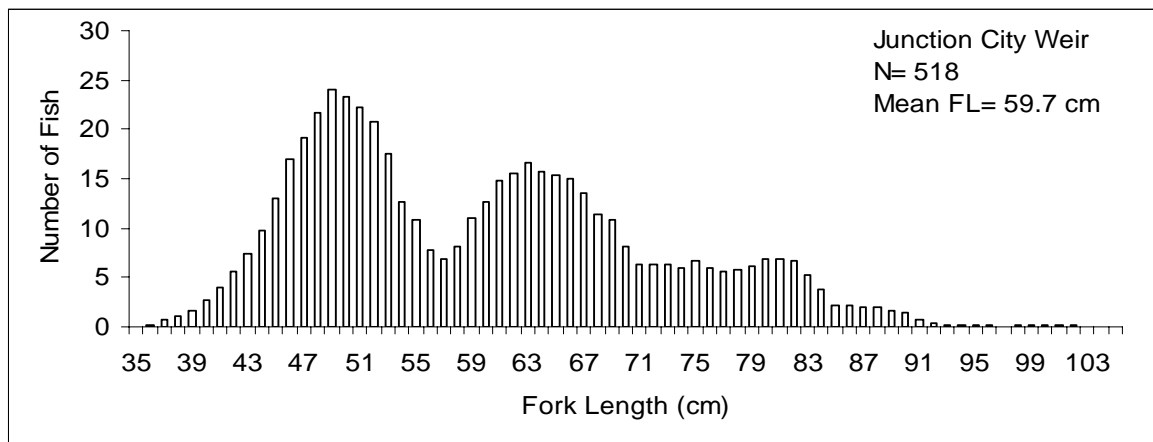


Figure 8. Spring-run Chinook salmon fork lengths (cm) observed at Junction City Weir and Trinity River Hatchery during the 2004-05 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

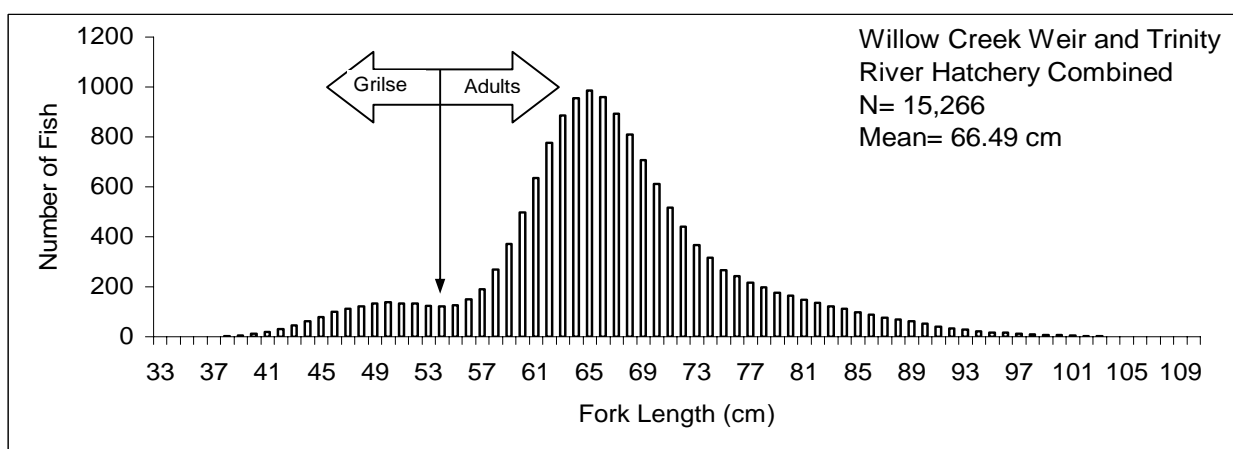
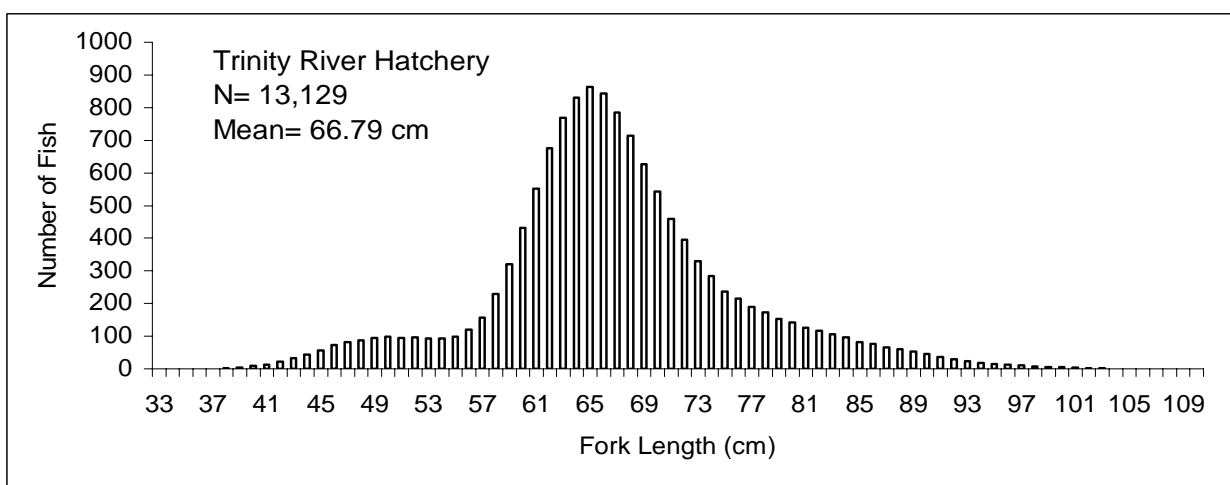
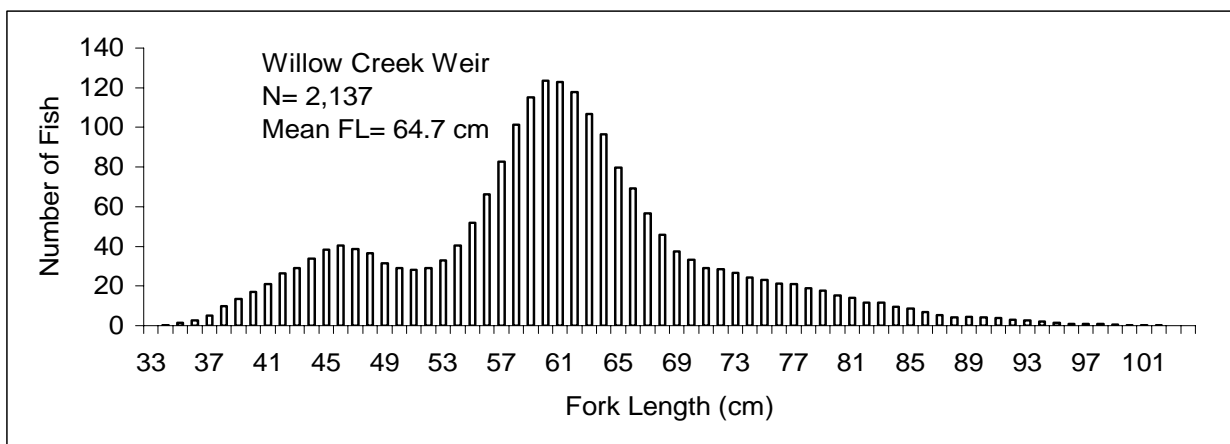


Figure 9. Fall-run Chinook salmon fork lengths (cm) observed at Willow Creek Weir and Trinity River Hatchery during the 2004-05 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

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 2004-05 season.

Release data							Numbers recovered from tagging site: b/	
CWT and release type a/	Species	Race	Brood year	Date	Number of fish	Site c/	WCW	JCW
Spring-run Chinook								
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	0
065253-f	Chinook	spring	1999	06/01-07/00	46,966	TRH	0	0
065258-y	Chinook	spring	1999	10/03-06/00	129,919	TRH	0	0
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	0
065263-f	Chinook	spring	2000	06/06-13/01	34,385	TRH	0	1
065264-f	Chinook	spring	2000	06/06-13/01	31,857	TRH	0	0
065269-f	Chinook	spring	2000	06/06-13/01	52,491	TRH	0	1
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	4
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	17
065295-f	Chinook	spring	2002	06/03-09/03	89,284	TRH	0	4
065296-f	Chinook	spring	2002	06/03-09/03	84,568	TRH	0	8
065297-f	Chinook	spring	2002	06/03-09/03	70,902	TRH	0	2
065308-y	Chinook	spring	2002	10/01-07-03	106,139	TRH	0	1
shed tag d/	Chinook	spring					0	2
Total spring-run Chinook:							0	42
Fall-run Chinook								
065254-f	Chinook	fall	1999	06/01-07/00	44,654	TRH	1	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	0	0
065259-y	Chinook	fall	1999	10/03-06/00	296,892	TRH	0	0
065265-f	Chinook	fall	2000	06/06-13/01	32,795	TRH	0	0
065266-f	Chinook	fall	2000	06/06-13/01	33,806	TRH	0	0
065267-f	Chinook	fall	2000	06/06-13/01	34,852	TRH	1	0
065268-f	Chinook	fall	2000	06/06-13/01	33,240	TRH	0	0
065271-f	Chinook	fall	2000	06/06-13/01	54,867	TRH	0	0
065272-f	Chinook	fall	2000	06/06-13/01	36,035	TRH	0	0
065273-f	Chinook	fall	2000	06/06-13/01	57,444	TRH	2	0
065274-f	Chinook	fall	2000	06/06-13/01	32,096	TRH	1	0
065275-f	Chinook	fall	2000	06/06-13/01	64,250	TRH	0	0
065276-f	Chinook	fall	2000	06/06-13/01	27,159	TRH	1	0
065277-f	Chinook	fall	2000	06/06-13/01	56,582	TRH	0	0
065278-f	Chinook	fall	2000	06/06-13/01	34,183	TRH	1	0
065280-y	Chinook	fall	2000	10/01-10/01	216,593	TRH	17	6
065643-f	Chinook	fall	2000	06/06-13/01	25,007	TRH	0	0
065284-f	Chinook	fall	2001	06/03-10/02	119,555	TRH	2	0
065285-f	Chinook	fall	2001	06/03-10/02	114,119	TRH	3	0
065286-f	Chinook	fall	2001	06/03-10/02	126,135	TRH	2	0
065287-f	Chinook	fall	2001	06/03-10/02	121,607	TRH	1	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	193	6
065292-f	Chinook	fall	2002	06/03-09/03	10,355	TRH	0	0
065298-f	Chinook	fall	2002	06/03-09/03	124,602	TRH	12	3
065299-f	Chinook	fall	2002	06/03-09/03	126,729	TRH	6	0
065306-f	Chinook	fall	2002	06/03-09/03	124,014	TRH	3	1
065307-f	Chinook	fall	2002	06/03-09/03	123,263	TRH	1	3
065309-y	Chinook	fall	2002	10/01-07/03	236,319	TRH	1	0
shed tag d/	Chinook	fall	2002				10	2
Total fall-run Chinook:							258	21
Coho salmon								
RM e/	coho		2001	03/17-19/03	416,201	TRH	226	
RM e/	coho		2002	03/15-17/04	516,906	TRH	21	
Total coho:							247	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 2002 and coho greater than 53 cm, FL were classified as brood year 2001. Age cutoff based on fork length distribution.

Ad-clipped fish comprised 22.5% (480/2,137) of the fall Chinook observed at WCW (Appendix 5). Two hundred fifty eight (53.8%) of the Ad-clipped fall Chinook tagged at WCW were recovered at TRH (Table 3). Of these, the vast majority were 3-year-old fall Chinook released from TRH as yearlings in 2001 (CWT groups 065289).

Incidence of Gill-net Wounds, Hook Scars, and Predator Wounds. Seventy seven (14.9%) of the 518 spring Chinook trapped at JCW had gill-net wounds. The average size of spring Chinook with gill-net wounds verses without gill net wounds was 67.2 and 58.4 cm FL, respectively. Although subjective, crews noted one fresh hooking scar, seven predator scars, and 16 wounds of unknown origin on spring Chinook at JCW.

One hundred fifty eight (7.4%) of the 2,137 fall Chinook trapped at WCW had gill-net wounds. The average size of fall Chinook with gill-net wounds verses without gill-net wounds was 70.1 and 64.3 cm. FL respectively. Although subjective, crews at WCW noted 27 ocean hooking scars, and 100 fresh hooking scars on fall Chinook at WCW. Crews also observed predator wounds on 151 of the fall Chinook and an additional 48 had wounds of unknown origin.

Coho Salmon

Run timing. We trapped the first coho at WCW on 14 September, 2004 (JW 37). Coho trapping peaked during JW 41 when average catch was 84.8 fish/night (Table 4, Figure 10). We trapped 1,009 coho salmon (151 grilse and 858 adults) at WCW this season.

Size of Fish Trapped. Coho trapped at WCW ranged from 33 to 87 cm FL and averaged 63.3 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 ≤ 53 cm FL were considered grilse. Grilse coho comprised 15.0 and 9.8% of the coho trapped at WCW and TRH respectively.

Effectively Tagged Fish. Of the 1,009 coho salmon trapped at WCW, 976 were effectively tagged (Appendix 6). To discourage anglers from harvesting coho, all coho received non-reward tags.

Incidence of Tags and Fin Clips. Seventy seven percent (774/1,009) of the coho salmon we trapped at WCW (147 grilse and 627 adults) bore right maxillary (RM) clips (Appendix 6). Two hundred forty seven of the project tagged, RM-clipped coho, were recovered at TRH (Table 3).

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. Forty four (4.4%) of the 1,009 coho observed at WCW had gill-net wounds. The average size of coho with gill-net wounds verses without gill-net wounds was 67.9 and 63.1 cm. FL respectively. Although subjective, crews at WCW noted 19 fresh hooking scars, 92 predator scars and 22 wounds of unknown origin on adult coho.

Table 4. Weekly summary of coho salmon trapped in the Trinity River at Willow Creek Weir during 2004. a/

Julian Week	Inclusive dates	Nights Trapped	Number Trapped			fish/night
			Grilse b/	Adults	Total	
37	10-Sep - 16-Sep	3	1	8	9	3.0
38	17-Sep - 23-Sep	5	3	24	27	5.4
39	24-Sep - 30-Sep	5	7	102	109	21.8
40	1-Oct - 7-Oct	5	27	300	327	65.4
41	8-Oct - 14-Oct	5	67	357	424	84.8
42	15-Oct - 21-Oct	4	16	35	51	12.8
43	22-Oct - 28-Oct	4	17	13	30	7.5
44	29-Oct - 4-Nov	5	5	6	11	2.2
45	5-Nov - 11-Nov	5	2	7	9	1.8
46	12-Nov - 18-Nov	5	6	6	12	2.4
47	19-Nov - 25-Nov	2	0	0	0	0.0
Total		48	151	858	1,009	
Mean:						18.8

a/ Trapping at Willow Creek took place from 14 September (Julian Week 37) through 22 November (Julian Week 47) of 2004.

b/ Coho salmon <54 cm, FL were considered grilse.

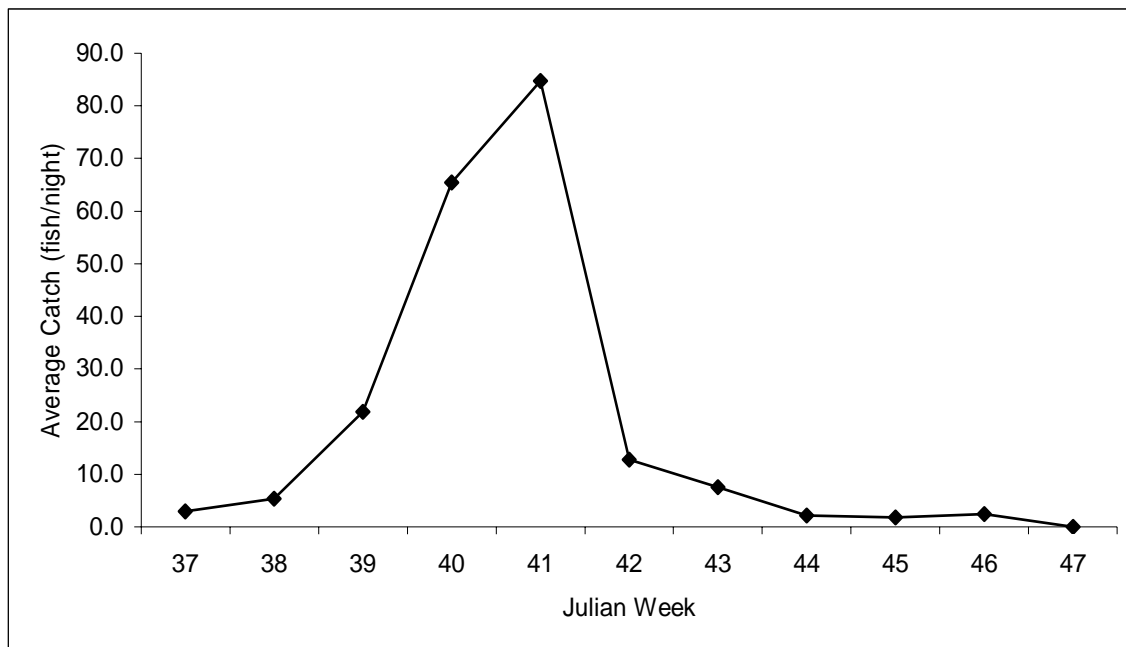


Figure 10. Average catch of coho salmon in the Trinity River at Willow Creek Weir during 2004.

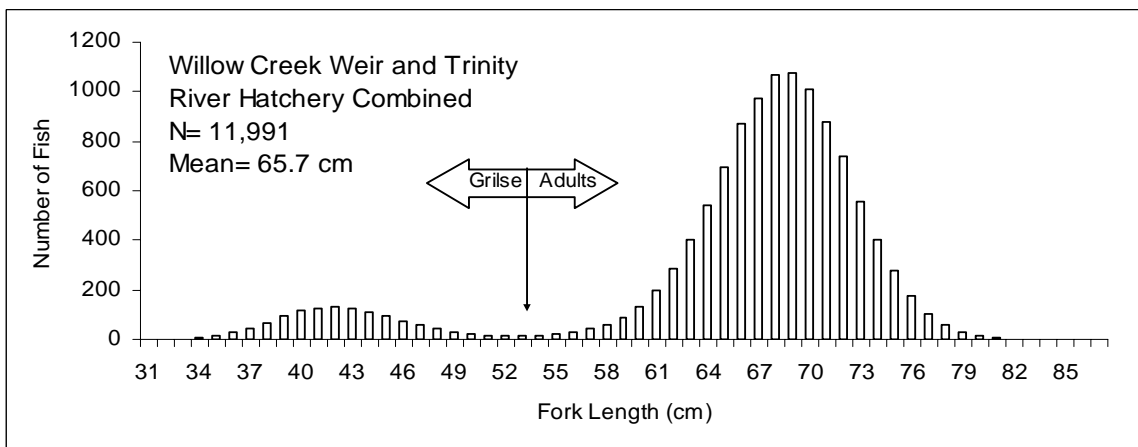
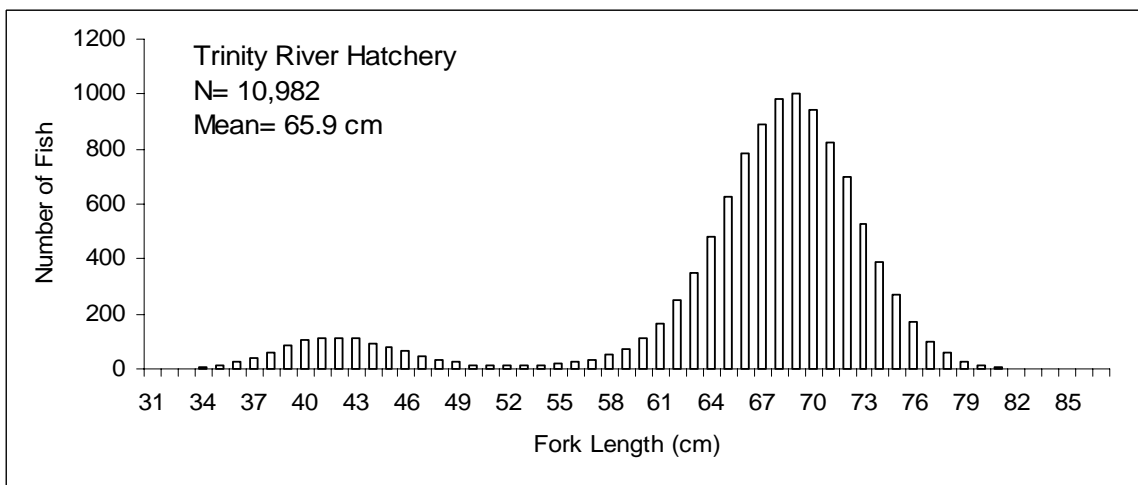
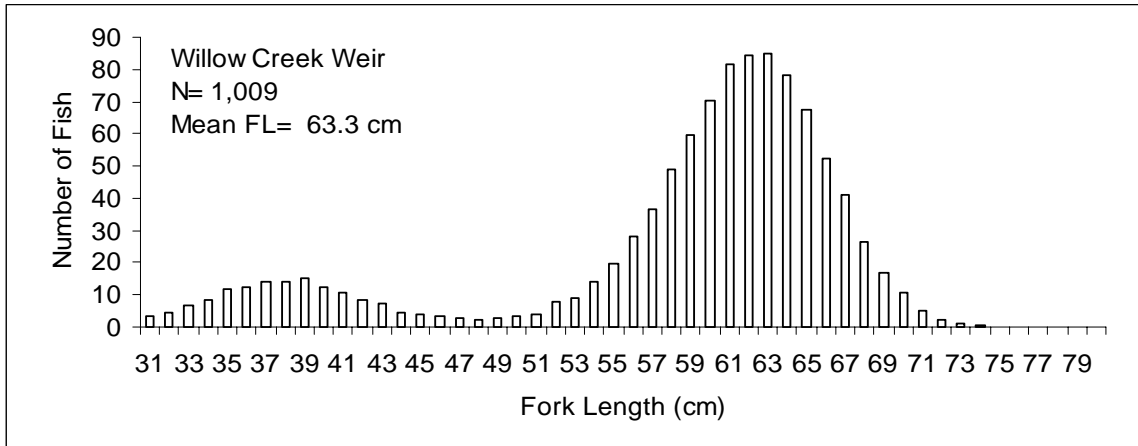


Figure 11. Coho salmon fork lengths (FL) observed at the Willow Creek Weir and Trinity River Hatchery during the 2004-2005 season. The number of fish at each FL is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Fall Steelhead

Run Timing. We trapped steelhead all but the last week of trapping at WCW (Table 5, Figure 12). Peak trapping of steelhead occurred during JW 41 when 120 fish/night were trapped. One and a half percent of the steelhead trapped (31/2,041) during the season was trapped during the first week, indicating that the trap was installed before the peak of the steelhead run arrived at WCW. We trapped 2,032 adult steelhead at WCW this season. At JCW, less than 6.0 fish/night were trapped throughout the season until JW 40, the last week of trapping, when 16.0 fish/night were trapped. We trapped 173 adult steelhead at JCW this season (Table 6, Figure 13).

Size of Fish Trapped. Steelhead caught at, JCW, WCW, and TRH averaged 57.8, 61.7 and 61.8 cm FL, respectively (Figure 14). Adult steelhead (> 41 cm, FL) made up 98.3% and 99.6% of the steelhead trapped at JCW, WCW respectively.

Effectively Tagged Fish. We trapped 2,032 adult steelhead at WCW and 1,816 of those were effectively tagged (Appendix 7). We detected one tagging mortality, 37 fish were not tagged, and anglers reported removing tags from 178 caught and released fish. Eight hundred ninety two 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 1,538 (75.3 %) of the steelhead at WCW, 154 (87.5 %) at JCW, and 5,688 (99.4%) at TRH (Appendix 8). Additionally, seventeen steelhead at WCW had various other clips (2-adipose plus left maxillary; 5-adipose plus right maxillary; 2-left maxillary, and 8-right maxillary). 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, 27 of the steelhead trapped had gill-net wounds, 10 had fresh hook wounds, 37 had unknown wounds, and 248 had predator wounds. At JCW, 2 steelhead had gill-net wounds, 2 had wounds of unknown origin and four had predator wounds.

Table 5. Weekly summary of steelhead trapped in the Trinity River at Willow Creek Weir during 2004. a/

Julian Week	Inclusive dates	Nights Trapped	Number Trapped			fish/night
			1/2 lbers b/	Adults	Total	
37	10-Sep - 16-Sep	3	0	31	31	10.3
38	17-Sep - 23-Sep	5	1	100	101	20.2
39	24-Sep - 30-Sep	5	2	371	373	74.6
40	1-Oct - 7-Oct	5	0	459	459	91.8
41	8-Oct - 14-Oct	5	1	599	600	120.0
42	15-Oct - 21-Oct	4	1	267	268	67.0
43	22-Oct - 28-Oct	4	3	160	163	40.8
44	29-Oct - 4-Nov	5	0	18	18	3.6
45	5-Nov - 11-Nov	5	1	18	19	3.8
46	12-Nov - 18-Nov	5	0	9	9	1.8
47	19-Nov - 25-Nov	2	0	0	0	0.0
Total		48	9	2,032	2,041	
Mean:						39.4

a/ Trapping at Willow Creek took place from 14 September (Julian Week 37) through 22 November (Julian Week 47) of 2004.

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

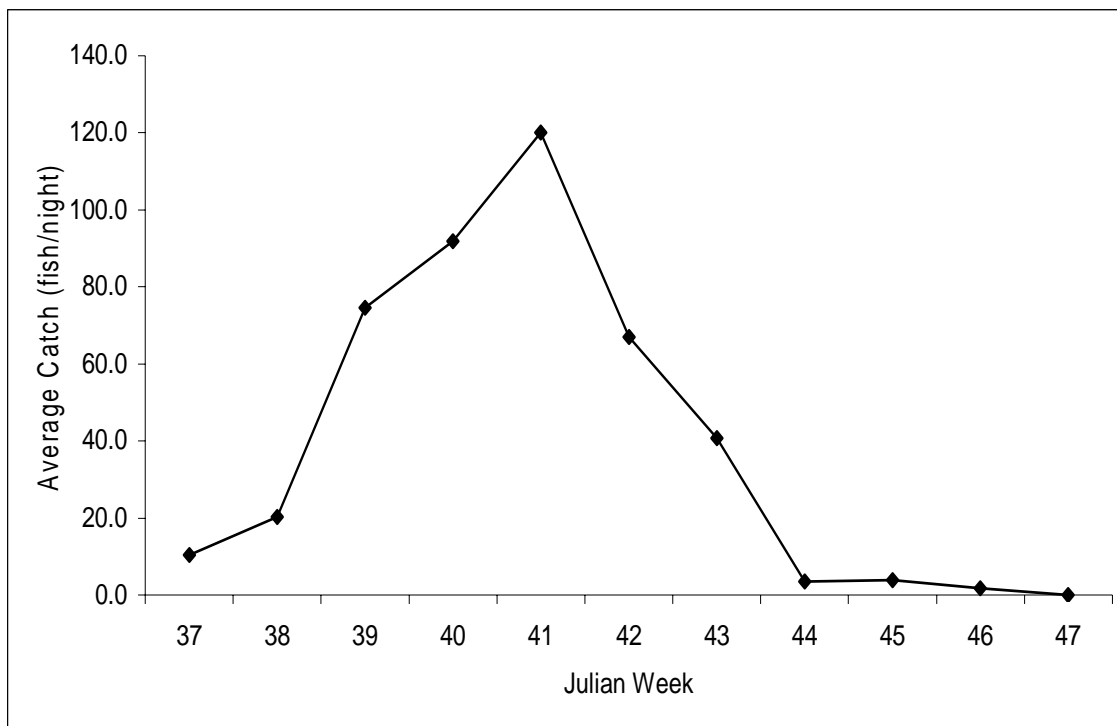


Figure 12. Average catch of steelhead in the Trinity River at Willow Creek Weir during 2004.

Table 6. Weekly summary of steelhead trapped in the Trinity River at Junction City Weir during 2004. a/

Julian Week	Inclusive dates	Nights Trapped	Number Trapped			fish/night
			1/2 lbers b/	Adults	Total	
29	16-Jul - 22-Jul	2	0	11	11	5.5
30	23-Jul - 29-Jul	5	0	20	20	4.0
31	30-Jul - 5-Aug	5	0	4	4	0.8
32	6-Aug - 12-Aug	5	0	6	6	1.2
33	13-Aug - 19-Aug	5	0	6	6	1.2
34	20-Aug - 26-Aug	1	0	0	0	0.0
35	27-Aug - 2-Sep	high flows no trapping				
36	3-Sep - 9-Sep					
37	10-Sep - 16-Sep	2	1	10	11	5.5
38	17-Sep - 23-Sep	5	0	20	20	4.0
39	24-Sep - 30-Sep	5	1	17	18	3.6
40	1-Oct - 7-Oct	5	1	79	80	16.0
Total		40	3	173	176	
Mean:						4.4

a/ Trapping at Junction City took place from 21 July (Julian week 29) through 20 August (Julian week 34) and 15 September (Julian week 37) through 7 October (Julian week 40) of 2004.

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

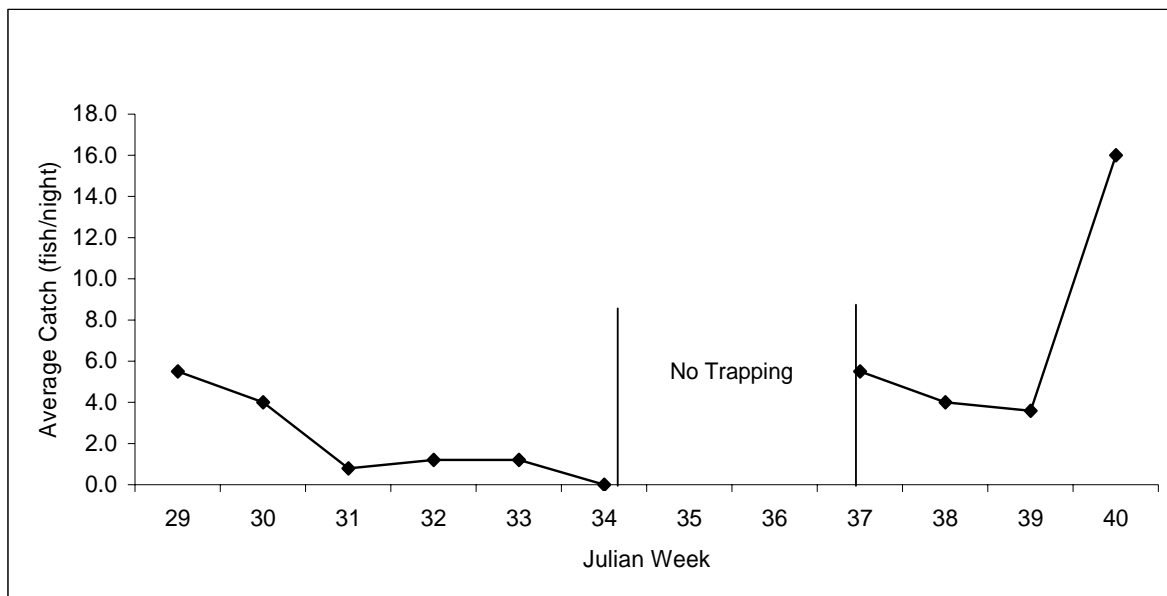


Figure 13. Average catch of steelhead in the Trinity River at Junction City Weir during 2004.

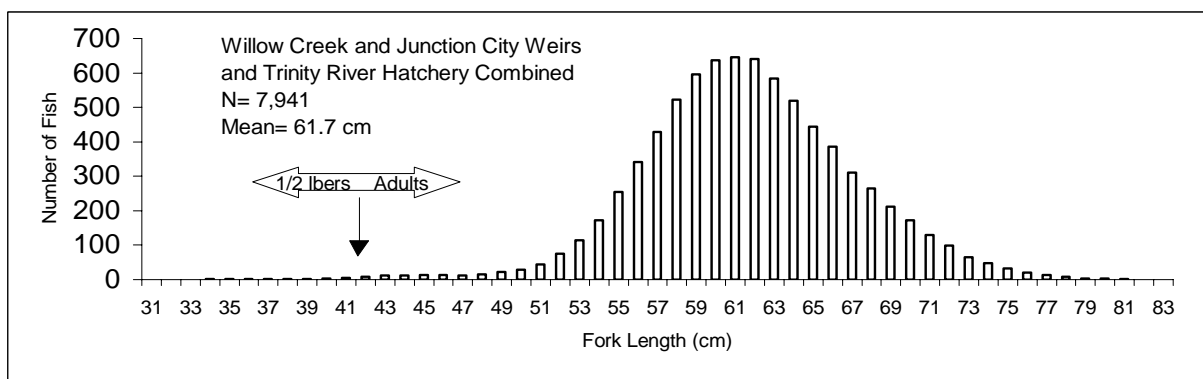
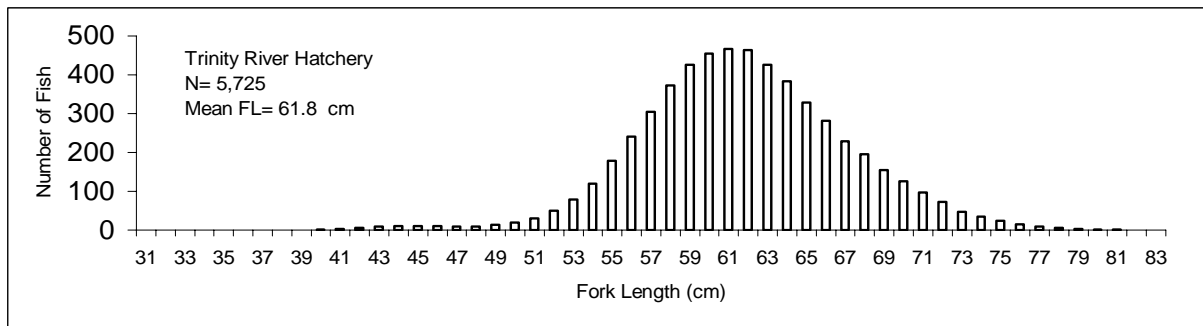
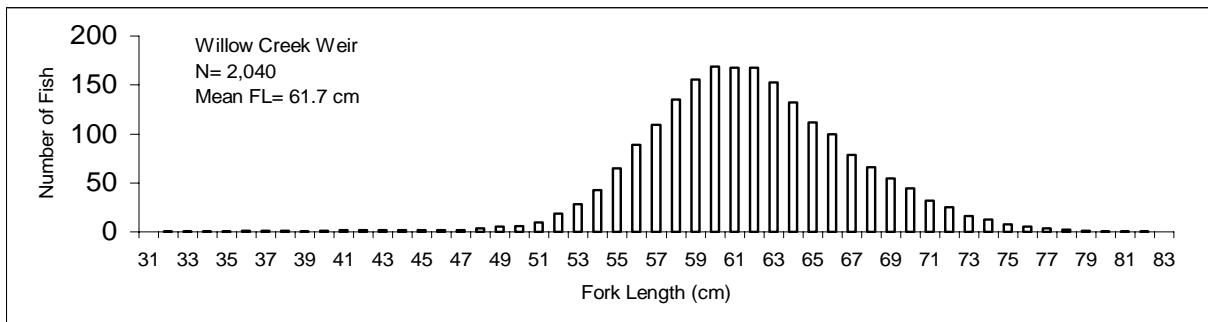
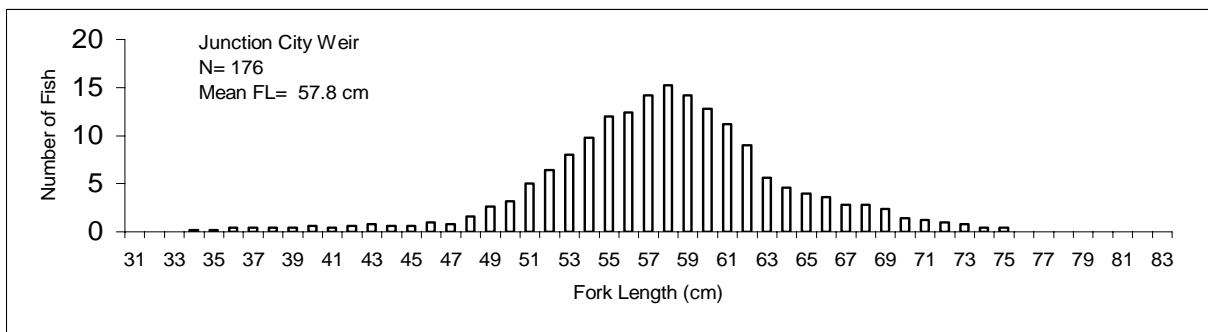


Figure 14. Fall-run steelhead fork lengths observed at Junction City and Willow Creek weirs, and Trinity River Hatchery (TRH) during the 2004-05 season. The number of fish at each fork length is shown as a moving average of 5, 1-cm increments. The arrow denotes the size we used to separate half-pounders and adults for analysis. Steelhead less than or equal to 41cm were not counted at TRH.

Brown trout

Capture timing. Brown trout were captured every week of trapping at JCW during the 2004 season (Table 7, Figure 15). The peak weeks of brown trout capture were JW 29 and 30, when an average of 20.0 and 19.2 fish/night were trapped respectively.

Size of Fish Trapped. Brown trout captured this season ranged in size from 34 to 60 cm, FL and averaged 45.3 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 2004. 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. At JCW we trapped 256 brown trout, of which 233 were effectively tagged. Twelve brown trout were reported as caught and released by anglers. All of the brown trout at JCW were tagged with non-reward tags. Two brown trout were trapped at WCW and one was tagged with a reward tag.

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.

Forty-eight percent of the effectively tagged spring Chinook at JCW and 53% of the fall Chinook at WCW were recovered. Thirty seven percent of the effectively tagged coho, and 37% 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 2004-05 season was 1,584 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. The take of coho was prohibited.

Spring Chinook. Anglers returned 10 (4 reward and 6 non-reward) tags from harvested adult spring Chinook tagged at JCW. Anglers returned eleven (7 reward and 4 non-reward) tags from harvested grilse spring Chinook tagged at JCW this season (Appendix 9). We estimated harvest rate, based on the return of reward tags, at 8.0% for grilse and 4.9% for adults. Anglers

Table 7. Weekly summary of brown trout trapped in the Trinity River at Junction City Weir during 2004. a/

Julian Week	Inclusive dates		Nights Trapped	Number Trapped	
				Total	fish/night
29	16-Jul	- 22-Jul	2	40	20.0
30	23-Jul	- 29-Jul	5	96	19.2
31	30-Jul	- 5-Aug	5	31	6.2
32	6-Aug	- 12-Aug	5	32	6.4
33	13-Aug	- 19-Aug	5	13	2.6
34	20-Aug	- 26-Aug	1	2	2.0
35	27-Aug	- 2-Sep	high flows	0	
36	3-Sep	- 9-Sep	no trapping	0	
37	10-Sep	- 16-Sep	2	3	
38	17-Sep	- 23-Sep	5	8	1.6
39	24-Sep	- 30-Sep	5	6	1.2
40	1-Oct	- 7-Oct	5	25	5.0
Total			40	256	
Mean:					6.4

a/ Trapping at Junction City took place from 21 July (Julian week 29) through 20 August (Julian week 34) and 15 September (Julian week 37) through 7 October (Julian week 40) of 2004.

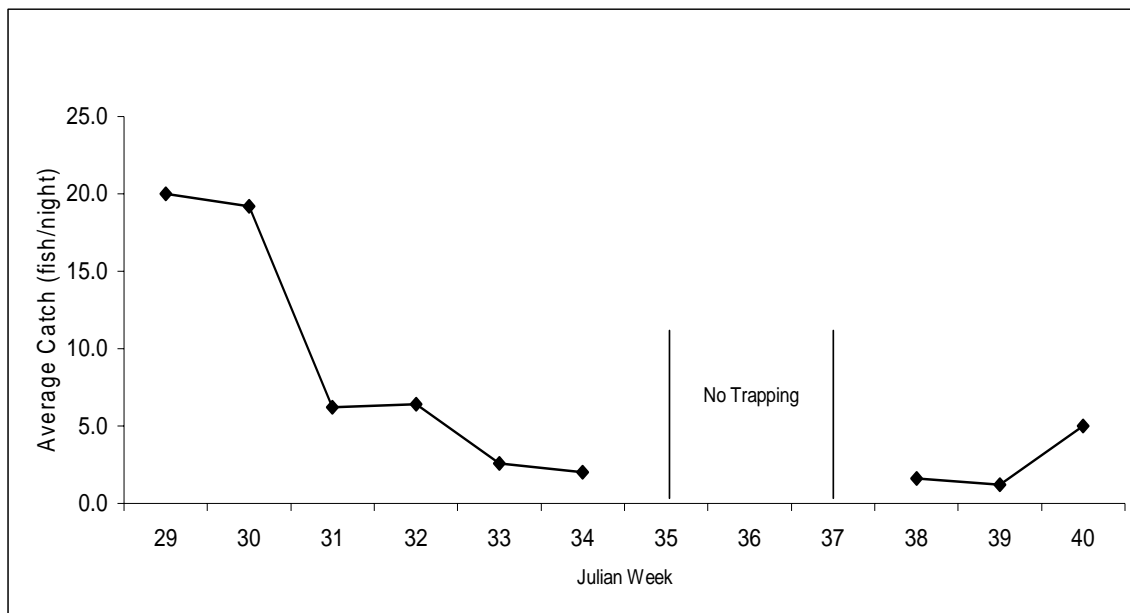


Figure 15. Average catch of brown trout in the Trinity River at Junction City Weir during 2004.

Table 8. Summary of fork length by Julian week for brown trout captured at Junction City weir during 2004.

Fork length (cm)	Julian week of capture										Totals
	29	30	31	32	33	34	37	38	39	40	
	Number of trapping days										
	2	5	5	5	5	1	2	5	5	5	
34				2	1						3
35		2	1	0	1					1	5
36	1	1	0	2	0					0	4
37	2	1	0	1	0					1	5
38	0	1	0	2	1	1				1	6
39	0	3	0	1	0	0			1	1	6
40	0	1	3	5	0	0	1	1	0	3	14
41	4	2	3	1	2	0	0	1	1	1	15
42	2	7	4	2	2	0	0	0	0	0	17
43	5	1	2	2	0	0	0	1	2	3	16
44	5	9	2	3	1	0	1	2	1	0	24
45	3	5	2	2	1	1	0	0	0	2	16
46	5	11	1	2	1		0	1	0	1	22
47	2	10	1	5	1		0	1	1	1	22
48	2	6	5	1	0		0	0		2	16
49	3	9	0	0	1		0	0		3	16
50	1	7	1	0	0		1	0		0	10
51	0	6	2	0	1			1		1	11
52	0	2	0	0						2	4
53	2	2	1	1						1	7
54	1	7	0							0	8
55	1	2	2							0	5
56	1	0	0							0	1
57		1	1							0	2
58										0	0
59										0	0
60										1	1
61											0
62											0
Totals:	40	96	31	32	13	2	3	8	6	25	256
Mean FL:	45.4	46.8	45.6	42.3	42.7	41.5	44.7	44.5	42.8	45.3	45.3

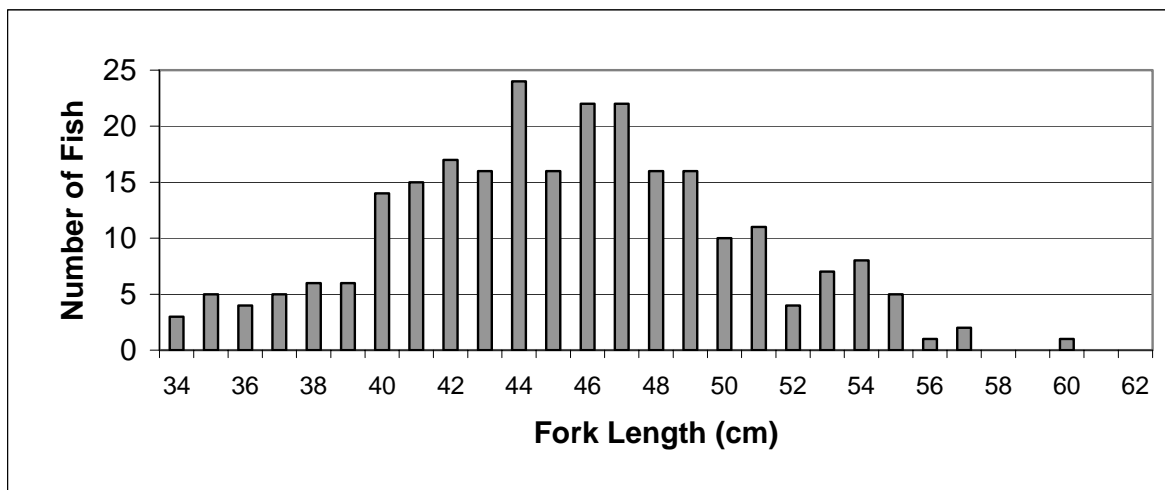


Figure 16. Fork length distribution of brown trout captured in the Trinity River at the Junction City weir during 2004.

reported releasing three reward-tagged adults and one non-reward-tagged grilse. The catch and release rates for adults was estimated from reward tags alone at 3.6%, and the catch and release rate for grilse was estimated by averaging returns from reward and non-reward tags at 0.4%.

Fall Chinook. Anglers returned tags from 10 grilse (7 reward and 3 non-reward tags) and 25 (9 reward, 16 non-reward) adult harvested fall Chinook salmon tagged at WCW. Based on the return of reward tags, the estimated harvest rate of fall Chinook upstream of WCW was 1.6% for adults and 6.3% for grilse. Anglers reported catch and releasing 10 (5 reward and 5 non-reward) adult fall Chinook tagged at WCW this season. Anglers reported catch and releasing an additional 5 (2 reward and 3 non-reward) grilse fall Chinook tagged at WCW (Appendix 10). Catch and release rates for fall Chinook upstream of the WCW were estimated using reward tags only at 0.9% for adults and 1.8% for grilse.

Coho Salmon. To discourage the harvest of threatened coho salmon, all coho tagged at WCW received non-reward tags. One tag was returned from a harvested adult coho. Two tagged coho salmon (one adult and one grilse) were reported as caught and released by anglers during the season (Appendix 11). Catch and release rates for coho salmon above the WCW were estimated at 0.7% for grilse and 0.1% for adults.

Fall Steelhead. Anglers returned 34 tags (21 reward and 13 non-reward) from steelhead tagged at WCW. Based on the reward tags returned, we estimated that anglers harvested 2.4% of the steelhead migrating upstream of WCW. Two of the 21 reward tags returned by anglers were from unmarked steelhead. Anglers returned 178 tags from steelhead reported as caught and released (Appendix 12). Based on the return of reward tags, we estimated that anglers caught and released 10.3% of the steelhead migrating upstream of the WCW.

Spawner Surveys

A total of 20 adults and 3 grilse spring Chinook tagged at JCW were subsequently recovered during main-stem spawner surveys (Appendix 9) between TRH and Cedar Flat. Eleven grilse and 100 adult fall Chinook tagged at WCW were recovered during the spawner surveys (Appendix 10). Six grilse and 71 adult coho salmon tagged at WCW were subsequently recovered during the spawner surveys this year (Appendix 11). Coho spawning in the Trinity River (December through February) typically peaks after the cessation of the main-stem spawner surveys, therefore it is likely that the time frame of the spawner surveys (October through December) inhibited full recovery of coho salmon. Six steelhead tagged at WCW were recovered as carcasses during spawner surveys this season (Appendix 12). For additional information on the 2004 spawner survey please refer to Task 4 of this report.

Trinity River Hatchery

Operation Dates. The fish ladder and trapping facility at TRH operated from September 3rd, 2004 (JW 36) through March 15th, 2005 (JW 11). The ladder and trap were closed for a two week period from October 12th through October 25th (part of JW 41, all of JW 42 and part of

JW 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.

Based on CWT analysis JW 41 had considerable representation of both spring and fall Chinook. During JW 41 five hundred and thirty three Chinook entered TRH of which 44 and 63 bore spring and fall CWT's respectively. Therefore, based on proportions of known race CWT's that entered TRH during JW 41 two hundred and nineteen were classified as spring Chinook and 314 were classified as fall Chinook.

Spring Chinook. Based on CWT recoveries, spring Chinook began entering TRH during JW 36 and continued through JW 43 (Figure 17, Table 9). Based upon CWT expansion, we estimated that 5,775 spring Chinook entered TRH (Figure 17). For the purpose of analysis, the 219 spring Chinook which entered TRH during JW 41 were added to the 6,017 Chinook which entered TRH prior to JW 41 for a total of 6,236 spring Chinook.

We recaptured 38.5% (196/509) of effectively tagged spring Chinook from JCW at TRH. The mean FL for effectively tagged JCW Chinook was 59.7 cm, slightly larger than tagged spring Chinook recovered at TRH, which averaged 58.9 cm (Table 10, Appendix 4).

We recovered 1,451 Ad-clipped spring Chinook at TRH, from which we recovered 1,385 CWTs (Table 9). The age structure of TRH spring Chinook based on CWT's was composed of a two (15%), three (35%), four (49%) and five (1%) year old returns (See Task 2 of this report).

Fall Chinook. Based on the recovery of CWTs, the first fall Chinook entered TRH during JW 37 of 2004 (Table 11). The run peaked during JW 45 when 4,320 Chinook salmon entered the facility, decreasing thereafter until the last Chinook entered during JW 52 (Figure 17, Table 10). Based on CWT expansions, we estimated that 12,799 fall Chinook entered TRH (Figure 17). For the purpose of estimating fall Chinook run-size, the 314 fall Chinook that entered TRH during JW 41 were added to the 13,129 Chinook which entered after JW 41 for a total of 13,443 fall Chinook.

Hatchery recovery of fall Chinook tagged at WCW consisted of 100 grilse and 844 adults. This total represented 45.5% (944/2,075) of those effectively tagged at WCW. The mean FL of effectively tagged Chinook at WCW was similar to WCW-tagged fall Chinook that subsequently entered TRH; 64.7 cm and 65.0 cm, respectively (Table 10, Appendix 5).

We recovered 3,263 Ad-clipped fall Chinook at TRH, from which we recovered 3,128 CWTs (Table 11). The age structure of TRH fall Chinook based on CWT's was composed of a two (8%), three (78%), four (13%) and five (1%) year old returns (See Task 2 of this report).

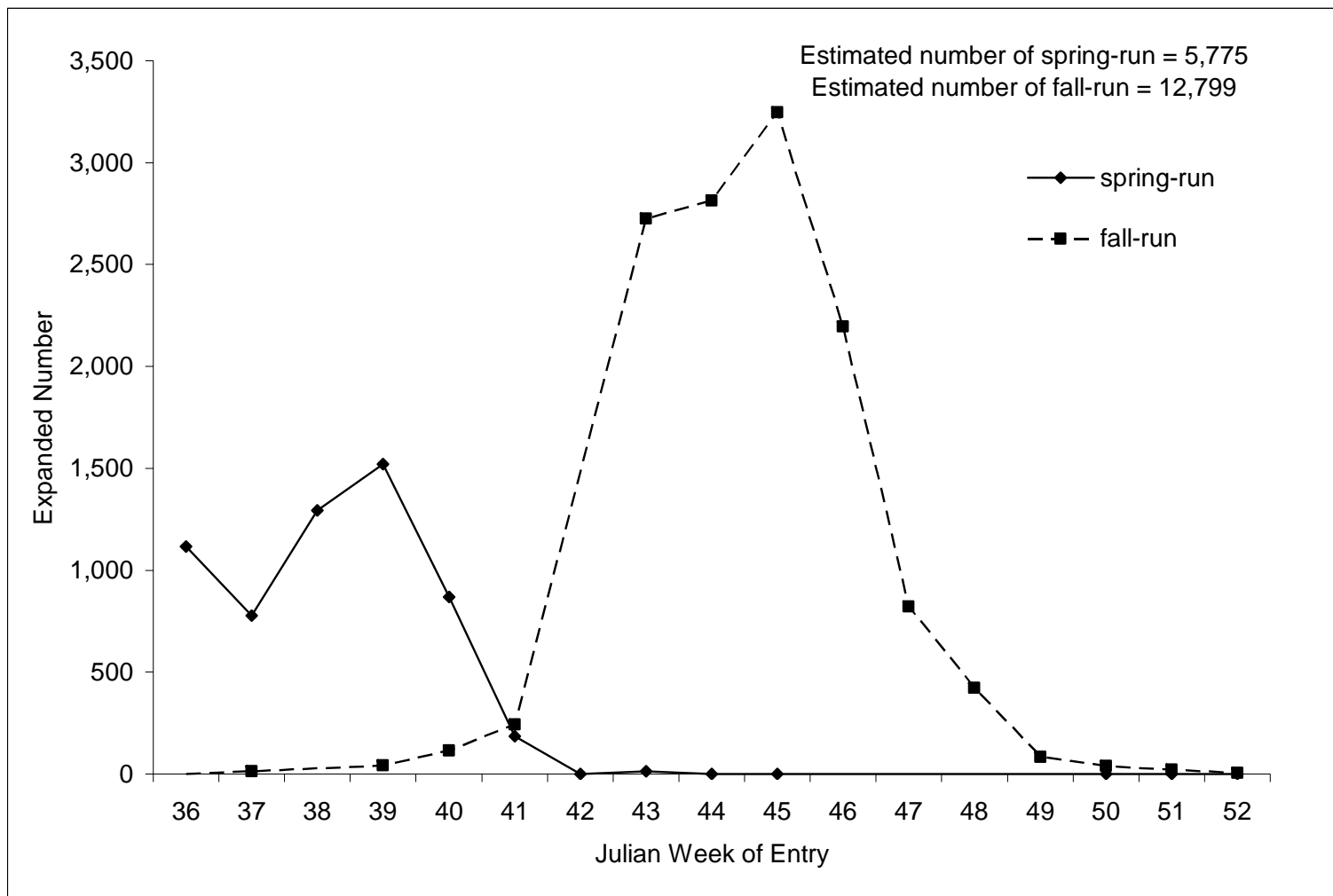


Figure 17. Estimated numbers of spring- and fall-run Chinook salmon that entered Trinity River Hatchery during the 2004-05 season, based on expansion of coded-wire tagged fish.

Table 9. Recoveries at Trinity River Hatchery of coded-wire tagged, spring-run Chinook salmon during the 2004-05 season. a/

Coded-wire tag number and release type c/	Brood year	Julian week of entry b/											Totals
		36	37	38	39	40	41	42 d/	43	44	45	46	
065251-f	1999			1									1
065252-f	1999		1										1
065258-y	1999	3	2	3	2	4							14
065260-f	2000	7	9	5	3	1							25
065261-f	2000	10	4	15	5	1							35
065262-f	2000	6	3	4	3								16
065263-f	2000	11	6	13	5	5							40
065264-f	2000	3	3	4	8	9	1						28
065269-f	2000	14	8	19	17	7							65
065270-f	2000	5	2	6	24	17	4						58
065279-y	2000	96	54	97	113	35	14	0	2				411
065281-f	2001	11	7	24	9	9	2						62
065282-f	2001	13	2	10	13	3	1						42
065283-f	2001	3	3	9	14	7	1						37
065288-y	2001	72	51	60	89	61	14						347
065295-f	2002	12	13	18	16	14	0	0	1				74
065296-f	2002	2	12	9	17	15	2						57
065297-f	2002	2	3	14	21	16	3						59
065308-y	2002		2	1	5	3	2						13
No CWT e/		9	11	14	17	12	3						66
Weekly totals:		279	196	326	381	219	47	0	3	0	0	0	
Grand Total:													1,451

a/ The fish ladder was open from September 4, 2004 through March 15, 2005 (Julian weeks 36-11).

b/ Entry week was the week that fish were initially 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, 2004 (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 2004-05 season.a/

Julian Week of entry c/	Inclusive Dates			Numbers of Chinook salmon				Numbers of coho salmon	
				Total entering TRH d/	Spring-run from tagging site b/		Fall-run from tagging site b/		Total entering TRH d/
					WCW	JCW	WCW	JCW	
36	3-Sep	-	9-Sep	446		10			
37	10-Sep	-	16-Sep	710		30			
38	17-Sep	-	23-Sep	1,839		42			
39	24-Sep	-	30-Sep	1,640		63		2	
40	1-Oct	-	7-Oct	1,386		43	2	8	11
41	8-Oct	-	14-Oct	529		8	2	22	40
42	15-Oct	-	21-Oct	0		0	0	0	0
43	22-Oct	-	28-Oct	2,164		2	240	49	947
44	29-Oct	-	4-Nov	2,650			240	11	1,228
45	5-Nov	-	11-Nov	4,320			242	6	2,020
46	12-Nov	-	18-Nov	2,491			146	1	3,631
47	19-Nov	-	25-Nov	903			49		1,188
48	26-Nov	-	2-Dec	434			15		1,073
49	3-Dec	-	9-Dec	92			5		278
50	10-Dec	-	16-Dec	53			1		434
51	17-Dec	-	23-Dec	20			2		50
52	24-Dec	-	31-Dec	2					77
1	1-Jan	-	7-Jan						5
2	8-Jan	-	14-Jan						0
3	15-Jan	-	21-Jan						0
4	22-Jan	-	28-Jan						1
5	29-Jan	-	4-Feb						
6	5-Feb	-	11-Feb						
7	12-Feb	-	18-Feb						
8	19-Feb	-	25-Feb						
Totals:				19,679	0	198	944	99	10,983
									275

a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Week 36-11)

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

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

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

Table 11. Recoveries at Trinity River Hatchery of fall-run Chinook salmon with coded wire tags indicating origin at Trinity River Hatchery during the 2004-05 season.

Coded-wire tag number and release type c/	Brood year	Julian week of entry a/																Totals
		37	38	39	40	41	42 d/	43	44	45	46	47	48	49	50	51	52	
065254-f	1999							1	0	1								2
065255-f	1999							1										1
065256-f	1999	1																1
065257-f	1999									1								1
065259-y	1999	1	0	0	1	1	0	7	4	6								20
065265-f	2000					3	0	1	3	1								8
065266-f	2000							2										2
065267-f	2000			1	0	1	0	1	0	1								4
065268-f	2000								1	2	1	3	1					8
065271-f	2000		1	0	0	1	0	7	2	2								13
065272-f	2000							3	1									4
065273-f	2000				1	0	0	1	4	1	1	0	1					9
065274-f	2000					1	0	2	2	2								7
065275-f	2000				1	1	0	4	1	1								8
065276-f	2000					1	0	1	4									6
065277-f	2000							1	3	5	3							12
065278-f	2000								3	2	2							7
065643-f	2000							2	1	1	1							5
065280-y	2000		1	3	12	14	0	111	103	62	12	7	1	0	1			327
065284-f	2001					1	0	12	6	4	3	1						27
065285-f	2001		1	0	0	2	0	8	7	10	4	0	1					33
065286-f	2001							9	13	14	2	3						41
065287-f	2001							7	11	9	5	0	2					34
065290-f	2001									1	1							2
065291-f	2001									1								1
065289-y	2001			5	9	21	0	407	454	612	483	184	93	21	8	5	1	2,303
065298-f	2002			1	0	7	0	27	17	10	1							63
065299-f	2002				3	3	0	16	12	12	7	1						54
065306-f	2002					1	0	14	16	12	10	1						54
065307-f	2002							11	11	9	3	1						35
065309-y	2002				1	1	0	11	10	9	2	0	2					36
No CWT e/						4		26	30	39	19	8	7	1	1			135
Weekly totals:		2	3	10	28	63	0	693	719	830	560	209	108	22	10	5	1	
Grand Total:																		3,263

a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Week 36-11).

b/ Entry week was the week that fish were initially 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 7, 2004 (JW 40) were considered spring-run and are shown on Table 9.

Coho Salmon. The first coho entered TRH during JW 40, 2004. The coho run peaked during JW 46 and the last coho entered TRH during JW 4, 2005 (Table 12). We recovered 10,983 coho (1,077 grilse and 9,906 adults) at TRH. We recovered 275 WCW-tagged coho (21 grilse and 254 adults) at TRH (28.2 % of those effectively tagged). The mean FL of effectively tagged coho at WCW was 63.3 cm and the mean FL of WCW-tagged coho recovered at TRH was 65.6 cm (Appendix 6). Coho were not tagged at JCW this year.

Of the 10,983 coho recovered at TRH, 9,896 (90.1%) were observed to have right maxillary (RM) clips, indicating they were of TRH origin. One thousand seventy one (9.8%) had no clips. These fish are believed to be naturally produced coho which entered the hatchery or coho which received no or poor clips prior to release from the hatchery. Sixteen other marks were observed on coho which entered TRH this year, including two LM (left maxillary), seven ADRM (Adipose + right maxillary), and seven RMLM (right and left maxillary) clips (Table 12).

Based on length frequency analysis, we apportioned TRH-produced, RM-clipped coho, into two brood years. Coho ≤ 53 cm, FL were considered grilse (age 2) from the 2002 brood year and accounted for 10.8% (1,068/9,896) of the total, the remaining 8,828 were considered adults (age 3), progeny of the 2001 brood year. The 1,071 unmarked coho which entered the hatchery were also considered grilse or adults based on their length (Appendix 14).

Fall Steelhead. Appreciable numbers of steelhead did not enter the hatchery until late October (Table 13). A total of 5,725 adult steelhead (>41 cm, FL) entered TRH during the season. A total of 523 steelhead, tagged at WCW, (28.8% of those effectively tagged) also entered TRH this season (Appendix 7). The mean fork length of recovered WCW tagged steelhead at TRH and effectively tagged adult steelhead at WCW were both 61.9 cm.

Ad-clipped adults composed 99.4% (5,688/5,725) of the steelhead that entered TRH this season (Appendix 8). Beginning with the 1997 brood year, all steelhead released from TRH have been Ad-clipped prior to their release.

Table 12. Recovery of coho salmon that returned to Trinity River Hatchery during the 2004-05 season. a/

Julian Week of entry c/		Inclusive Dates		Brood year and clip b/							Total	
				2001					2002			
				No clip	RM	LM	ADRM	RMLM	No clip	RM		
40	1-Oct	-	7-Oct	1	10							11
41	8-Oct	-	14-Oct	2	37					1		40
42	15-Oct	-	21-Oct									0
43	22-Oct	-	28-Oct	48	776			2	1	120		947
44	29-Oct	-	4-Nov	47	1,026		1	2	1	151		1,228
45	5-Nov	-	11-Nov	162	1,682	1	4	1	1	169		2,020
46	12-Nov	-	18-Nov	350	3,073		1	2	3	202		3,631
47	19-Nov	-	25-Nov	118	936		1			133		1,188
48	26-Nov	-	2-Dec	160	741	1			2	169		1,073
49	3-Dec	-	9-Dec	43	186					49		278
50	10-Dec	-	16-Dec	108	277				1	48		434
51	17-Dec	-	23-Dec	3	35					12		50
52	24-Dec	-	31-Dec	18	45					14		77
1	1-Jan	-	7-Jan	2	3							5
2	8-Jan	-	14-Jan									0
3	15-Jan	-	21-Jan									0
4	22-Jan	-	28-Jan		1							1
Totals:				1,062	8,828	2	7	7	9	1,068		10,983

a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (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 2002 brood year, larger coho from the 2001 brood year. RM=right maxillary; LM=left maxillary; ADRM=adipose and right maxillary; RMLM=right and left maxillary.

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

Table 13. Total number and numbers of Project-tagged steelhead that entered Trinity River Hatchery (TRH) during the 2004-2005 season. a/

Julian Week of entry c/	Inclusive Dates	Number entering TRH d/	Recoveries from tagging site b/
		Adults	WCW
36	3-Sep - 9-Sep	10	
37	10-Sep - 16-Sep	5	
38	17-Sep - 23-Sep	1	
39	24-Sep - 30-Sep	0	
40	1-Oct - 7-Oct	7	
41	8-Oct - 14-Oct	2	
42	15-Oct - 21-Oct		
43	22-Oct - 28-Oct	116	5
44	29-Oct - 4-Nov	40	2
45	5-Nov - 11-Nov	75	3
46	12-Nov - 18-Nov	197	16
47	19-Nov - 25-Nov	131	9
48	26-Nov - 2-Dec	119	7
49	3-Dec - 9-Dec	40	5
50	10-Dec - 16-Dec	565	51
51	17-Dec - 23-Dec	262	28
52	24-Dec - 31-Dec	404	38
1	1-Jan - 7-Jan	552	62
2	8-Jan - 14-Jan	459	55
3	15-Jan - 21-Jan	477	37
4	22-Jan - 28-Jan	542	56
5	29-Jan - 4-Feb	551	39
6	5-Feb - 11-Feb	376	36
7	12-Feb - 18-Feb	274	28
8	19-Feb - 25-Feb	257	25
9	26-Feb - 4-Mar	181	14
10	5-Mar - 11-Mar	63	6
11	12-Mar - 18-Mar	19	1
Totals:		5,725	523

a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (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 and are not counted at TRH.

Run-size, Angler Harvest, and Spawner Escapement Estimates

We tagged and recovered too few grilse salmon (spring and fall Chinook and coho) 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. We stratified the estimate based on the ratio of adults and grilse observed WCW for fall Chinook, coho and steelhead. For spring Chinook we stratified the estimate based on the ratio of adults and grilse observed at JCW and TRH combined.

Spring Chinook Salmon

We estimated 16,147 (13,218 adults and 2,929 grilse) spring Chinook migrated into the Trinity River basin upstream of JCW. Based on the Poisson Approximation, the 95% confidence interval for the run-size estimate was 14,085–18,635 spring Chinook salmon (Table 14). We estimated that the spawning escapement above JCW was 12,565 adult fish, including 5,251 adult spring Chinook that entered TRH (Table 15). This year's run-size estimate is 15% below the 24 year average spring Chinook run-size of 18,903. Estimated spring Chinook run-size has ranged from 2,381 fish in 1991 to 62,692 fish in 1988 (Appendix 15). Anglers caught and kept an estimated 653 (4.9%) of the adults from the spring run. Additionally, anglers caught and harvested an estimated 236 (8.0%) of the grilse from the spring run (Table 15).

Fall Chinook Salmon

We estimated that 29,534 (24,310 adults and 5,224 grilse) fall Chinook migrated into the Trinity River basin upstream of WCW. Based on the Normal Approximation, the 95% confidence interval for the fall Chinook run-size estimate upstream of WCW was 27,747–31,379 (Table 14). We estimated the Trinity River fall Chinook spawner escapement, upstream of WCW, was 23,929 adult fish, including 12,384 adult fall Chinook that entered TRH (Table 15). We estimated that anglers harvested 327 (6.3%) grilse and 381 (1.6%) adult fall Chinook. 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 29,534 fish is 32% less than the mean fall Chinook run-size since 1977 of 43,297 fish.

Coho Salmon

We estimated 38,882 (33,063 adults and 5,819 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 34,646–43,881 fish (Table 14). The spawning escapement estimate for coho upstream of WCW this year was 33,023 adult fish, 9,906 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 17,778 fish. This year's coho estimate was 1.2 times larger than the long term average. We estimate that anglers caught and harvested 40 (0.12%) adult and zero grilse coho salmon migrating upstream of WCW (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 2004-2005 season.

Species/ race	Area of Trinity River basin for run size estimate	Stratum a/	Trinity River Hatchery recoveries			Run-size estimate d/	Confidence limits 1-p= 0.95	Confidence limit estimator
			Number effectively tagged b/	Number examined for tags c/	Number of tags in sample			
Spring-run Chinook	Upstream of Junction City Weir	Grilse	238	985	92	16,147	14,085 - 18,635	Poisson Approximation
		Adults	271	5,251	104			
		Total	509	6,236	196			
Fall-run Chinook	Upstream of Willow Creek Weir	Grilse	363	1,059	100	29,534	27,747 - 31,379	Normal Approximation
		Adults	1,712	12,384	844			
		Total	2,075	13,443	944			
Coho	Upstream of Willow Creek Weir	Grilse	147	1,077	21	38,882	34,646 - 43,881	Poisson Approximation
		Adults	829	9,906	254			
		Total	976	10,983	275			
Fall-run steelhead	Upstream of Willow Creek Weir	Adults	1,816	5,725	523	19,855	18,269 - 21,511	Normal 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 actual recoveries.

d/ Estimates for grilse and adult spring-run Chinook salmon were based on proportioning the total run size by the ratio of grilse to adults observed at Junction City Weir and Trinity River Hatchery combined. Estimates for grilse and adult fall-run Chinook and coho salmon were based on proportioning the total run size by the ratio of grilse to adults observed at the Willow Creek Weir.

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 2004-2005 season.

Species/ race	Area of Trinity River basin for run size estimate	Stratum a/	Run-size estimate	Angler Harvest		Spawner Escapement		
				Harvest rate b/	Number of fish c/	Natural d/	Trinity River Hatchery	Total
Spring-run Chinook	Upstream of Junction City Weir	Grilse	2,929	0.080	236	1,708	985	2,693
		Adults	13,218	0.049	653	7,314	5,251	12,565
		Total	16,147		888	9,022	6,236	15,258
Fall-run Chinook	Upstream of Willow Creek Weir	Grilse	5,224	0.063	327	3,839	1,059	4,898
		Adults	24,310	0.016	381	11,545	12,384	23,929
		Total	29,534		708	15,383	13,443	28,826
Coho	Upstream of Willow Creek Weir	Grilse	5,819	0	0	4,742	1,077	5,819
		Adults	33,063	0.001	40	23,117	9,906	33,023
		Total	38,882		40	27,859	10,983	38,842
Fall-run adult steelhead	Upstream of Willow Creek Weir	Natural	4,817	0.010	48	4,732	37	4,769
		Hatchery	15,038	0.027	413	8,937	5,688	14,625
		Total	19,855		461	13,669	5,725	19,394

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 19,855 adult fall-run steelhead migrated upstream of WCW this season. The 95% confidence interval for our estimate, based on the Normal Approximation, was 18,269-21,511 adult steelhead (Table 14). The adult steelhead spawning escapement was composed of 4,769 naturally produced fish and 14,625 steelhead of TRH origin. We estimate anglers harvested 48 wild and 413 TRH-produced steelhead (Table 15).

Intermittent fall steelhead run-size estimates made since 1980 have ranged from 37,276 in 1989 to 2,972 in 1998 (Appendix 18). Mean run-size for fall adult steelhead, for years in which we have estimates, is 11,454 fish. This years run-size estimate, the fourth highest on record, of 19,855 adult fall-run steelhead is 72% higher than the historical average.

DISCUSSION

Both runs of Chinook that we monitor, spring and fall, were estimated to have had run-sizes below the long term averages this season. The coho salmon and steelhead run-sizes were estimated to have been above the historical averages. Although the Chinook runs were below average this year all of these runs have experienced fairly good returns since 1995 (Appendices 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 duration 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.

Due to late installation of both weirs we did not capture the beginning of the spring run at the JCW or the beginning of the fall run at the WCW. At the current JCW location we are unable to trap prior to late June or early July when flows recede below 800cfs. 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. 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 trapping duration and coincident lowered number of fish trapped may influence our run-size estimates. We calculated run-size estimates for six 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. The partial season estimates were not significantly different from the whole season estimates (Sinnen and Knechtle 2004), although the recalculated estimates did produce a small positive bias. This assumes that the fish's migration timing is independent of the two flow regimes. Ongoing research in the basin may aid in our understanding of adult fish migration timing and the influence of various flow regimes.

Unaccounted tagging mortality creates a positive bias in all mark-recapture studies (Hankin 2001). We attempt to account for tagging mortalities through recovery of tagged fish found dead at the weirs or in carcass surveys, although we can not be sure that all tagging mortalities are accounted for. 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 mid 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
2	8-Jan	-	14-Jan	28	9-Jul
3	15-Jan	-	21-Jan	29	16-Jul
4	22-Jan	-	28-Jan	30	23-Jul
5	29-Jan	-	4-Feb	31	30-Jul
6	5-Feb	-	11-Feb	32	6-Aug
7	12-Feb	-	18-Feb	33	13-Aug
8	19-Feb	-	25-Feb	34	20-Aug
9/a	26-Feb	-	4-Mar	35	27-Aug
10	5-Mar	-	11-Mar	36	3-Sep
11	12-Mar	-	18-Mar	37	10-Sep
12	19-Mar	-	25-Mar	38	17-Sep
13	26-Mar	-	1-Apr	39	24-Sep
14	2-Apr	-	8-Apr	40	1-Oct
15	9-Apr	-	15-Apr	41	8-Oct
16	16-Apr	-	22-Apr	42	15-Oct
17	23-Apr	-	29-Apr	43	22-Oct
18	30-Apr	-	6-May	44	29-Oct
19	7-May	-	13-May	45	5-Nov
20	14-May	-	20-May	46	12-Nov
21	21-May	-	27-May	47	19-Nov
22	28-May	-	3-Jun	48	26-Nov
23	4-Jun	-	10-Jun	49	3-Dec
24	11-Jun	-	17-Jun	50	10-Dec
25	18-Jun	-	24-Jun	51	17-Dec
26	25-Jun	-	1-Jul	52 b/	24-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 2004-2005 season. a/

FL (cm)	1999				2000								2001				2002				Total
	CWT # b/	65251-f	65252-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	65295-f	65296-f	65297-f	65308-y	
41																				1	1
42																				2	2
43																		2		3	5
44																	1	1		0	2
45																	0	2		0	2
46																	4	3	3	2	12
47																	4	2	1	1	8
48																	3	6	4	1	15
49																	10	1	3	2	16
50																	8	5	9	1	23
51																	7	6	6		20
52												1					9	5	5		22
53												1					3	6	6		19
54												1					6	5	2		17
55												1					5	5	4		18
56												1					8	1	7		21
57												0					3	2	4		17
58												0					2	1	0		10
59												1					1	2	4		26
60												1									36
61												0	1	1				2			17
62						1						5	1	2							29
63						0						1	2	1							31
64						0						3	6	3							39
65						0						3	10	1							50
66						0				1		4	6	4							43
67						0		2		1	0	9	1	4							45
68						0		1		1	0	8	5	1							44
69					1	0		0	2	0	0	11	5	7							18
70					0	1	2	0	1	2	0	20	6	3							54
71					1	0	0	0	0	1	0	18	4	1							42
72					0	1	0	0	0	1	1	28	2	2							46
73				2	2	1	0	1	1	4	2	23	0	1							42
74				0	1	0	1	1	1	2	5	31	3	0							50
75				0	0	1	3	1	0	1	0	23	2	1							34
76				0	1	2	0	4	0	4	1	28	2	1							45
77				0	0	1	0	2	2	3	1	30	1	1							44
78			1	1	1	6	2	3	2	1	1	15	2	3							43
79			0	0	3	5	0	3	1	5	6	14	0	0							39
80			0	0	1	3	2	2	2	3	4	21	0	2							44
81			0	0	1	0	1	4	1	2	3	15	0	0							29
82			0	0	1	2	0	2	1	4	7	12	2	0							32
83			0	0	2	0	0	1	4	1	3	15		1							27
84			3	0	2	2	0	0	3	6	4	17		0							37
85			0	0	2	1	1	4	3	2	3	7		1							24
86			3	0	1	0	2	1	0	3	4	10									24
87			0	0	0	2	1	0	0	3	2	7									15
88			0	0	0	2	0	1	2	2	3	10									21
89			0	0	0	1	0	3	0	1	1	3									9
90			2	0	1	0	0	1	0	3	1	6									14
91			1	0	1	1	0	0	0	0	2	2									7
92			0	0	0	1	0	0	0	3	2	2									8
93			1	0	1	0	1	2	0	0	1	2									8
94			0	0	0	0	0	0	0	1	0	0									1
95			0	0	0	0	0	0	1	0	1	1									2
96			1	0	0	0	0	0	1	1	1	3									3
97		1			1	0	0	0	0	1	1	1									3
98					0	0		1		1											2
99					1	1															2
100																					0
Totals:		1	1	14	25	35	16	40	28	65	58	411	62	42	37	347	74	57	59	13	1,385
Mean		97.0	78.0	85.3	82.2	80.6	79.6	81.0	81.2	81.1	82.0	76.3	68.7	69.9	70.4	64.8	51.7	51.5	52.6	45.3	70.2

a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Week 36-11).

b/ Age at release: 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 2004-2005 season. a/

[illegible]

a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Week 36-11).

b/ Age at release: 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 during the 2004-05 season. a/

FL (cm)	Total Trapped	Ad-clips b/	Effective Tags c/	TRH Recoveries
35				
36				
37				
38	1			
39	3		3	
40	1		1	
41	3		3	
42	6		6	2
43	7	1	7	1
44	11	2	11	2
45	10	1	10	2
46	15	3	15	2
47	22	3	22	8
48	27	5	27	10
49	22	1	22	11
50	22	4	21	8
51	27	3	27	15
52	19	2	19	8
53	21	4	21	14
54	15	1	15	5
55	6	2	6	3
56	2	0	2	1
57	10	3	8	5
58	6	1	6	2
59	10	2	10	7
60	13	3	13	8
61	16	2	16	5
62	18	5	17	8
63	17	5	17	5
64	14	1	14	7
65	18	8	16	10
66	12	2	12	5
67	16	4	15	5
68	15	6	15	3
69	7	1	7	3
70	7	2	7	4
71	9	2	9	3
72	3	1	3	2
73	6	1	6	2
74	7	0	7	4
75	7	3	7	2
76	7	0	6	2
77	6	2	6	3
78	3	0	3	0
79	5	1	5	1
80	8	0	8	1
81	9	2	9	2
82	9	1	9	1
83	3	1	3	1
84	4	1	4	2
85	1	0	1	0
86	2	0	2	0
87	1	0	1	0
88	3	0	3	0
89	3	1	3	1
90	1		1	
91	0		0	
92	0		0	
93	0		0	
94	1		1	
95	0		0	
96	0		0	
97	0		0	
98	0		0	
99	0		0	
100	1		1	
101				
Totals:	518	93	509	196
Mean FL:	59.7	61.3	59.7	58.9
Total grilse d/:	240	32	238	92
Total adults:	278	61	271	104

a/ Trapping at Junction City took place from July 21 through August 20 (Julian Weeks 29-34) and September 15 through October 7 (Julian Weeks 37-40). Chinook trapped prior to Julian week 38 were considered spring Chinook.

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 56 cm FL were considered grilse.

Appendix 5. Fork length (FL) distribution of fall-run Chinook salmon trapped and tagged at the Willow Creek Weir during the 2004-05 season. a/

FL (cm)	Total Trapped	Ad-clips b/	Effective Tags c/	TRH Recoveries
39				
40	2	1	2	1
41	5	0	5	1
42	6	1	5	1
43	13	4	13	3
44	23	1	23	6
45	21	3	19	5
46	22	5	22	7
47	26	7	25	10
48	40	8	39	8
49	37	7	37	9
50	44	8	41	10
51	45	8	43	10
52	36	5	33	12
53	31	4	30	8
54	27	6	26	9
55	18	5	17	6
56	33	5	32	12
57	32	9	32	10
58	36	8	36	18
59	46	12	46	25
60	55	17	51	23
61	90	30	87	46
62	104	29	103	57
63	119	25	117	74
64	138	37	136	70
65	125	37	122	55
66	132	30	128	76
67	100	24	96	51
68	94	25	92	55
69	83	21	78	48
70	73	17	73	45
71	48	11	47	25
72	48	11	47	24
73	31	8	28	13
74	30	3	29	14
75	31	3	31	15
76	27	6	25	10
77	27	2	26	13
78	27	1	26	7
79	21	3	20	5
80	19	2	18	7
81	22	4	22	5
82	18	3	18	3
83	25	5	25	8
84	11	5	11	4
85	12	3	11	3
86	10	3	10	2
87	13	2	12	6
88	13	1	13	2
89	10	0	9	0
90	2	2	2	1
91	5	0	5	1
92	5	1	5	1
93	5	2	5	2
94	4		4	1
95	3		3	0
96	4		4	0
97	4		4	0
98	0		0	0
99	2		2	1
100	1		1	
101	1		1	
102	1		1	
103	0		0	
104	1		1	
105				
106				
Totals:	2,137	480	2,075	944
Mean FL:	64.7	64.2	64.7	65.0
Total grilse d/:	378	68	363	100
Total adults:	1,759	412	1,712	844

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47). All Chinook trapped were considered fall Chinook.

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 during the 2004-05 season. a/

FL (cm)	Total Trapped	RM-clips b/	Effective Tags c/	TRH Recoveries
33	1	1	1	
34	0	0	0	
35	0	0	0	
36	1	1	1	
37	6	5	6	
38	10	10	10	
39	6	6	6	2
40	12	12	12	0
41	9	9	8	0
42	21	21	21	3
43	14	14	14	1
44	15	15	15	4
45	11	10	10	3
46	16	16	15	3
47	7	7	7	1
48	4	4	4	0
49	5	5	5	1
50	5	4	4	2
51	2	1	2	0
52	5	5	5	1
53	1	1	1	0
54	0	0	0	0
55	3	2	3	1
56	6	6	6	1
57	6	5	6	2
58	5	4	4	1
59	19	16	18	6
60	10	6	9	4
61	30	24	29	7
62	35	29	35	12
63	47	35	45	9
64	60	46	56	9
65	73	54	72	21
66	84	64	81	22
67	87	57	84	25
68	105	74	104	37
69	72	57	67	24
70	77	57	74	24
71	51	31	50	20
72	33	19	33	5
73	29	21	28	12
74	14	10	14	9
75	5	5	5	2
76	3	2	2	0
77	2	2	2	0
78	1	0	1	0
79	0	0	0	0
80	0	0	0	0
81	0	0	0	0
82	0	0	0	0
83	0	0	0	0
84	0	0	0	0
85	0	0	0	0
86	0	0	0	0
87	1	1	1	1
Totals:	1009	774	976	275
Mean FL:	63.3	62.2	63.3	65.6
Total grilse d/:	151	147	147	21
Total adults:	858	627	829	254

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47).

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 2004-2005 season.

FL (cm)	Willow Creek Weir a/				Junction City Weir a/		
	Total Trapped	Ad-clips b/	Other-clips c/	Effective Tags d/	TRH Recoveries f/	Total Trapped	Ad-clips b/
33	1						
34	1						
35	0						
36	2	2				1	1
37	0	0				0	0
38	2	1				1	1
39	1	1				0	0
40	0	0				0	0
41	1	1				1	1
42	2	2		1		1	1
43	4	3		4	1	0	0
44	1	0		1	0	1	1
45	2	2		0	0	1	1
46	1	1		1	0	0	0
47	2	1		0	0	1	0
48	2	0		2	0	2	2
49	2	1		2	1	0	0
50	10	4		9	0	5	4
51	12	5		12	3	5	5
52	4	2		4	0	4	4
53	19	13		15	3	11	10
54	48	35		39	9	7	6
55	59	46	1	45	9	13	10
56	83	69	1	72	20	14	13
57	114	93	0	97	30	15	14
58	141	116	0	122	36	13	13
59	149	122	1	135	44	16	11
60	189	149	1	166	48	18	15
61	186	145	2	167	53	9	8
62	178	134	2	166	47	8	7
63	136	96	1	127	38	5	5
64	150	113	3	134	45	5	5
65	113	80	1	100	31	1	1
66	83	60	0	74	28	4	4
67	77	54	0	72	22	5	3
68	77	52	2	71	16	3	3
69	42	33	0	37	10	1	1
70	52	38	1	51	15	1	1
71	25	18	0	24	4	2	2
72	27	19	1	26	7	0	0
73	12	10		11	2	2	1
74	10	9		10	1		
75	8	4		7			
76	6	5		6			
77	2	2		2			
78	1	1		1			
79	1	1		1			
80	2	1		2			
81							
82							
Totals:	2,040	1,544	17	1,816	523	176	154
Mean FL:	61.7	61.6	63.2	61.9	61.9	57.8	57.7
Total 1/2 pounders e/:	8	5	0	0	0	3	3
Total adults:	2,032	1,539	17	1,816	523	173	151

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47) and at Junction City from July 21 through August 20 (Julian Weeks 29-34) and September 15 through October 7 (Julian Weeks 38-40).

b/ Ad clips= Adipose fin clipped fish.

c/ Other clips include: 2-ADLM (adipose fin and left maxillary clip); 5-ADRM (adipose fin and right maxillary clip); 2-LM (left maxillary clip) and 8-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. Only adults were counted at TRH.

f/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Weeks 36-11).

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 2004-2005 season.

FL (cm)	Recovery Site						
	Willow Creek Weir a/			Junction City Weir a/		Trinity River Hatchery b/	
	Unmarked	Ad-clips c/	Other-clips d/	Unmarked	Ad-clips c/	Unmarked	Ad-clips c/
31							
32							
33	1						
34	1						
35	0						
36	0	2			1		
37	0	0			0		
38	1	1			1		
39	0	1			0		
40	0	0			0		
41	0	1			1		
42	0	2			1		4
43	1	3			0		9
44	1	0			1	1	16
45	0	2			1	1	11
46	0	1			0	0	8
47	1	1		1	0	0	9
48	2	0		0	2	0	7
49	1	1		0	0	1	8
50	6	4		1	4	1	14
51	7	5		0	5	1	27
52	2	2		0	4	0	41
53	6	13		1	10	1	57
54	13	35		1	6	3	105
55	12	46	1	3	10	0	159
56	14	68	1	1	13	1	232
57	21	93	0	1	14	1	332
58	25	116	0	0	13	1	368
59	26	122	1	5	11	1	427
60	40	148	1	3	15	3	495
61	41	143	2	1	8	3	495
62	42	134	2	1	7	3	480
63	39	96	1	0	5	2	426
64	34	113	3	0	5	4	407
65	32	80	1	0	1	0	311
66	23	60	0	0	4	2	279
67	23	54	0	2	3	2	208
68	24	51	2	0	3	1	194
69	9	33	0	0	1	1	148
70	14	37	1	0	1	1	145
71	7	18	0	0	2	0	75
72	8	18	1	0	0	2	63
73	2	10		1	1		51
74	1	9					27
75	4	4					17
76	1	5					17
77	0	2					6
78	0	1					5
79	0	1					3
80	1	1					1
81							0
82							0
83							1
Totals:	486	1,537	17	22	154	37	5,688
Mean FL:	61.8	61.6	63.2	58.5	57.7	60.3	61.8
Total 1/2 pounders e/:	3	5	0	0	3	0	0
Total adults:	483	1,532	17	22	151	37	5,688

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47) and at Junction City from July 21 through August 20 (Julian Weeks 29-34) and September 15 through October 7 (Julian Weeks 38-40).

b/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Weeks 36-11).

c/ Ad clips= Adipose fin clipped fish.

d/ Other clips include: 2-ADLM (adipose fin and left maxillary clip); 5-ADRM (adipose fin and right maxillary clip); 2-LM (left maxillary clip) and 8-RM (right maxillary clip).

e/ Steelhead less than or equal to 41 cm FL were considered half pounders. Only adults were counted at TRH.

Appendix 9 . Fork Length (FL) distribution of spring-run Chinook salmon tagged at Junction City Weir and subsequently recovered during the 2004-2005 season. a/

FL (cm)	Total Tagged	Recoveries						Total Recoveries	% Recoveries
		Tag Morts b/	Carcass c/ Recoveries	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/		
37									
38	1	1						1	100.0
39	3	0						0	0.0
40	1	0						0	0.0
41	3	0						0	0.0
42	6	0		2				2	33.3
43	7	0		1				1	14.3
44	11	0		2				2	18.2
45	10	0		2				2	20.0
46	15	0	2	2				4	26.7
47	22	0	0	8		1		9	40.9
48	27	0	0	10		2		12	44.4
49	22	0	0	11		0		11	50.0
50	22	0	0	8	1	2		11	50.0
51	27	0	0	15	0	1		16	59.3
52	19	0	1	8	0	3		12	63.2
53	21	0	0	14	0	0		14	66.7
54	15	0	0	5	0	2		7	46.7
55	6	0	0	3	0	0		3	50.0
56	2	0	0	1	0	0		1	50.0
57	9	0	0	5	1	1		7	77.8
58	6	0	0	2	0	1		3	50.0
59	10	0	0	7	0	0		7	70.0
60	13	0	0	8	0	0		8	61.5
61	16	0	2	5	0	1		8	50.0
62	17	0	2	8	0	1		11	64.7
63	17	0	1	5	0	3		9	52.9
64	14	0	1	7	0	0		8	57.1
65	17	0	1	10	1	0		12	70.6
66	12	0	1	5	0	0		6	50.0
67	16	0	0	5	1	0		6	37.5
68	15	0	3	3		0		6	40.0
69	7	0	0	3		0		3	42.9
70	7	0	1	4		0		5	71.4
71	9	0	2	3		0		5	55.6
72	3	0	0	2		0		2	66.7
73	6	0	0	2		0		2	33.3
74	7	0	0	4		0		4	57.1
75	7	0	1	2		1		4	57.1
76	7	1	0	2		0		3	42.9
77	6		0	3		0		3	50.0
78	3		1	0		0		1	33.3
79	5		1	1		0		2	40.0
80	8		1	1		0		2	25.0
81	9		2	2		0		4	44.4
82	9			1		0		1	11.1
83	3			1		0		1	33.3
84	4			2		0		2	50.0
85	1			0		0		0	0.0
86	2			0		1		1	50.0
87	1			0		0		0	0.0
88	3			0		0		0	0.0
89	3			1		0		1	33.3
90	1					0		0	0.0
91	0					0		0	-
92	0					0		0	-
93	0					0		0	-
94	1					0		0	0.0
95	0					0		0	-
96	0					0		0	-
97	0					0		0	-
98	0					0		0	-
99	0					0		0	-
100	1					1		1	100.0
101									
Grilse: h/	240	1	3	92	1	11	0	108	45.0
Adults:	275	1	20	104	3	10	0	138	50.2
Total:	515	2	23	196	4	21	0	246	47.8

a/ Trapping at Junction City took place from July 21 through August 20 (Julian Weeks 29-34) and September 15 through October 7 (Julian Weeks 37-40).

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. The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Weeks 36-11).

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 56 cm FL.

Appendix 10 . Fork Length (FL) distribution of fall-run Chinook salmon tagged at Willow Creek Weir and subsequently recovered during the 2004-05 season a/.

FL (cm)	Total Tagged	Recoveries						Total Recoveries	% Recoveries
		Tag Morts b/	Carcass c/ Recoveries	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/		
40	2			1				1	50.0
41	5			1				1	20.0
42	5			1		1		2	40.0
43	13		1	3		1		5	38.5
44	23		1	6		0		7	30.4
45	20		3	5	1	0		9	45.0
46	22		0	7	0	0		7	31.8
47	25		0	10	0	1		11	44.0
48	40	1	0	8	1	2		12	30.0
49	37	0	1	9	0	1		11	29.7
50	44	1	1	10	2	2		16	36.4
51	43		0	10	0	2		12	27.9
52	34		3	12	0	0		15	44.1
53	31		0	8	1	0		9	29.0
54	26		1	9	0	0		10	38.5
55	17		1	6	0	0		7	41.2
56	32		1	12	0	0		13	40.6
57	32		2	10	0	0		12	37.5
58	36		0	18	0	0		18	50.0
59	46		2	25	0	0	1	28	60.9
60	53		3	23	2	0		28	52.8
61	87		1	46	0	3		50	57.5
62	103		8	57	0	2		67	65.0
63	117		3	74	0	2		79	67.5
64	137		6	70	1	2		79	57.7
65	123		8	55	1	1		65	52.8
66	130		7	76	2	0		85	65.4
67	96		7	51	0	4		62	64.6
68	93		6	55	1	0		62	66.7
69	78		3	48	0	0		51	65.4
70	73		1	45	0	1		47	64.4
71	47		2	25	0	1		28	59.6
72	47		1	24	0	3		28	59.6
73	30		3	13	2	2		20	66.7
74	29		4	14	0	1		19	65.5
75	31		4	15	0	1		20	64.5
76	25		1	10	0	0		11	44.0
77	26		1	13	0	0		14	53.8
78	26		1	7	0	0		8	30.8
79	20		5	5	0	1		11	55.0
80	19		4	7	0	0		11	57.9
81	22		1	5	0	0		6	27.3
82	18		4	3	0	0		7	38.9
83	25		3	8	0	1		12	48.0
84	11		0	4	0			4	36.4
85	12		1	3	1			5	41.7
86	10		0	2				2	20.0
87	12		0	6				6	50.0
88	13		2	2				4	30.8
89	10		3	0				3	30.0
90	2		0	1				1	50.0
91	5		0	1				1	20.0
92	5		0	1				1	20.0
93	5		0	2				2	40.0
94	4		0	1				1	25.0
95	3		0	0				0	0.0
96	4		0	0				0	0.0
97	4		1	0				1	25.0
98	0			0				0	-
99	2			1				1	50.0
100	1							0	0.0
101	1							0	0.0
102	1							0	0.0
103	0							0	-
104	1							0	0.0
105								0	-
106								0	-
Grilse: h/	370	2	11	100	5	10	0	128	34.6
Adults:	1,724	0	100	844	10	25	1	980	56.8
Total:	2,094	2	111	944	15	35	1	1,108	52.9

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47).

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. The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Weeks 36-11).

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 2004-05 season a/.

FL (cm)	Total Tagged	Recoveries						Total Recoveries	% Recoveries
		Tag Morts b/	Carcass Recoveries c/	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/		
33	1							0	0.0
34	0							0	-
35	0							0	-
36	1							0	0.0
37	6							0	0.0
38	10							0	0.0
39	6			2				2	33.3
40	12			0				0	0.0
41	8			0				0	0.0
42	21			3				3	14.3
43	14		2	1				3	21.4
44	15		1	4				5	33.3
45	11		0	3	1			4	36.4
46	15		0	3	0			3	20.0
47	7		0	1	0			1	14.3
48	4		1	0	0			1	25.0
49	5		1	1	0			2	40.0
50	4		1	2	0			3	75.0
51	2		0	0	0			0	0.0
52	5		0	1	0			1	20.0
53	1		0	0	0			0	0.0
54	0		0	0	0			0	-
55	3		0	1	0			1	33.3
56	6		0	1	0			1	16.7
57	6		0	2	0			2	33.3
58	4		1	1	0			2	50.0
59	19		0	6	1			7	36.8
60	9		0	4				4	44.4
61	29		1	7				8	27.6
62	35		3	12				15	42.9
63	45		4	9				13	28.9
64	56		5	9				14	25.0
65	73	1	7	21				29	39.7
66	82	1	4	22		1		28	34.1
67	85	1	9	25				35	41.2
68	104	0	10	36				46	44.2
69	68	1	5	25				31	45.6
70	74	0	4	24				28	37.8
71	51	1	4	20				25	49.0
72	33		8	5				13	39.4
73	28		2	12				14	50.0
74	14		2	9				11	78.6
75	5		2	2				4	80.0
76	2			0				0	0.0
77	2			0				0	0.0
78	1			0				0	0.0
79	0			0				0	-
80	0			0				0	-
81	0			0				0	-
82	0			0				0	-
83	0			0				0	-
84	0			0				0	-
85	0			0				0	-
86	0			0				0	-
87	1			1				1	100.0
Grilse: h/	148	0	6	21	1	0	0	28	18.9
Adults:	835	5	71	254	1	1	0	332	39.8
Total:	983	5	77	275	2	1	0	360	36.6

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47).

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. The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Weeks 36-11).

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 2004-05 season. a/

FL (cm)	Total Tagged	Recoveries						Total Recoveries	% Recoveries
		Tag Morts b/	Carcass Recoveries c/	TRH d/ Recoveries	Angler Released e/	Angler Harvest f/	Angler Found Tags g/		
42	1							0	0.0
43	4			1				1	25.0
44	1			0				0	0.0
45	1			0	1			1	100.0
46	1			0	0	1		1	100.0
47	1			0	1	0		1	100.0
48	2			0	0	0		0	0.0
49	2			1	0	0		1	50.0
50	10			0	1	0		1	10.0
51	12			3	0	1		4	33.3
52	4			0	0	0		0	0.0
53	19			3	4	0		7	36.8
54	47			9	8	0		17	36.2
55	57			9	12	1		22	38.6
56	80			20	8	1		29	36.3
57	113		1	30	16	3		50	44.2
58	137		1	36	15	1		53	38.7
59	147		1	44	12	1		58	39.5
60	185		1	48	19	5		73	39.5
61	183	1	1	53	15	1		71	38.8
62	177		0	47	11	4		62	35.0
63	135		1	38	8	4		51	37.8
64	148			45	14	1		60	40.5
65	110			31	10	1		42	38.2
66	82			28	8	1		37	45.1
67	76			22	4	1		27	35.5
68	75			16	4	1		21	28.0
69	40			10	3	1		14	35.0
70	52			15	1	2		18	34.6
71	25			4	1	0		5	20.0
72	27			7	1	0		8	29.6
73	11			2	0	2		4	36.4
74	10			1	0	0		1	10.0
75	8				1	0		1	12.5
76	6					1		1	16.7
77	2							0	0.0
78	1							0	0.0
79	1							0	0.0
80	2							0	0.0
81								0	-
82								0	-
Adults:	1,995	1	6	523	178	34	0	742	37.2

a/ Trapping at Willow Creek took place from September 14 through November 22 (Julian Weeks 37-47).

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. The fish ladder was open from September 3, 2004 - March 15, 2005 (Julian Weeks 36-11).

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 2004-2005 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.	All Year	1 hatchery trout or hatchery steelhead. Salmon Quota Area. Also see subsection (b)(91.1)(C)**.
c. Canyon Creek above the falls located about four miles above the wilderness area 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)	Dec.1 through Aug 31.	See subsection (b)(91.1)(D)*
e. New River main stem from the mouth upstream to the confluence of the East Fork.	Sept 15 through Nov 15 only artifical lures with barbless hooks may be used.	0
f. Trinity River main stem from Hawkins Bar Bridge (Road to Denny) to the confluence with the Klamath River.	All Year	1 hatchery trout or hatchery steelhead. Salmon Quota Area. Also see subsection (b)(91.1)(C)***.
g. 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 or 1 brown trout. 0 king salmon
h. 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 or 1 brown trout. 0 king salmon
i. 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 1 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 Highway 96 bridge at Weitchpec. 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)(f)(i) 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 the Highway 96 bridge at Weitchpec.		
(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 2004, 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 2004 Klamath River basin quota is 4,700 king salmon over 22 inches total length.

Appendix 14. Fork length (FL) distribution of coho salmon recovered at Trinity River Hatchery during the 2004-05 season. a/

FL (cm)	Unmarked	Right maxillary clip b/	Other Clips c/	Total
22		1		1
23		0		0
24		0		0
25		0		0
26		0		0
27		0		0
28		0		0
29		0		0
30		0		0
31		0		0
32		1		1
33		1		1
34		4		4
35		7		7
36	1	15		16
37	0	35		35
38	0	55		55
39	0	91		91
40	1	110		111
41	2	128		130
42	1	123		124
43	0	114		114
44	0	96		96
45	1	83		84
46	0	53		53
47	0	57		57
48	0	27		27
49	1	18		19
50	0	13		13
51	0	5		5
52	2	16		18
53	0	15		15
54	0	10		10
55	2	13		15
56	2	15		17
57	6	39		45
58	4	31		35
59	5	63		68
60	7	83	1	91
61	12	115	1	128
62	25	222	0	247
63	30	274	1	305
64	44	439	4	487
65	56	539	1	596
66	65	712	1	778
67	88	877	1	966
68	110	994	1	1,105
69	105	907	3	1,015
70	130	924	0	1,054
71	91	773	0	864
72	79	591	1	671
73	70	459	0	529
74	52	313	0	365
75	37	180	1	218
76	22	130		152
77	10	64		74
78	5	37		42
79	4	11		15
80	0	8		8
81	1	1		2
82		2		2
83		1		1
84		0		0
85		0		0
86		0		0
87		1		1
Totals:	1,071	9,896	16	10,983
Mean FL:	68.8	65.6	66.3	65.9

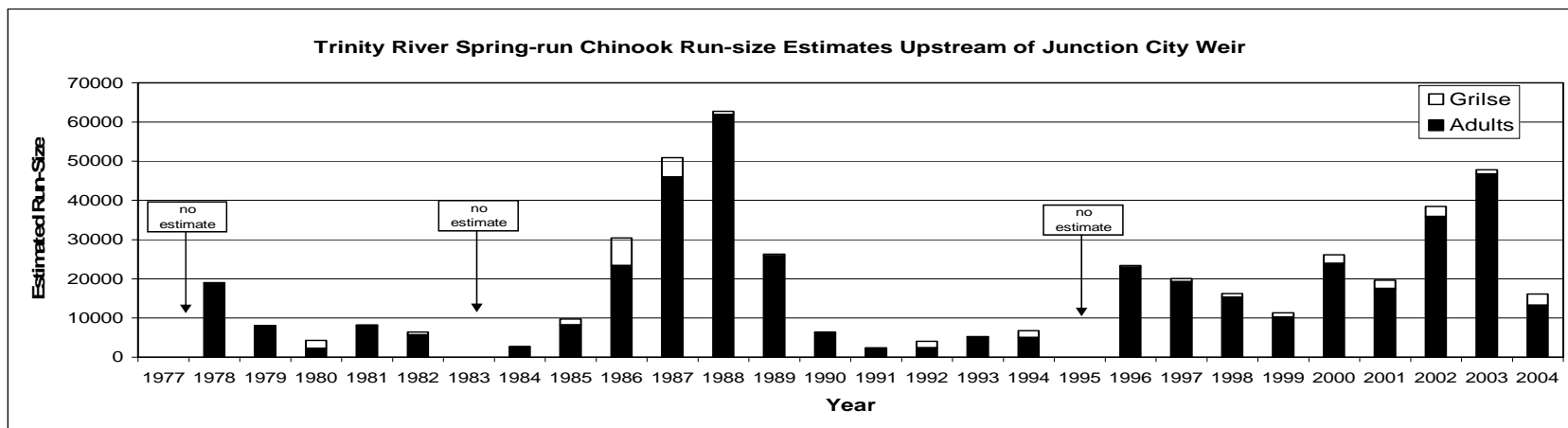
a/ The fish ladder was open from September 3, 2004 through March 15, 2005 (Julian Weeks 36-11).

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

c/ Other clips include: 7 ADRM (adipose fin clip and right maxillary clip); 2 LM (left maxillary clip) and 7 RMLM (right and 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 2004.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Grilse		Adults		Total	Natural		Total	Trinity River Hatchery			Grilse	Adults	Total
	Number	Percent	Number	Percent		Grilse	Adults		Grilse	Adults	Total			
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
2004	2,929	18.1%	13,218	81.9%	16,147	1,708	7,314	9,022	985	5,251	6,236	236	653	889

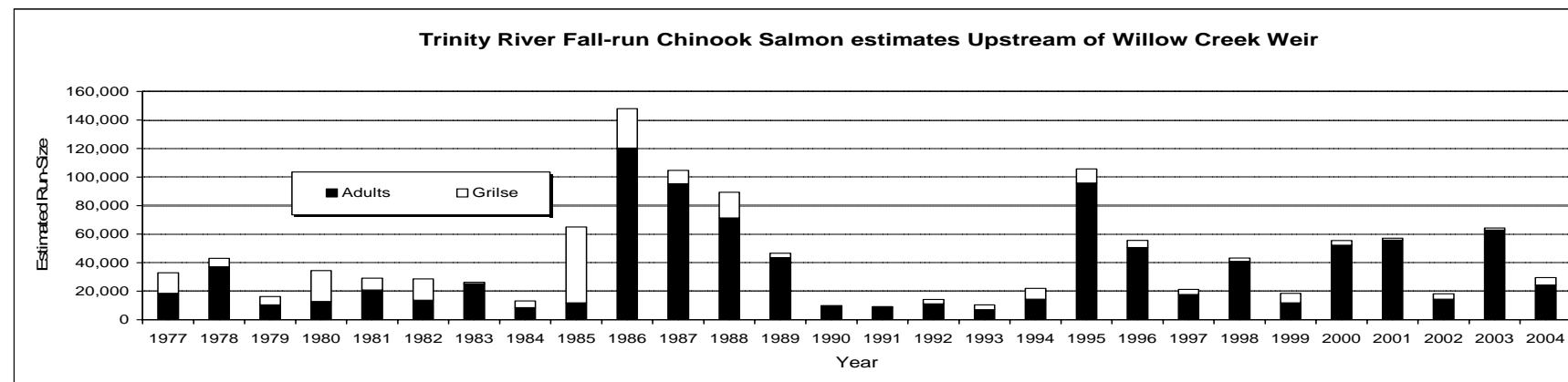


a/ The 1978 sport harvest of spring-run Chinook was limited by a salmon fishing closure beginning 25 August 1978.

b/ The sport harvest of adult spring-run Chinook was limited by fishing closures to the taking of 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 1995-00 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 2004.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Grilse		Adults		Total	Natural			Trinity River Hatchery			Grilse	Adults	Total
	Number	Percent	Number	Percent		Grilse	Adults	Total	Grilse	Adults	Total			
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/		
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
2004	5,224	17.7%	24,310	82.3%	29,534	3,839	11,545	15,384	1,059	12,384	13,443	327	381 d/	708



a/ The 1978 harvest of fall-run Chinook was essentially eliminated by a salmon fishing closure beginning 25 August 1978.

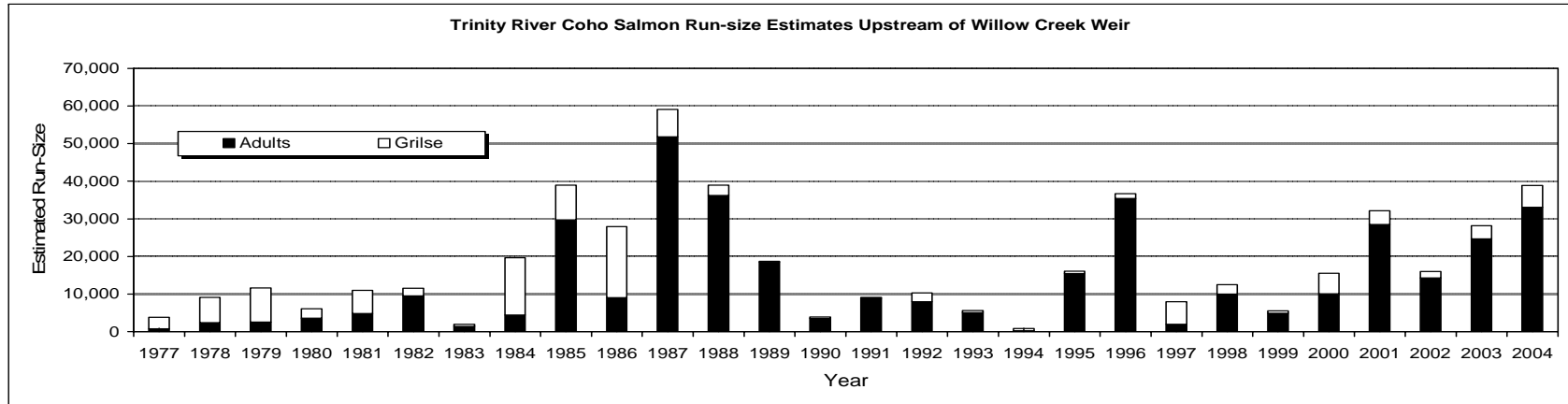
b/ The sport harvest of adult fall-run Chinook was limited by fishing closures to the taking of Chinook salmon greater than or equal to 56 cm total length during these years. The closures took effect 22 September 1985, 5 November 1992, 9 October 1993, and 3 October 1994. The Trinity River was subject 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 2001-2004 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; 10,800 in 2003 and 4,700 in 2004.

Appendix 17. Coho salmon run-size, spawner escapement and angler harvest estimates for the Trinity River upstream of Willow Creek Weir from 1977 through 2004.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Grilse		Adults		Total	Natural			Trinity River Hatchery			Grilse	Adults	Total
	Number	Percent	Number	Percent		Grilse	Adults	Total	Grilse	Adults	Total			
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/		
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/
2004	5,819	15.0%	33,063	85.0%	38,882	4,742	23,117	27,859	1,077	9,906	10,983	0	40	40 c/



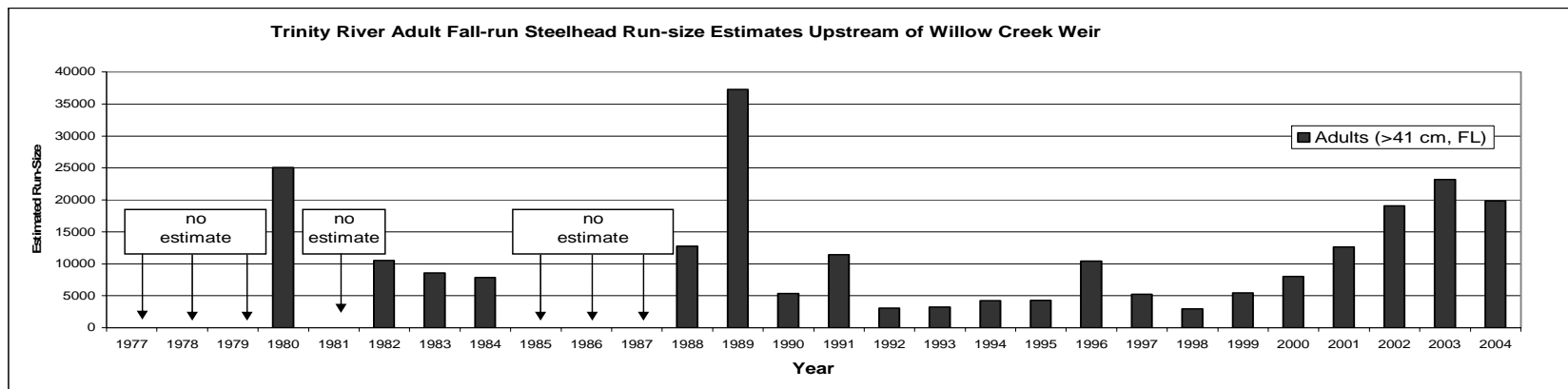
a/ The 1978 sport harvest of coho was essentially eliminated by a salmon fishing closure beginning 25 August 1978.

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-'04 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 2004.

Year	Run-size estimate					Spawner escapement						Angler harvest		
	Hatchery b/		Wild c/		Total	Natural		Total	Trinity River Hatchery			Hatchery	Wild	Total
	Number	Percent	Number	Percent		Hatchery	Wild		Hatchery	Wild	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		
1998	"				2,972	"		2,463	"		441	"		
1999	"				5,470	"		3,817	"		1,571	"		
2000	"				8,042	"		7,097	"		768	"		
2001	"				12,638	"		9,938	"		2,333	"		
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/
2004	15,038	75.7%	4,817	24.3%	19,855	8,937	4,732	13,669	5,688	37	5,725	413	48	461 e/



a/ Adult steelhead are greater than 41 centimeters, fork length.

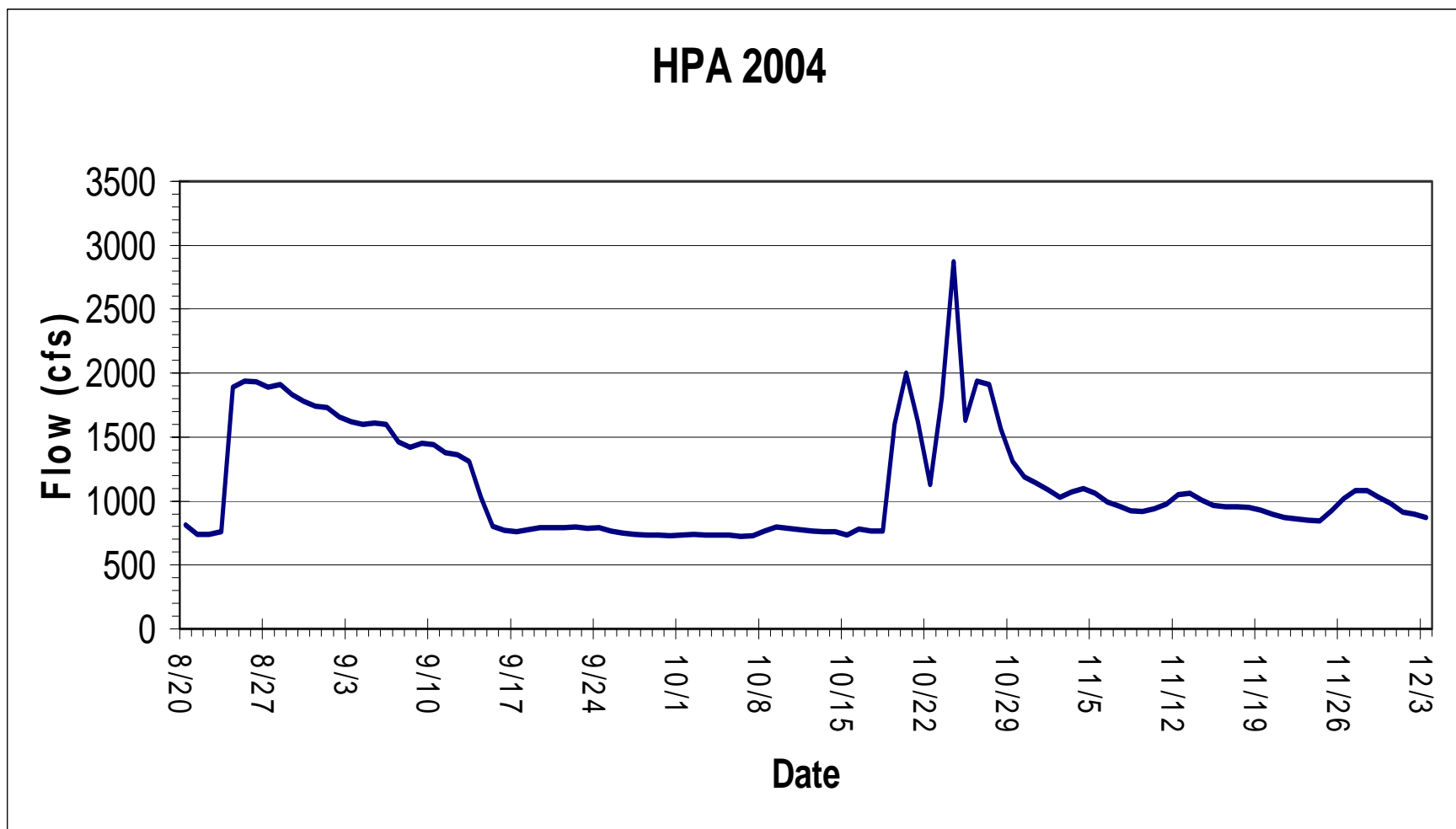
b/ Trinity River Hatchery-produced steelhead.

c/ Naturally produced steelhead.

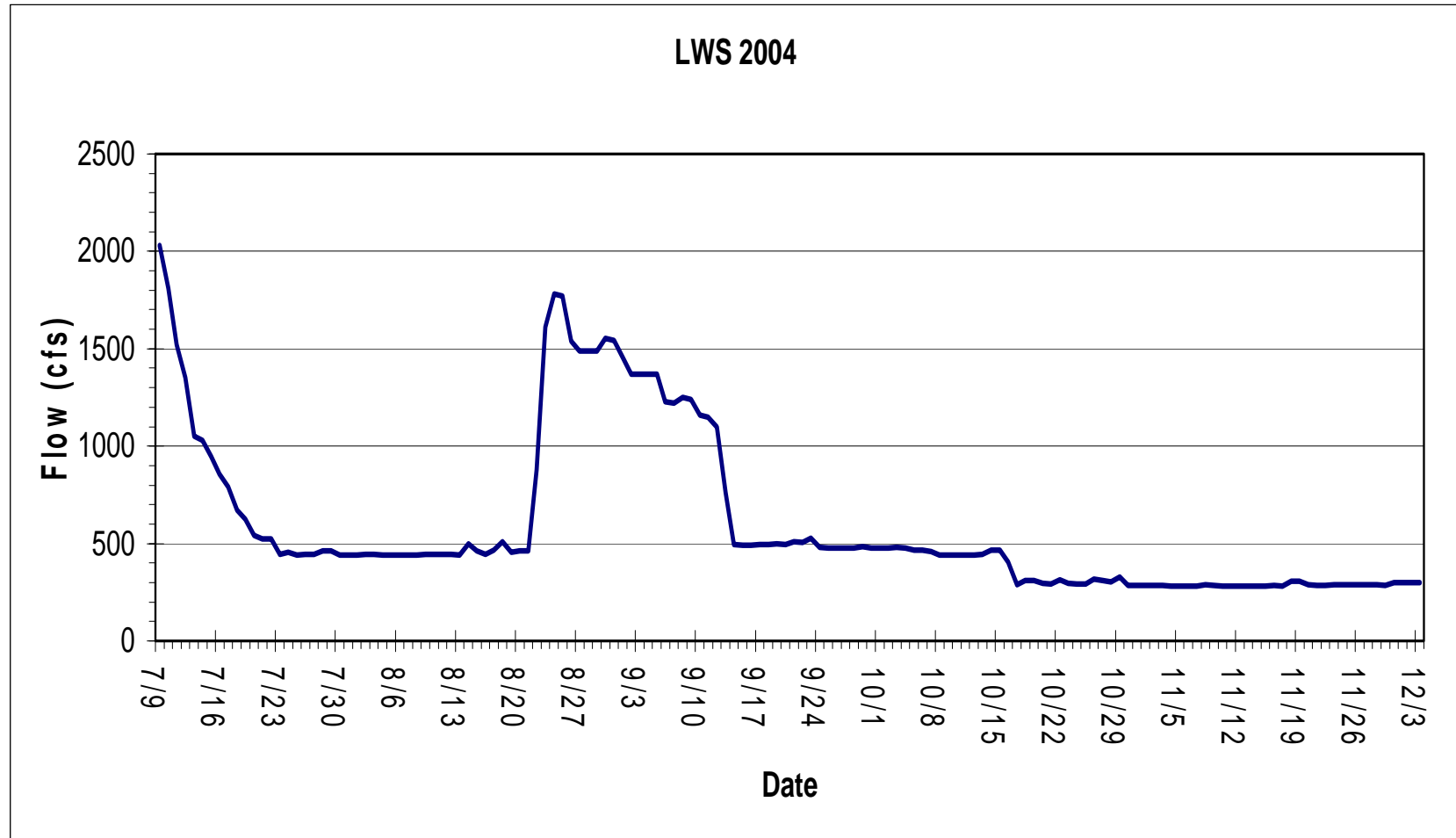
d/ The natural spawner escapement reflects an overestimate due to the unknown number of fish harvested by anglers upstream of Willow Creek Weir.

e/ Harvest was limited to hatchery produced fish only. Hatchery fish are those with an adipose fin-clip.

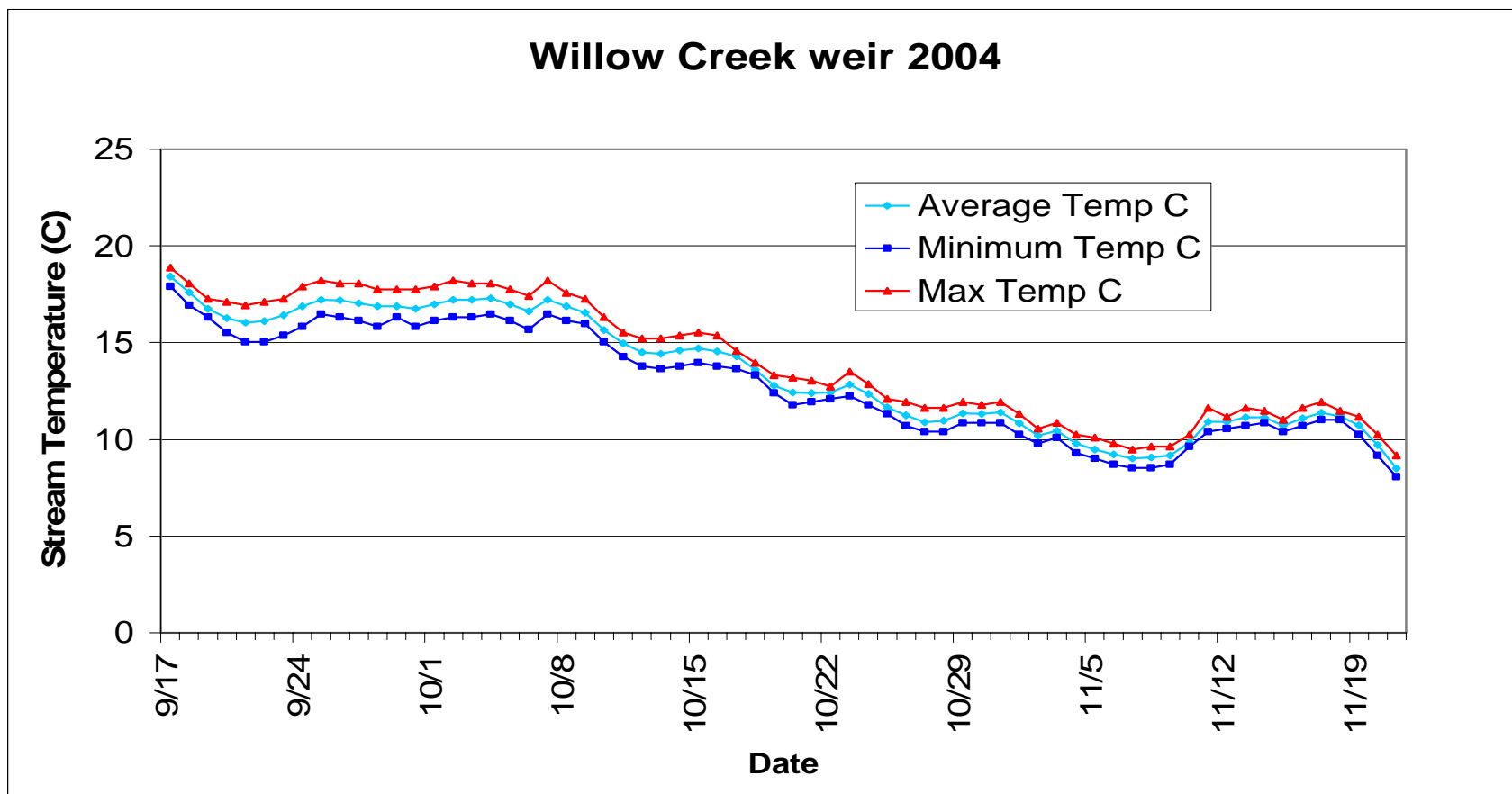
Appendix 19. Flow in cubic feet per second in the Trinity River at USGS gauge (11530000) in Hoopa from August 20th through December 3rd 2004.



Appendix 20. Flow in cubic feet per second in the Trinity River at USGS guage (11525500) near Lewiston from July 9th through December 3rd 2004.



Appendix 21. Daily minimum, maximum, and average temperatures in degrees Celsius recorded at the Willow Creek weir trapping site from September 17th through November 19th 2004.



ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2004-05 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 7 September, 2004 and 15 March, 2005. Of the 19,679 Chinook salmon that entered TRH, we recovered 4,721 adipose fin-clipped (AD) Chinook salmon, 24.0% of the total. Of these, coded-wire tags (CWT) were recovered from 1,385 spring Chinook and 3,128 fall Chinook salmon.

We estimated that 2,761 marked (AD+CWT) spring Chinook returned to the Trinity River upstream of the Junction City Weir (JCW) and 6,351 marked fall Chinook returned to the Trinity River upstream of the Willow Creek Weir (WCW) during the 2004-05 season.

Run-size, in-river angler harvest, and spawner escapements of marked TRH spring and fall Chinook salmon for the 1999 through 2002 brood years (BY's) are presented. Complete returns are only available for both runs of fish from the 1999 brood year. These fish have reached age five and are considered to have completed their life cycle. Chinook return rates for the completed 1999 BY ranged from 1.7% to 2.2% for spring Chinook fingerling CWT groups and 0.30% to 0.55% for fall Chinook fingerlings. Returns of spring Chinook released as yearlings was estimated at 3.2%, while fall Chinook yearlings returned at a rate of 2.0%.

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 70.1% and 87.9% respectively.

Returns of BY 1999 -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 7 September, 2004 through 15 March, 2005, 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 approximately 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, 2004a, 2004b and 2005.

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:

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

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 $N_{run-size\ estimate}$ = 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, $N_{\text{CWT escapement}}$ = 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:

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

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 4,721 AD-clipped Chinook at TRH this season, of which we recovered CWT's from 1,385 spring Chinook and 3,128 fall Chinook (Table 1). The remaining 208 AD-clipped fish had either shed their CWT (140) or the CWT was lost or unreadable (68). 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 1999 through 2002 BY's. Recovered fall Chinook with CWT's were from 32 groups representing the 1999 through 2002 BY's (Table 1).

Table 1. Release and recovery data for adipose fin-clipped chinook recovered at Trinity River Hatchery (TRH) during the 2004-05 season.

Release data							Recovery data				
CWT a/ code	Egg source	Brood year	Date	Number	Size (No./lb)	Site	Males		Females		Total No.
							No.	FL b/	No.	FL b/	
Spring-run chinook salmon											
065251	TRH	1999	06/1-07/00	49,421	40.8	TRH	1	97.0	0	----	1
065252	TRH	1999	06/1-07/00	51,993	40.8	TRH	0	----	1	78.0	1
065253	TRH	1999	06/1-07/00	46,966	50.6	TRH	0	----	0	----	0
065258	TRH	1999	10/03-06/00	129,919	10.3	TRH	9	88.7	5	79.2	14
065260	TRH	2000	06/6-13/01	33,049	33.3	TRH	8	89.6	17	77.2	25
065261	TRH	2000	06/6-13/01	32,621	33.3	TRH	14	85.0	21	77.7	35
065262	TRH	2000	06/6-13/01	24,480	33.3	TRH	5	87.4	11	76.0	16
065263	TRH	2000	06/6-13/01	34,385	33.3	TRH	13	88.2	27	77.5	40
065264	TRH	2000	06/6-13/01	31,587	42.0	TRH	8	84.4	20	79.9	28
065269	TRH	2000	06/6-13/01	52,491	33.3	TRH	27	86.8	38	77.1	65
065270	TRH	2000	06/6-13/01	52,580	42.0	TRH	24	85.6	34	79.5	58
065279	TRH	2000	10/1-10/01	99,304	7.9	TRH	157	80.1	254	74.0	411
065281	TRH	2001	06/3-10/02	89,482	39.0	TRH	20	71.4	42	67.4	62
065282	TRH	2001	06/3-10/02	89,978	39.0	TRH	16	73.8	26	67.5	42
065283	TRH	2001	06/3-10/02	73,788	45.0	TRH	15	72.8	22	68.8	37
065288	TRH	2001	10/10-16/02	104,627	8.3	TRH	191	65.7	156	63.7	347
065295	TRH	2002	06/3-9/03	89,284	44.5	TRH	74	51.7	0	----	74
065296	TRH	2002	06/3-9/03	84,568	44.5	TRH	57	51.5	0	----	57
065297	TRH	2002	06/3-9/03	70,902	44.5	TRH	59	52.6	0	----	59
065308	TRH	2002	10/1-7/03	106,139	11.4	TRH	13	45.3	0	----	13
Lost CWT c/ e/							11	69.4	14	70.3	25
No CWT d/ e/							29	64.8	19	68.3	48
Spring-run chinook salmon totals:							751		707		1,458
Fall-run chinook salmon											
065254	TRH	1999	06/1-07/00	44,654	79.4	TRH	2	93.5	0	----	2
065255	TRH	1999	06/1-07/00	42,549	79.4	TRH	0	----	1	84.0	1
065256	TRH	1999	06/1-07/00	43,565	90.5	TRH	0	----	1	91.0	1
065257	TRH	1999	06/1-07/00	50,533	90.5	TRH	1	100.0	0	----	1
065259	TRH	1999	10/03-06/00	296,892	14.7	TRH	9	91.7	11	84.2	20
065265	TRH	2000	06/6-06/13/01	32,795	56.5	TRH	4	90.8	4	81.5	8
065266	TRH	2000	06/6-06/13/01	33,806	56.5	TRH	0	----	2	79.5	2
065267	TRH	2000	06/6-06/13/01	34,852	56.5	TRH	0	----	4	80.0	4
065268	TRH	2000	06/6-06/13/01	33,240	86.0	TRH	1	77.0	7	76.0	8
065271	TRH	2000	06/6-06/13/01	54,867	56.5	TRH	4	86.3	9	81.4	13
065272	TRH	2000	06/6-06/13/01	36,035	56.5	TRH	2	88.0	2	86.5	4
065273	TRH	2000	06/6-06/13/01	57,444	56.5	TRH	2	91.0	7	73.3	9
065274	TRH	2000	06/6-06/13/01	32,096	56.5	TRH	3	90.3	4	86.5	7
065275	TRH	2000	06/6-06/13/01	64,250	56.5	TRH	2	84.5	6	77.5	8
065276	TRH	2000	06/6-06/13/01	27,159	56.5	TRH	4	87.8	2	89.5	6
065277	TRH	2000	06/6-06/13/01	56,582	86.0	TRH	2	84.0	10	79.0	12
065278	TRH	2000	06/6-06/13/01	34,183	86.0	TRH	2	89.0	5	79.2	7
065643	TRH	2000	06/6-06/13/01	25,007	86.0	TRH	3	90.3	2	77.5	5
065280	TRH	2000	10/1-10/10/01	216,593	12.3	TRH	156	84.0	171	77.7	327
065284	TRH	2001	06/3-10/02	119,555	71.0	TRH	10	71.7	17	69.5	27
065285	TRH	2001	06/3-10/02	114,119	71.0	TRH	13	68.9	20	67.8	33
065286	TRH	2001	06/3-10/02	126,135	86.0	TRH	17	70.4	24	68.3	41
065287	TRH	2001	06/3-10/02	121,607	86.0	TRH	18	69.7	16	68.4	34
065289	TRH	2001	10/10-16/02	230,055	13.5	TRH	1,181	67.0	1,122	64.7	2,303
065290	TRH	2001	06/3-10/02	10,234	126.0	TRH	0	----	2	68.0	2
065291	TRH	2001	06/3-10/02	8,269	126.0	TRH	0	----	1	66.0	1
065292	TRH	2002	06/3-9/03	10,355	105.5	TRH	0	----	0	----	0
065298	TRH	2002	06/3-9/03	124,602	76.0	TRH	63	50.7	0	----	63
065299	TRH	2002	06/3-9/03	126,729	76.0	TRH	52	50.1	2	52.5	54
065306	TRH	2002	06/3-9/03	124,014	84.5	TRH	54	50.3	0	----	54
065307	TRH	2002	06/3-9/03	123,263	84.5	TRH	35	50.6	0	----	35
065309	TRH	2002	10/1-7/03	236,319	16.7	TRH	35	45.8	1	65.0	36
Lost CWT c/ e/							20	64.5	23	66.3	43
No CWT d/ e/							51	64.1	41	67.5	92
Fall-run chinook salmon totals:							1,746		1,517		3,263

a/ CWT = Coded-wire tag.

b/ FL = Mean fork length in cm.

c/ CWT lost during recovery.

d/ No CWT was detected.

e/ Assigned as either spring-run or fall-run chinook based on entry date 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 2,761 CWT'ed spring Chinook salmon returned to the Trinity River above JCW during the 2004-05 season. An estimated 148 of these fish were harvested by anglers during the season. Escapement of CWT'ed spring Chinook was divided between 1,385 fish recovered at TRH and 1,228 estimated to have spawned in natural areas (Table 2).

The year's run of CWT'd spring Chinook was composed of 405 (14.7%) age 2, 973 (35.2%) age 3, 1,355 (49.0%) age 4 and 32 (1.2%) age 5 fish (Table2).

1999 brood year

Four spring Chinook CWT groups from the 1999 BY completed their life cycle this season, having reached the age of five. Estimated in-river age five returns occurred for three of the four groups. We estimated 32 fish returned from these groups (Table 3), with the majority of returns from the yearling release group, 065258. Cumulative return rates, expressed as a percentage of release numbers, ranged from 1.7% to 2.9% and averaged 2.26% for the groups released as fingerlings and 3.3% for the group released as yearlings (Table 3). Thus, yearlings returned at a rate approximately 1.5 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.

2000 brood year

Spring Chinook from the 2000 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 1.3% through age four (Table 3). The yearling group, 065258, has also performed well, returning at a rate over 2%. Similar to BY 1999 releases, fingerlings have experienced their highest returns at age three. Yearlings also experienced their highest return as age three fish.

2001 brood year

Three fingerling release groups, 065281, 065281, and 065283 and one yearling release group, 065288, have returned as age two and three-year-old fish thus far. Returns to date for all of these groups are well behind returns from the 1999 and 2000 BY groups. Return rates are less than 0.8% for all of the groups through age three (Table 3). Spring Chinook from these groups will be returning as four- and five-year-olds during 2005 and 2006 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 2004-05 season.

Run-size estimates a/		Harvest rates b/		TRH Ads With CWTs c/	% Weir Ads d/	Ad+CWT Run-size estimates e/
		Grilse	Adults			
Spring Chinook (JCW)	16,147	8.0%	4.9%	0.95	17.95%	2,761
Fall Chinook (WCW)	29,534	6.3%	1.6%	0.96	22.46%	6,351

CWT code	BY	Age	TRH Total No.	% of Total	Run-size	Angler harvest	Spawning escapement		
							TRH	Natural	Total
Spring-run chinook salmon									
065251	99	5	1	0.1%	2	0	1	1	2
065252	99	5	1	0.1%	2	0	1	1	2
065253	99	5	0	0.0%	0	0	0	0	0
065258	99	5	14	1.0%	28	1	14	13	27
065260	00	4	25	1.8%	50	2	25	22	47
065261	00	4	35	2.5%	70	3	35	31	66
065262	00	4	16	1.2%	32	2	16	14	30
065263	00	4	40	2.9%	80	4	40	36	76
065264	00	4	28	2.0%	56	3	28	25	53
065269	00	4	65	4.7%	130	6	65	58	123
065270	00	4	58	4.2%	116	6	58	52	110
065279	00	4	411	29.7%	819	40	411	368	779
065281	01	3	62	4.5%	124	6	62	56	118
065282	01	3	42	3.0%	84	4	42	38	80
065283	01	3	37	2.7%	74	4	37	33	70
065288	01	3	347	25.1%	692	34	347	311	658
065295	02	2	74	5.3%	148	12	74	62	136
065296	02	2	57	4.1%	114	9	57	48	105
065297	02	2	59	4.3%	118	9	59	49	108
065308	02	2	13	0.9%	26	2	13	11	24
			1,385	100%	2,761	148	1,385	1,228	2,613
Fall-run chinook salmon									
065254	99	5	2	0.1%	4	0	2	2	4
065255	99	5	1	0.0%	2	0	1	1	2
065256	99	5	1	0.0%	2	0	1	1	2
065257	99	5	1	0.0%	2	0	1	1	2
065259	99	5	20	0.6%	41	1	20	20	40
065265	00	4	8	0.3%	16	0	8	8	16
065266	00	4	2	0.1%	4	0	2	2	4
065267	00	4	4	0.1%	8	0	4	4	8
065268	00	4	8	0.3%	16	0	8	8	16
065271	00	4	13	0.4%	26	0	13	13	26
065272	00	4	4	0.1%	8	0	4	4	8
065273	00	4	9	0.3%	18	0	9	9	18
065274	00	4	7	0.2%	14	0	7	7	14
065275	00	4	8	0.3%	16	0	8	8	16
065276	00	4	6	0.2%	12	0	6	6	12
065277	00	4	12	0.4%	24	0	12	12	24
065278	00	4	7	0.2%	14	0	7	7	14
065280	00	4	327	10.5%	664	11	327	326	653
065643	00	4	5	0.2%	10	0	5	5	10
065284	01	3	27	0.9%	55	1	27	27	54
065285	01	3	33	1.1%	67	1	33	33	66
065286	01	3	41	1.3%	83	1	41	41	82
065287	01	3	34	1.1%	69	1	34	34	68
065289	01	3	2,303	73.6%	4,676	75	2,303	2,298	4,601
065290	01	3	2	0.1%	4	0	2	2	4
065291	01	3	1	0.0%	2	0	1	1	2
065292	02	2	0	0.0%	0	0	0	0	0
065298	02	2	63	2.0%	128	8	63	57	120
065299	02	2	54	1.7%	110	7	54	49	103
065306	02	2	54	1.7%	110	7	54	49	103
065307	02	2	35	1.1%	71	4	35	32	67
065309	02	2	36	1.2%	73	5	36	32	68
			3,128	100%	6,351	125	3,128	3,098	6,226

- 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), including those lost during recovery.
- 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 2001 through 2004.

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
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
					5	2	0.004	0	1	1	2
					Totals: d/	1,412	2.8571	72	565	772	1,337
				Total adults: e/		1,356	2.7438	65	537	751	1,288
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
					5	2	0.0038	0	1	1	2
					Totals: d/	1,151	2.2138	60	461	627	1,088
				Total adults: e/		1,101	2.1176	54	436	608	1,044
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
					5	0	0	0	0	0	0
					Totals: d/	809	1.7225	39	322	445	767
				Total adults: e/		791	1.6842	37	313	438	751
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
					5	28	0.0216	1	14	13	27
					Totals: d/	4,288	3.3005	204	1,706	2,373	4,079
				Total adults: e/		4,174	3.2128	190	1,649	2,330	3,979
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
					4	50	0.1513	2	25	22	47
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
					4	70	0.2146	3	35	31	66
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
					4	32	0.1307	2	16	14	30
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
					4	80	0.2327	4	40	36	76

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 1999. 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 3. (continued) 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 2001 through 2004.

Release data					Estimated returns						
CWT a/ code	Brood year	Date b/ Date	Number	Site	Age	Run- size	% of release	River harvest	Spawning escapement		
									TRH c/	Natural	Total
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
					4	56	0.1773	3	28	25	53
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
					4	130	0.2477	6	65	58	123
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
					4	116	0.2206	6	58	52	110
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
					4	819	0.8247	40	411	368	779
065281	2001	06/3-10/02	89,482	TRH	2	5	0.0056	0	2	3	5
					3	124	0.1386	6	62	56	118
065282	2001	06/3-10/02	89,978	TRH	2	20	0.0222	0	8	12	20
					3	84	0.0934	4	42	38	80
065283	2001	06/3-10/02	73,788	TRH	2	5	0.0068	0	2	3	5
					3	74	0.1003	4	37	33	70
065288	2001	10/10-16/02	104,627	TRH	2	43	0.0411	0	17	26	43
					3	692	0.6614	34	347	311	658
065295	2002	06/3-9/03	89,284	TRH	2	148	0.1658	12	74	62	136
065296	2002	06/3-9/03	84,568	TRH	2	114	0.1348	9	57	48	105
065297	2002	06/3-9/03	70,902	TRH	2	118	0.1664	9	59	49	108
065308	2002	10/1-7/03	106,139	TRH	2	26	0.0245	2	13	11	24

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 1999. 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.

2002 brood year

Four release groups (3 fingerling and 1 yearling) from the 2002 BY returned as two-year-olds this season. Return rates for all these groups, through age 2, appear average as compared to the previous three brood years (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 6,351 CWT'ed fall Chinook salmon returned to the Trinity River above WCW during the 2004-05 season. We estimated that anglers harvested 125 CWT'ed fall Chinook. Escapement of CWT'ed fall Chinook was divided between 3,128 fish recovered at TRH and 3,098 estimated to have spawned naturally this season (Table 2).

The fall Chinook CWT run was composed of 491 (7.7%) age 2, 4,956 (78.0%) age 3, 853 (13.4%) age 4 fish, and 51 (0.8%) age 5 fish (Table 2).

1999 brood year

The BY 1999 releases were composed of four fingerling and one yearling group and have completed their life cycle this season, having reached the age of five. Return rates for fingerling releases ranged between .033 and .055% (Table 4). The yearling groups, 065259 returned at a rate of 1.97%, which is approximately 4.5 times that of the fingerling group average. All Chinook from the 1999 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 three fall Chinook from 1999 BY groups (CDFG, 2003).

2000 brood year

The 2000 BY is represented by fourteen CWT groups, of which thirteen are fingerling groups and one a yearling group. Through age four returns, the yearling group, 065280 has returned at a rate of 2.5%, approximately 3 times that of the fingerling return groups. The fingerling groups have returned at a rate ranging between 0.4 and 0.9%. Returns of both release types were greatest last year as age three fish. Similar to BY 1999 returns, the fish kill also affected this BY, except that age two fish were lost. Fish released from this BY are expected to return as five-year-olds during the 2005 season.

2001 brood year

Returns of 2001 BY fall Chinook are complete through age 3 only. Seven release groups (6 fingerling and 1 yearling) have returned to date as two and three-year-old fish (Table 4). The yearling group, 065289, has experienced the best returns to date, over 2% through age 3. The

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 2001 through 2004.

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	
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	
					5	4	0.009	0	2	2	4	
					Totals: d/		247	0.553	9	121	117	238
					Total adults: e/		230	0.515	8	113	109	222
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	
					5	2	0.005	0	1	1	2	
					Totals: d/		143	0.336	4	70	69	139
					Total adults: e/		139	0.327	4	68	67	135
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	
					5	2	0.005	0	1	1	2	
					Totals: d/		144	0.331	5	74	65	139
					Total adults: e/		142	0.326	5	73	64	137
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	
					5	2	0.004	0	1	1	2	
					Totals: d/		159	0.315	6	81	72	153
					Total adults: e/		149	0.295	5	76	68	144
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	
					5	41	0.014	1	20	20	40	
					Totals: d/		5,833	1.965	181	3,103	2,548	5,651
					Total adults: e/		5,806	1.956	179	3,090	2,536	5,626
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	
					4	16	0.049	0	8	8	16	
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	
					4	4	0.012	0	2	2	4	
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	
					4	8		0	4	4	8	
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	
					4	16	0.048	0	8	8	16	
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	
					4	26	0.047	0	13	13	26	
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	
					4	8	0.022	0	4	4	8	
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	
					4	18	0.031	0	9	9	18	

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 1999. 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 2001 through 2004.

CWT a/ code	Brood year	Release data			Estimated returns						
		Date b/	Number	Site	Age	Run- size	% of release	River harvest	Spawning escapement		
									TRH c/	Natural	Total
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
					4	14	0.044	0	7	7	14
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
					4	16		0	8	8	16
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
					4	12	0.044	0	6	6	12
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
					4	24	0.042	0	12	12	24
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
					4	14	0.041	0	7	7	14
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
					4	10	0.040	0	5	5	10
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
					4	664	0.307	11	327	328	655
065284	2001	06/03-10/02	119,555	TRH	2	24	0.020	2	13	9	22
					3	55		1	27	27	54
065285	2001	06/03-10/02	114,119	TRH	2	24	0.020	2	13	9	22
					3	67	0.056	1	33	33	66
065286	2001	06/03-10/02	126,135	TRH	2	24	0.019	2	13	9	22
					3	83	0.066	1	41	41	82
065287	2001	06/03-10/02	121,607	TRH	2	27	0.022	3	15	9	24
					3	69		1	34	34	68
065289	2001	10/10-16/02	230,055	TRH	2	137	0.060	14	75	48	123
					3	4,676	2.033	75	2,303	2,312	4,615
065290	2001	06/03-10/02	10,234	TRH	2	2	0.020	0	1	1	2
					3	4	0.039	0	2	2	4
065291	2001	06/03-10/02	8,269	TRH	2	0	0.000	0	0	0	0
					3	2	0.024	0	1	1	2
065292	2002	06/3-9/03	10,355	TRH	2	0	0.000	0	0	0	0
065298	2002	06/3-9/03	124,602	TRH	2	128	0.103	8	63	57	120
065299	2002	06/3-9/03	126,729	TRH	2	110	0.087	7	54	49	103
065306	2002	06/3-9/03	124,014	TRH	2	110	0.089	7	54	49	103
065307	2002	06/3-9/03	123,263	TRH	2	71	0.058	4	35	32	67
065309	2002	10/1-7/03	236,319	TRH	2	73	0.031	5	36	33	69

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 1999. 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.

fingerling groups have not returned in significant numbers through age 3, none have surpassed 0.1% returns to date. Fish from both release groups should return as four and five-year-old fish in 2005 and 2006, respectively.

2002 brood year

Six CWT groups (5 fingerling and 1 yearling) from the 2002 BY returned as two-year-olds during the 2004 season (Table 4). Age 2 return rates were highest for the fingerling groups, with the exception of CWT group 065290, a small release group with no estimated returns, as compared to the yearling group, 065309. 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 2004-05 run of spring Chinook was composed of the 11,324 Chinook of TRH origin. This represents 70.1% (11,324/16,147) of the total estimated run upstream of JCW. The fall run, upstream of WCW, was estimated to be composed of 25,956 TRH-produced Chinook, which represents 87.9% (25,956/29,534) 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 late June, may affect our spring-run Chinook CWT estimates.

In-river return rates for the completed 1999 BY were exceptionally good for both spring and fall Chinook fingerling and yearling releases. Spring Chinook return rates for 1999 BY releases were the highest observed during the past 14 years for both release types (Appendix 1). Fall Chinook return rates for 1999 BY releases were above average for both release types (Appendix 2), however, return rates (above WCW) may have been substantially higher had fall Chinook from this BY not experienced large losses as age three fish during the 2002 lower Klamath River

fish kill. Data collected during the kill event (CDFG, 2003) indicated that large numbers of Trinity River bound fall Chinook died in the lower Klamath. Conversely, no CWT's were collected from dead Trinity River Hatchery origin spring Chinook, indicating these fish had migrated above the "kill zone" prior to the event occurring.

The overall contribution of hatchery-produced Chinook to total run-sizes (Table 5) was very high this year. Hatchery-produced spring Chinook composed an estimated 70.1% (11,324/16,147) of the run upstream of Junction City weir. The contribution of hatchery-produced fall Chinook was even greater, composing 87.9% (25,956/29,534) of the run upstream of Willow Creek weir. Thus, of the total 45,681 spring and fall Chinook estimated above respective weir sites, only 8,401 of these were estimated to be of natural origin.

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 or their run-timing coincides with dates of weir operations (i.e spring Chinook at JCW) more than their wild counterparts at the weirs, the estimated contribution of hatchery fish could be 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 2004-05 season are the following: spring Chinook (JCW) 18.0%; fall Chinook (WCW) 22.5%; TRH springs 24.0%; TRH falls 24.1%. Performing the calculations results in a contribution rate of 75.0% for spring Chinook and 93.4% for fall Chinook. These are slightly higher than our reported rates, but within 7%.

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 2004-05 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					Expanded total
								TRH f/	Expanded TRH	Natural	Expanded natural	Total	
Spring-run chinook salmon													
065251	99	5	6.7	2	13	0	1	1	7	1	6	2	13
065252	99	5	6.4	2	13	0	1	1	6	1	6	2	12
065253	99	5	6.2	0	0	0	0	0	0	0	0	0	0
065258	99	5	2.9	28	82	1	4	14	41	13	37	27	78
065260	00	4	4.2	50	211	2	10	25	105	23	95	48	200
065261	00	4	4.2	70	295	3	14	35	147	32	133	67	288
065262	00	4	4.2	32	135	2	7	16	67	14	61	30	128
065263	00	4	4.1	80	324	4	16	40	162	36	146	76	308
065264	00	4	4.5	56	253	3	12	28	126	25	114	53	240
065269	00	4	4.1	130	527	6	26	65	263	59	238	124	501
065270	00	4	4.5	116	523	6	26	58	262	52	236	110	498
065279	00	4	4.1	819	3,317	40	163	411	1,665	368	1,490	779	3,154
065281	01	3	4.1	124	507	6	25	62	254	56	229	118	482
065282	01	3	4.2	84	351	4	17	42	176	38	158	80	334
065283	01	3	4.1	74	303	4	15	37	151	33	137	70	288
065288	01	3	4.1	692	2,810	34	138	347	1,409	311	1,263	658	2,672
065295	02	2	4.1	148	607	12	48	74	303	62	255	136	558
065296	02	2	4.1	114	467	9	37	57	234	48	196	105	430
065297	02	2	4.1	118	484	9	39	59	242	50	203	109	445
065308	02	2	4.0	26	105	2	8	13	52	11	44	24	96
				2,765	11,324	148	605	1,385	5,672	1,232	5,047	2,617	9,189
Fall-run chinook salmon													
065254	99	5	10.8	4	44	0	1	2	22	2	22	4	43
065255	99	5	10.8	2	22	0	0	1	11	1	11	2	22
065256	99	5	10.8	2	22	0	0	1	11	1	11	2	22
065257	99	5	11.0	2	22	0	0	1	11	1	11	2	22
065259	99	5	2.9	41	117	1	2	20	58	20	58	40	115
065265	00	4	4.2	16	68	0	1	8	33	8	33	16	67
065266	00	4	4.1	4	16	0	0	2	8	2	8	4	16
065267	00	4	4.1	8	33	0	1	4	16	4	16	8	32
065268	00	4	4.1	16	67	0	1	8	33	8	33	16	66
065271	00	4	4.2	26	110	0	2	13	54	13	54	26	108
065272	00	4	4.2	8	34	0	1	4	17	4	17	8	33
065273	00	4	4.1	18	74	0	1	9	36	9	37	18	73
065274	00	4	4.0	14	58	0	1	7	28	7	28	14	57
065275	00	4	4.1	16	66	0	1	8	32	8	33	16	65
065276	00	4	4.1	12	50	0	1	6	24	6	24	12	49
065277	00	4	4.1	24	100	0	2	12	49	12	50	24	99
065278	00	4	4.1	14	59	0	1	7	29	7	29	14	58
065643	00	4	4.5	664	2,981	11	48	327	1,468	326	1,465	653	2,933
065280	00	4	4.0	10	41	0	1	5	20	5	20	10	40
065284	01	3	4.1	55	224	1	4	27	110	27	111	54	221
065285	01	3	4.3	67	290	1	5	33	143	33	143	66	286
065286	01	3	4.0	83	337	1	5	41	166	41	166	82	332
065287	01	3	4.1	69	284	1	5	34	139	34	140	68	279
065289	01	3	4.0	4,676	18,797	75	302	2,303	9,258	2,298	9,237	4,601	18,495
065290	01	3	4.1	4	17	0	0	2	8	2	8	4	16
065291	01	3	4.0	2	8	0	0	1	4	1	4	2	8
065292	02	2	3.9	0	0	0	0	0	0	0	0	0	0
065298	02	2	4.1	128	526	8	33	63	258	57	235	120	493
065299	02	2	4.0	110	442	7	28	54	217	49	197	103	414
065306	02	2	4.2	110	456	7	29	54	224	49	204	103	428
065307	02	2	4.1	71	294	4	19	35	145	32	131	67	276
065309	02	2	4.0	73	295	5	19	36	145	33	132	69	277
				6,353	25,956	125	511	3,128	12,779	3,100	12,666	6,228	25,444

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.

RECOMMENDATIONS

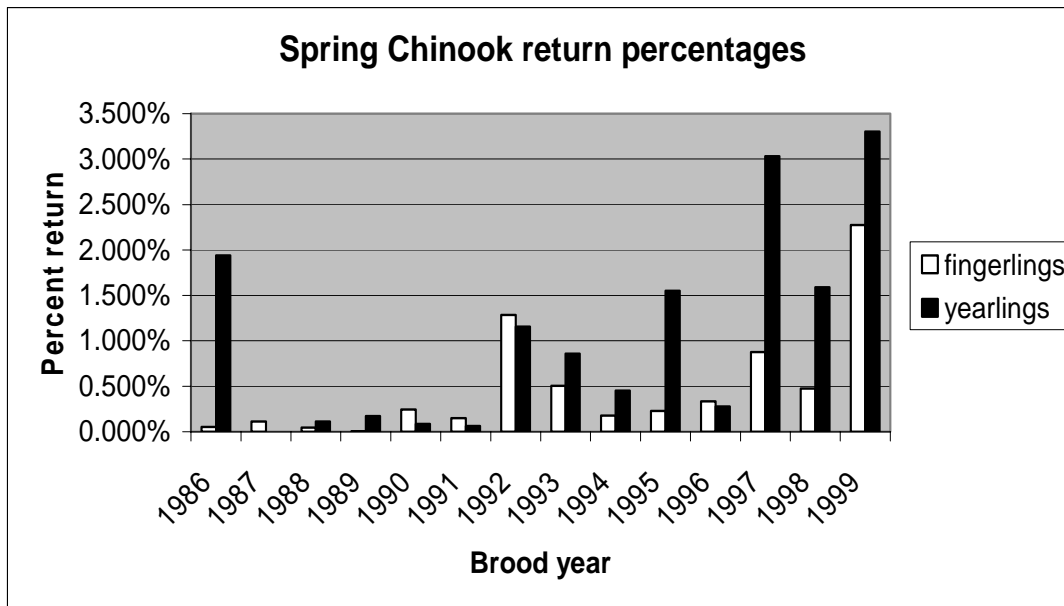
1. Coded-wire tagging and release of smolt and yearling Chinook salmon, and the monitoring of adult salmon returns at Trinity River Hatchery should be continued in 2005-06.
2. Monitor the annual TRH-produced Chinook salmon contribution rates to the overall runs to determine the relative status of naturally 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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Appendix 1. Percent return of Trinity River Hatchery produced, coded-wire tagged, spring-run Chinook salmon, brood years 1986-1999. a/

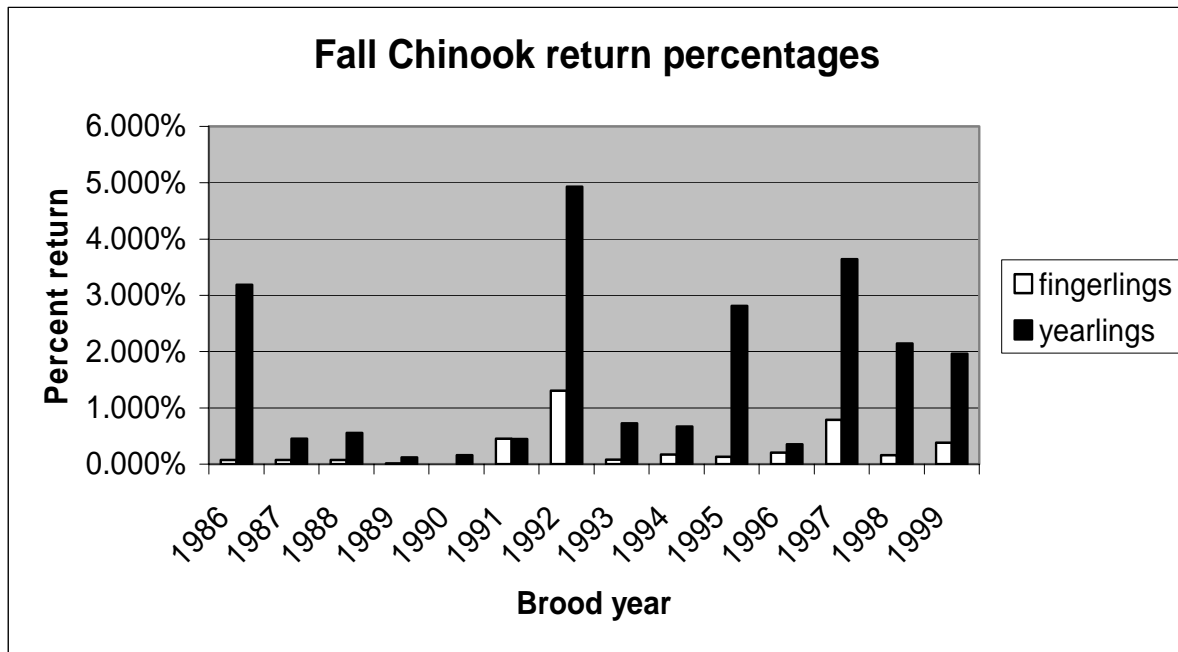
Brood year	Fingerling releases			Yearling releases		
	Number released	Number of returns	Percent return	Number released	Number of returns	Percent return
1986	197,113	103	0.052%	101,030	1,960	1.940%
1987	185,718	208	0.112%			
1988	181,698	84	0.046%	98,820	112	0.113%
1989	186,413	7	0.004%	102,555	176	0.172%
1990	196,908	479	0.243%	94,639	82	0.087%
1991	198,277	297	0.150%	110,797	68	0.061%
1992	215,038	2,766	1.286%	109,856	1,272	1.158%
1993	222,056	1,125	0.507%	111,525	958	0.859%
1994	113,236	202	0.178%	113,491	513	0.452%
1995	196,211	450	0.229%	101,934	1,581	1.551%
1996	222,950	743	0.333%	112,464	312	0.277%
1997	209,155	1,834	0.877%	147,507	4,471	3.031%
1998	176,968	845	0.477%	137,602	2,186	1.589%
1999	148,380	3,372	2.273%	129,919	4,288	3.301%
		Average:	0.483%		Average:	1.122%



a/ Based on estimated returns upstream of Junction City Weir. No estimate was produced in 1995, therefore returns of age 2 through 5 chinook from that brood year are hatchery returns only. Does not include ocean harvest or in-river harvest below Junction City Weir.

Appendix 2. Percent return of Trinity River Hatchery produced, coded-wire tagged, fall-run Chinook salmon, brood years 1986-1999. a/

Brood year	Fingerling releases			Yearling releases		
	Number released	Number of returns	Percent return	Number released	Number of returns	Percent return
1986	393,955	292	0.074%	153,700	4,899	3.187%
1987	172,980	129	0.075%	92,300	418	0.453%
1988	194,197	138	0.071%	143,934	796	0.553%
1989	201,622	21	0.010%	143,978	174	0.121%
1990				103,040	166	0.161%
1991	206,416	937	0.454%	115,300	517	0.448%
1992	192,032	2,503	1.303%	108,894	5,369	4.930%
1993	201,032	158	0.079%	110,336	798	0.723%
1994	216,563	374	0.173%	113,124	756	0.668%
1995	216,051	285	0.132%	110,327	3,106	2.815%
1996	217,981	445	0.204%	112,746	394	0.349%
1997	216,772	1,707	0.787%	313,080	11,396	3.640%
1998	184,781	292	0.158%	334,726	7,173	2.143%
1999	181,301	693	0.382%	296,892	5,833	1.965%
		Average:	0.300%		Average:	1.583%



a/ Based on estimated returns upstream of Willow Creek Weir. Does not include ocean harvest or in-river harvest below Willow Creek Weir.

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2004-2005 SEASON

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

by

Wade Sinnen

ABSTRACT

Project personnel marked 520,847 coho salmon (*Oncorhynchus kisutch*) from the 2003 brood year with a right maxillary (RM) clip prior to their release from Trinity River Hatchery (TRH) in March of 2005. These fish are expected to return as two and three-year-old fish during the 2005-06 and 2006-07 seasons respectively.

An estimated 38,882 coho returned to the Trinity River, upstream of the Willow Creek Weir (WCW), during the 2004-05 season. We estimated the TRH-produced component of this run to be 29,827 (76.7%) fish. An estimated 40 adult hatchery-produced coho were harvested by sport anglers this season. Spawning escapement of TRH-produced coho was divided between 9,903 fish which entered TRH and 19,884 fish estimated to have spawned outside of the hatchery facility.

TRH-produced coho from the 2001 brood year are considered to have completed their life cycle this year. An estimated 27,500 coho from the 2001 brood year returned to the Trinity River basin, upstream of Willow Creek weir, the past two seasons. This represents 6.61% of the 416,201 marked coho yearlings released from TRH in March of 2003. Estimated TRH-produced coho returns from the 2002 brood year are complete for age two returns only. An estimated 5,665 coho have returned thus far, representing 1.10% 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 2004-05 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, 2005.

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 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 using WCW and TRH data sets. The number of grilse and adults in the coho run was determined by multiplying the proportion of each observed at WCW times the total run-size estimate. 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 applied to the age stratified coho run to produce a harvest estimate. The estimate is apportioned to either RM clipped or naturally produced coho based on tag returns. Coho escapement is determined by the following equation:

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

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:

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

where $N_{\text{Naturalescapement}}$ = The estimated number of coho salmon above Willow Creek weir estimated to have spawned in natural areas; $N_{\text{TRHescapement}}$ = 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 521,170 2003 BY coho, representing the entire production at TRH. We began marking coho in late December, 2004 and finished in early March, 2005.

We performed a quality control check to determine our clipping effectiveness for coho in each raceway on March 4-5, 2005. We measured and examined approximately 2% of the coho in each raceway. The percentage of coho with proper clips ranged from 99.8% to 100% and averaged 99.96% for the 11,167 fish examined. We also recorded 96 post clip mortalities. Therefore, we estimate that 520,847 coho were effectively clipped and released (Table 1). These fish ranged in size from 75 to 265 mm, fork length (FL), with a range of mean lengths from 151 to 159 mm, FL. All BY 2003 coho were volitionally released from TRH March 15-18, 2005.

Table 1. Clipping totals and quality control data for 2003 brood year coho salmon reared at

Trinity River Hatchery and released March 14-18, 2005.

Pond number	Number counted/ clipped	Post-Clipping mortalities	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
F1&2	67,740	49	1,390	1	0.07%	67,642	49	67,691	85-230mm	150.6
F3&4	55,569	9	1,291	0	0.00%	55,560	0	55,560	88-247mm	151.7
G1&2	68,606	14	1599	2	0.13%	68,506	86	68,592	82-265mm	152.4
G3&4	66,226	1	1,341	0	0.00%	66,225	0	66,225	75-233mm	148.4
H1&2	61,919	5	1,333	2	0.15%	61,821	93	61,914	100-254mm	156.0
H3&4	69,426	12	1,417	0	0.00%	69,414	0	69,414	91-2201mm	152.7
I1&2	66,060	2	1,347	0	0.00%	66,058	0	66,058	110-240mm	155.7
I3&4	65,624	4	1,449	0	0.00%	65,620	0	65,620	119-255mm	158.6
Totals:	521,170	96	11,167	5	0.04%	520,847	227	521,074		153.3

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

Total (natural and TRH-produced) coho run-size for the 2004-05 season, above WCW, was estimated at 38,882 fish (TASK 1), of which 5,819 were grilse (age 2) and 33,063 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 97.4% (147/151) for grilse salmon and 73.1% (627/858) for adults. The overall marked coho total observed at WCW for the 2004-05 season was 76.7% (774/1,009). Therefore, we estimate that the 2004-05 coho run was composed of 9,055 naturally-produced fish and 29,827 TRH-produced fish (Table 2.).

Based on one angler tag return, we estimated that 40 adult RM clipped coho were harvested by anglers upstream of Willow Creek weir this year. The sport take of coho, a state and federally listed threatened species on the Trinity River, 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 2004-05 return year.

Strata	BY a/	Age b/	Run-size	Angler harvest	Spawning escapement	
					TRH c/	Natural
Naturally	02	2	154	0	9	145
Produced	01	3	8,901	0	1,071	7,830
		Totals:	9,055	0	1,080	7,975
TRH	02	2	5,665	0	1,068	4,597
Produced	01	3	24,162	40	8,835	15,287
		Totals:	29,827		9,903	19,884
	Grand totals:		38,882	40	10,983	27,859

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 2001, TRH-produced coho was 6.61% (Table 3). Coho from the 2001 BY have reached three years of age and are considered to have completed their life cycle. The estimated return of two- year-old 2002 BY coho was 0.80%. These fish will return during the 2005-06 season as three-year-olds.

Spawning escapement of 2001 BY, TRH-produced coho consisted of 10,284 (37.5%) fish that entered TRH and 17,176 (62.5%) fish estimated to have spawned in natural areas (Table 3).

Estimated escapement of TRH-produced, two-year-old coho from the 2002 brood year was 1,068 (18.9%) hatchery spawners and 4,597 (81.1%) 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 2003 through 2004.

Release Data						Estimated Returns					
Clip a/	Brood Year	Date	Number b/	Site	Age c/	Run-size	% of release	River harvest	Spawning Escapement		
									TRH d/	Natural	Total
RM	01	3/17-19/03	416,201	TRH	2	3,338	0.80	0	1,449	1,889	3,338
					3	24,162	5.81	40	8,835	15,287	24,122
					Totals:	27,500	6.61	40	10,284	17,176	27,460
RM	02	3/15 -18/04	516,906	TRH	2	5,665	1.10	0	1,068	4,597	5,665

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 generally only moderately rigorous, statistically speaking, due to low numbers of coho marked at WCW. This season however we trapped over 1,000 coho. The total coho run-size estimate of 38,882 fish, produced under task 1 of this report, had confidence intervals (1-p=0.95) within 13%, which is substantially better than previous year estimates which had confidence intervals ranging from 20 to 35%. Another source of potential bias, not trapping through the entire run, did not appear to be substantial this season. Trapping CPUE (Task 1, Table 4, Figure 10) at WCW indicated that the majority of coho had passed the weir prior to its removal in late November. Since our efforts represent the majority of work to quantify the hatchery vs. wild runs and survival and contribution rates of returning coho, we feel it is important to present the available information. 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.

The percent return of 2001 BY coho, estimated at 6.61%, is the highest return rate over the last eight years (Appendix 1). Return rates have ranged from a low of 1.30% for BY 1996 coho to 6.61% for BY 2001 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 2,319 coho in the mainstem Trinity River. Of these, 1,069 (46.1%) were RM clipped.

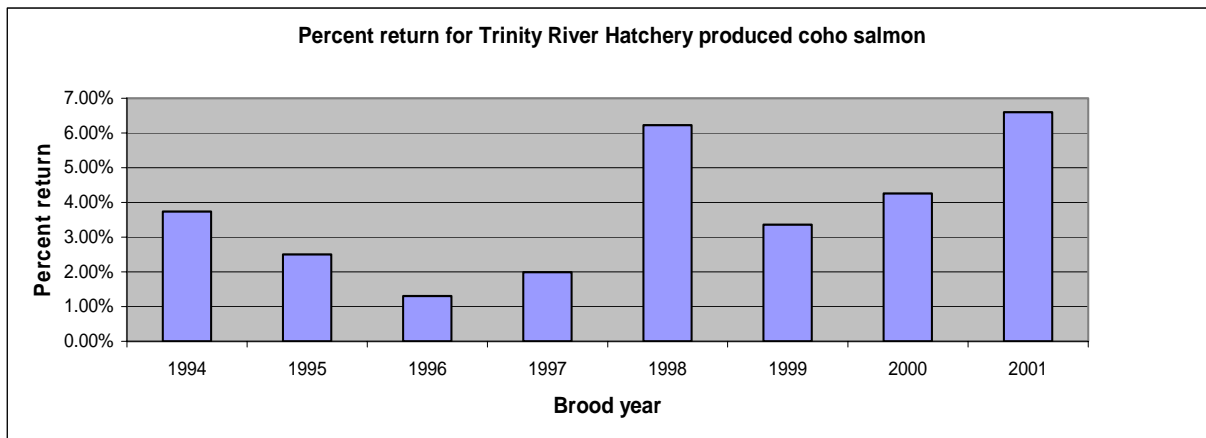
Despite potential run estimate biases, coho trends, based on trapping data at Willow Creek weir, indicate that coho runs returning to the upper Trinity basin are heavily supported by TRH production. The past eight seasons of trapping data (years in which all TRH-produced coho have been 100% marked) have consistently shown that the marked percentage of coho observed at the weir has been substantial, 77 to 94% of the total observed (appendix 2). This season we estimated that approximately 76.7% of the run was composed of TRH-produced coho, the lowest TRH contribution rate observed to date.

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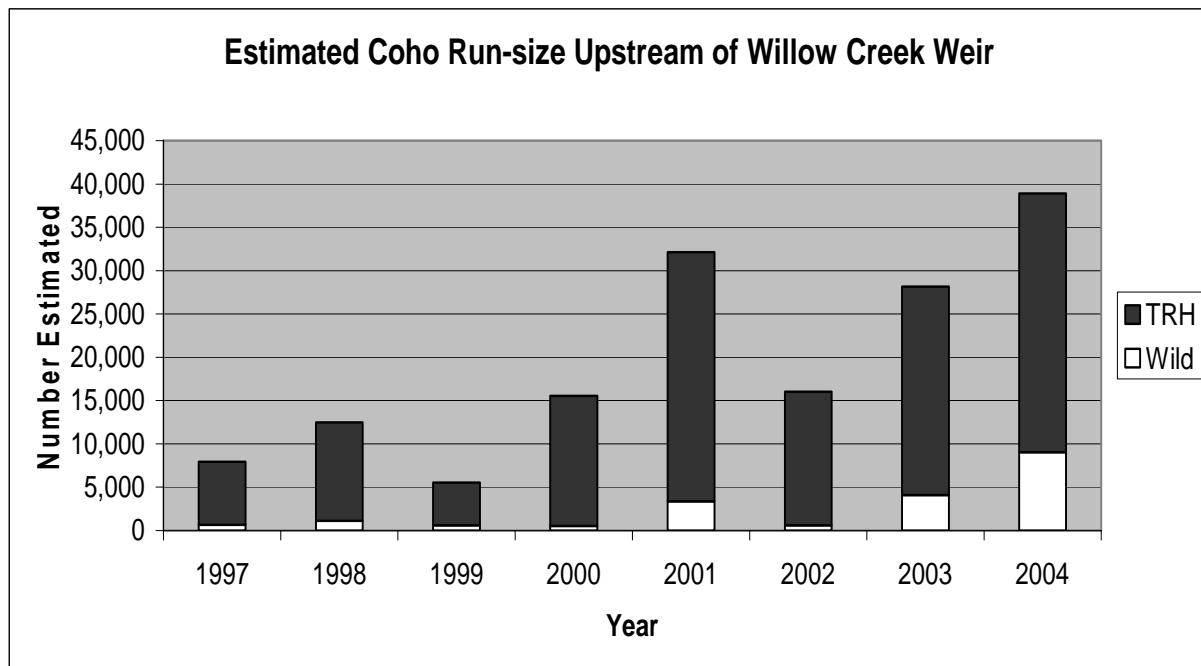
Appendix 1. Run-size, harvest and spawner escapement estimates for right maxillary clipped, Trinity River Hatchery-produced coho salmon returning to the Trinity River, upstream of Willow Creek weir, brood years 1994-2001.

Release data				Return data						
Brood year	Date	Effective Number	Site	Age	Run-size	% of release	In-river harvest	Spawner Escapement		
								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
2001	3/17-19/03	416,201	TRH	2	3,338	0.80%	0	1,449	1,889	3,338
			TRH	3	24,162	5.80%	40	8,835	15,287	24,122
			Totals:		27,500	6.60%	40	10,284	17,176	27,460



Appendix 2. Naturally and Trinity River Hatchery-produced coho salmon run-size, in-river angler harvest and spawner escapement estimates for the Trinity River upstream of Willow Creek Weir for 1997-2004.

Year	Strata	Run-size Estimate			Spawner Escapement						Angler harvest		
		Grilse	Adults	Total	Natural			Trinity River Hatchery			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
2004	Natural	154	8,901	9,055	145	7,830	7,975	9	1,071	1,080	0	0	0
	TRH	5,665	24,162	29,827	4,597	15,287	19,884	1,068	8,835	9,903	0	40	40



ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2004-05 SEASON

TASK 4
SALMON SPAWNER SURVEYS IN THE UPPER TRINITY RIVER

by Morgan Knechtle and Monty Currier

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 7th, 2004 through January 20th, 2005. The survey focused on the mainstem Trinity River from the upper most available anadromous spawning area at Lewiston Dam (river section #1) and continued downstream to the Cedar Flat recreation area (river section #10), a total of 101.6 kms. The survey did not include any tributaries that may have been used for spawning. During the survey 4,825 Chinook (*Oncorhynchus tshawytscha*) and 2,029 coho salmon (*O. kisutch*) carcasses were observed. Carcass numbers and density were the most numerous in the uppermost reach. Carcass numbers and density generally decreased from Lewiston Dam to Cedar Flat.

Spring and fall Chinook salmon carcasses were recovered during the spawning season. Recovery of spring Chinook carcasses out numbered fall Chinook carcasses until Julian week 43 (October 22nd). After this time, fall Chinook became the dominate run recovered during the survey. Coho salmon were recovered starting on October 18th (Julian week 42) and peaked during Julian week 48 (November 26th - December 2nd).

Fork length averaged 74.7 cm (range: 33-105 cm) and 72.1 cm (range: 31-108 cm) for spring and fall Chinook respectively. Adult Chinook made up 89.9% of the spring and 89.8 % of the fall Chinook observed. Coho salmon fork lengths averaged 68.2 cm (range: 35-91 cm). Coho adults represented 96.4 % of all coho recovered during the survey.

Adult male to female ratios of recovered spring Chinook, fall Chinook and coho salmon were 0.47: 1; 0.62: 1; and 0.80:1 respectively.

Estimated female pre-spawn mortality of spring and fall Chinook was 8.5% and 5.1%, respectively. Coho female pre-spawn mortality was estimated at 15.4%.

Based on the recovery of adipose-fin-clipped Chinook, an estimated 32.5% of the spring-run and 49.6 % of the fall-run carcasses observed in the mainstem survey were of hatchery origin. Based on the recovery of right-maxillary clipped coho, an estimated 46.1 % of the observed carcasses 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 (USFWS) 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. USFS 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 the 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 111.9 (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 in the upper mainstem Trinity River. Additionally, our surveys aid in the understanding of hatchery effects within the basin.

METHODS

The study area included the mainstem Trinity River from its upstream limit of anadromy at Lewiston Dam downstream to the Cedar Flat Recreational Area. The study area was divided into 10 sections (Table 1, Figure 1). Sections were surveyed between September 7, 2004 and January 20, 2005. A team of DFG and YT crews attempted to survey sections 1-5 weekly by starting at section one and working downstream through section five. USFWS crews attempted to survey sections 6 and 7 weekly and sections 8-10 biweekly. However, logistical constraints

caused some sections to be excluded on occasion (Table 2). Sections 1-3 were surveyed through Julian week 3 (Jan 20th 2005), section 4 was surveyed through Julian week 51 (Dec 23rd), and sections 5-10 were surveyed through Julian week 48 (Dec 2nd).

Table 1. River section number, section length (km) and section description used in the 2004 mainstem Trinity River carcass and redd survey.

Section	Length(km)	Description
1	3.2	Lewiston Dam (RKM 180.1)-Old Lewiston Bridge(RKM 176.9)
2	7.9	Old Lewiston Bridge(RKM 176.9)-Browns Mtn. Bridge(RKM 169.0)
3	10.2	Browns Mtn. Bridge(RKM 169.0)-Steel Bridge(RKM158.8)
4	10.4	Steel Bridge(RKM158.8)-Douglas City Camp(RKM 148.4)
5	15.7	Douglas City Camp(RKM 148.4)-Sky Ranch Road(RKM 132.7)
6	7.2	Sky Ranch Road(RKM 132.7)-Junction City Campground(RKM 125.5)
7	8.8	Junction City Campground(RKM 125.5)-mouth of the North Fork Trinity(RKM 116.7)
8	9.7	mouth of the North Fork Trinity(RKM 116.7)-Big Flat Boat Launch(RKM 107.0)
9	14.8	Big Flat Boat Launch(RKM 107.0)-Del Loma
10	13.7	Del Loma-Cedar Flat Recreation Area(RKM92.2)

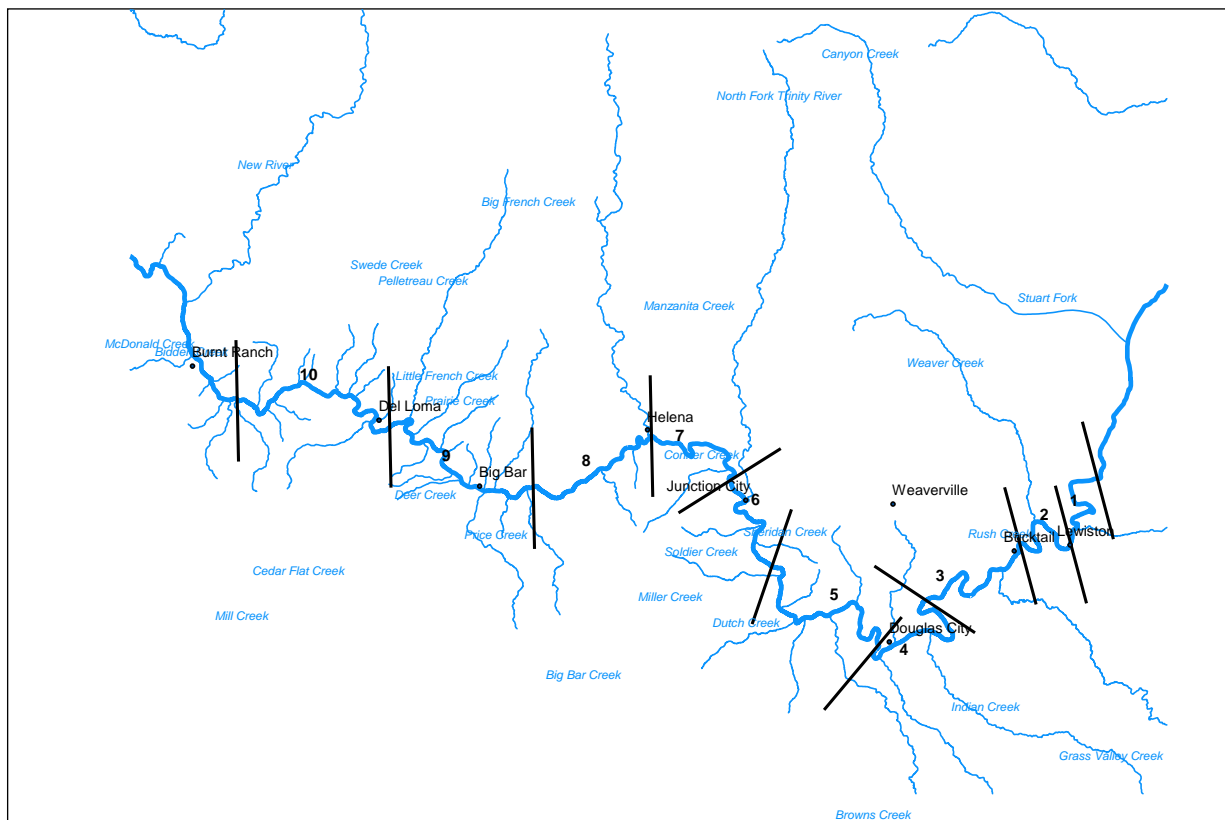


Figure1. Survey sections for 2004 Trinity River main stem spawner survey.

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 along the shoreline. 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 annual variation in spring and fall run timing, a date separating the two races is 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 race specific and are currently implanted in approximately 25% of all TRH Chinook as juveniles. 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 time they were captured and tagged at the weirs. The week separating spring and fall Chinook in the carcass survey was established when the percent of fall Chinook recovered (based on CWT and run timing at the weirs) was greater than spring Chinook.

Carcasses encountered in the survey were given a condition rating in order to describe their stage or degree of decomposition. During the survey, carcasses were separated into one of three categories: condition 1, was a carcass with one clear eye; condition 2, was a carcass with both eyes cloudy; and condition 3, was skeletal remains.

Carcasses that were recovered during the survey were identified to species, gender, and examined for hatchery clips and program tags (spaghetti tags). Carcasses were measured to the nearest cm fork length (FL). Hatchery clips included adipose-fin clips (Ad) on Chinook and steelhead and right maxillary clips (RM) on coho salmon. Additionally, all Ad-clipped Chinook salmon are implanted with a CWT. At TRH roughly 25% of all juvenile Chinook and roughly 100% of coho and steelhead are clipped prior to release. Heads of all recovered Ad-clipped Chinook were removed and retained for later CWT tag recovery. The CWT's are extracted and decoded by DFG's Trinity River Project staff. All project (spaghetti) tags, applied at the two main stem weirs, encountered were removed and recorded.

Spawning condition of all condition-1 and condition-2 female salmon was determined by field staff via direct observation of the ovaries. Fish were classified as either spawned or un-spawned based on their egg retention. Females retaining the majority of their eggs were classified as un-spawned, conversely females retaining very few eggs were determined to have spawned. Due to the difficulty in accurately determining if a male has successfully spawned, male spawning condition was not assessed. All carcasses encountered during the survey were cut in half with a machete to prevent processing the same fish twice.

RESULTS

Spring / Fall Chinook separation

Overlap of spring and fall Chinook occurred primarily during Julian weeks 42 – 44 (Oct 15th – Nov 4th). Spring Chinook carcass recoveries were predominant through Julian week 42 (Oct.15 - Oct 21), after which, fall Chinook recoveries were most numerous. For the purpose of analysis, all Chinook recoveries prior to Julian week 43 (Oct 22nd) were classified as spring Chinook and all subsequent carcass recoveries were classified as fall Chinook (Figure 2).

Carcass distribution

We recovered 4,825 Chinook carcasses during an 18 week period in our 10 survey sections (Table 2). Of the 4,825 Chinook carcasses encountered, 3,809 were recovered in sections 1- 2. Recovery of Chinook was greatest during Julian week 46 (Nov.12 - Nov.18) when crews recovered 853 carcasses.

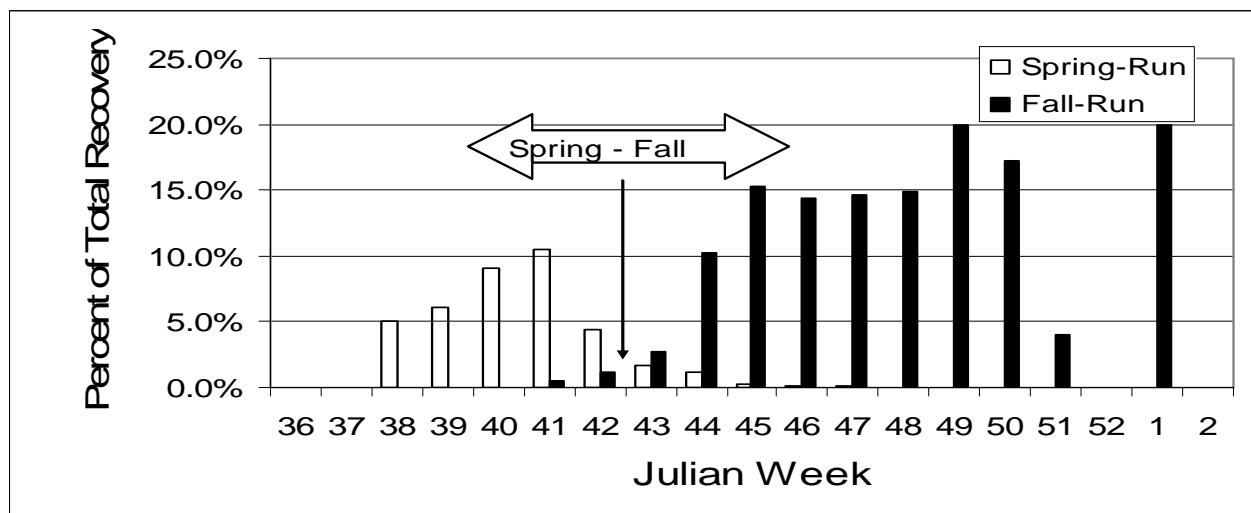


Figure 2. Weekly proportions of coded-wire tagged and Program-marked spring and fall run Chinook observed in the 2004 mainstem Trinity River spawner survey.

A total of 5,102 redds were enumerated between Julian week 36 and 50 (Sept 3rd – Dec 16th) in the upper mainstem Trinity River redd surveys (Table 3). Total section redd counts ranged from a high of 2,878 in section 1 to a low of 53 in section 8. Redd density (redd/km) also peaked in section 1 at 899.4 redds/km. Redd density dropped considerably in section 2 to 76.7 redds/km and gradually reduced downstream to below 8.0 redds/km in sections 8-10. The peak week of spring Chinook spawning occurred in Julian week 40 (Oct 1st – Oct 7th) when 503 redds were counted. Fall Chinook spawning peaked during Julian week 44 (Oct 29th – Nov 4th) when 883 redds were observed.

Table 2. Recovery of all Chinook salmon by julian week and section in the mainstem Trinity River spawner survey during the 2004-2005 season.

		Julian week of Chinook recovery																				
		36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	
		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	Dec. 31	Jan. 7	Jan. 14	Jan 21	
Section	Number of Surveys	Number of Chinook recovered a/																				Section totals:
1	18	1	NS	20	62	125	143	80	69	189	487	621	457	283	133	59	18	NS	2	1	0	2,750
2	18	1	NS	16	33	85	123	87	76	103	110	154	122	79	38	24	5	NS	2	1	0	1,059
3	16	NS	NS	17	38	44	39	34	45	39	32	28	18	20	NS	4	1	NS	1	0	0	360
4	11	NS	NS	NS	19	27	50 ^{b/}	NS	52	40	56 ^{b/}	NS	19	NS	10	NS	1	NS	NS	NS	NS	274
5	11	NS	NS	3	9	23	25	23	22	22	NS	6	4	4	NS	0	NS	NS	NS	NS	NS	141
6	11	NS	NS	0	4	4	12	17	11	14	3	7	3	2	NS	NS	NS	NS	NS	NS	NS	77
7	11	NS	NS	3	0	2	10	5	25	7	14	11	3	4	NS	NS	NS	NS	NS	NS	NS	84
8	5	NS	NS	NS	NS	0	NS	1	NS	8	NS	5	NS	4	NS	NS	NS	NS	NS	NS	NS	18
9	5	NS	NS	NS	NS	0	NS	0	NS	21	NS	15	NS	8	NS	NS	NS	NS	NS	NS	NS	44
10	5	NS	NS	NS	NS	0	NS	2	NS	5	NS	6	NS	5	NS	NS	NS	NS	NS	NS	NS	18
Weekly Totals:		2	0	59	165	310	402	249	300	448	702	853	626	409	181	87	25	0	5	2	0	4,825

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

b/ Two surveys were conducted during this Julian week.

Table 3 . Summary of weekly redd enumeration, mainstem Trinity River carcass/redd survey, 2004-05 season. a/

Section	Section Start/End	Julian week of redd enumeration															Total Redd Count	Redd Density (Redd/km)
		36	37	38	39	40	41	42	43	44	45	46	47	48	49	50		
1	Lewiston Dam- Old Lewiston Bridge	3	106	250	285	306	133	120		585	295	239	187	159	133	77	2,878	899.4
2	Old Lewiston Bridge- Browns Mt. Bridge			8	32	50	39	47	44	57	42	91	79	62	39	16	606	76.7
3	Browns Mt. Bridge Steel Bridge			21	41	29	24	39	22	46	46	74	60	35		15	452	44.3
4	Steel Bridge- Douglas City Campground				23	20	31		40	37	61		42		33		287	27.6
5	Douglas City Campground- Sky Ranch road (Jct. City)			23	52	44	43	35	33	28		42		43		19	362	23.1
6	Sky Ranch road (Jct. City) Jct. City Campground			14	12	13	26	19	38	16	7	1					146	20.3
7	Jct. City Campground- N.F. Trinity River				6	13	36	7	44	12	6	1	1				126	14.3
8	N.F. Trinity River- Big Flat					6		16		18		9		4			53	5.5
9	Big Flat- Del Loma					13		15		60		21		3			112	7.6
10	Del Loma- Cedar Flat Rec. area					9		32		24		9		6			80	5.8
Weekly totals:		3	106	66	451	503	332	330	221	883	457	487	369	312	205	127	5,102	

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

Spring Chinook

A total of 1,187 Chinook were classified as spring-run during the survey, of which 603 were classified as condition-one (Table 4). Spring Chinook carcass observations by section ranged from 431 in section one to zero in section 9. Spring Chinook carcass density was greatest in section one with 134.7 fish/km and dropped considerably to 43.7 fish/km in section two. Below section two carcass density steadily dropped by section to 2.3 fish/km in section 7 and remained less than 1.0 fish/km in sections 8-10.

Table 4. Number, density, incidence of Ad clips, project tags, and condition of spring Chinook salmon recovered during the 2004-2005 main stem Trinity River spawner survey.

Section	length (km)	Number observed a/	Density (fish/km)	C-1 b/	C-2 c/	Ad-clips d/		Project tags e/	
						Total	C-1	Total	C-1
1	3.2	431	134.7	220	201	59	32	7	3
2	7.9	345	43.7	149	189	31	13	1	0
3	10.2	172	16.9	86	83	4	1	3	2
4	10.4	96	9.2	53	37	0	0	4	2
5	15.7	83	5.3	56	24	2	1	3	2
6	7.2	37	5.1	26	9	0	0	0	0
7	8.8	20	2.3	11	9	0	0	0	0
8	9.7	1	0.1	0	0	0	0	0	0
9	14.8	0	0.0	0	0	0	0	0	0
10	13.7	2	0.1	2	0	0	0	0	0
Totals:	101.6	1,187	11.7	603	552	96	47	18	9

a/ For the purpose of analysis all Chinook recovered prior to Julian week 43 (Oct 22) were considered spring Chinook.

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

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

d/ Adipose fin clipped Chinook salmon.

e/ Spaghetti tags applied at Junction City weir.

Fall Chinook

A total of 3,638 Chinook were classified as fall-run during the survey, of which 1,355 were classified as condition-one (Table 5). Fall Chinook carcass observations by section ranged from 2,319 in section one to 16 in section 10. Fall Chinook carcass density was greatest in section one with 724.7 fish/km and dropped considerably to 90.4 fish/km in section two. Below section two carcass density dropped by section to 17.1 fish/km in section 4 and remained less than 8.0 fish/km in sections 5-10.

Table 5. Number, density, incidence of Ad clips, project tags, and condition of fall Chinook salmon recovered during the 2004-05 mainstem Trinity River spawner survey.

Section	length (km)	Number observed a/	Density (fish/km)	C-1 b/	C-2 c/	Ad-clips d/		Project tags e/	
						Total	C-1	Total	C-1
1	3.2	2,319	724.7	842	1,435	358	170	87	31
2	7.9	714	90.4	233	446	66	29	19	5
3	10.2	188	18.4	79	98	12	5	0	0
4	10.4	178	17.1	78	93	9	4	3	2
5	15.7	58	3.7	31	24	1	1	2	0
6	7.2	40	5.6	26	10	2	2	0	0
7	8.8	64	7.3	34	22	1	0	1	0
8	9.7	17	1.8	10	3	1	1	0	0
9	14.8	44	3.0	19	18	1	1	0	0
10	13.7	16	1.2	3	9	0	0	0	0
Totals:	101.6	3,638	35.8	1,355	2,158	451	213	112	38

a/ For the purpose of analysis all Chinook observed after Julian week 42 (Oct. 22) were considered fall Chinook.

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

c/ Condition-2 (C-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.

e/ Spaghetti tags applied at Willow Creek and Junction City weirs.

Coho Salmon

A total of 2,029 coho were observed during the survey, of which 934 were classified as condition-one (Table 6). Coho carcass observations by section ranged from 1,162 in section one to 6 in section 10. Coho carcass density was greatest in section one with 363.1 fish/km and dropped considerably to 70.3 fish/km in section two. Below section two carcass density steadily dropped by section to 3.3 fish/km in section 5 and remained less than 3.0 fish/km in sections 6-10.

Table 6. Number, density, incidence of RM clips, project tags, and condition of Coho salmon recovered during the 2004-05 mainstem Trinity River spawner survey.

Section	Length (km)	Number observed	Density (fish/km)	C-1 c/	C-2 d/	RM-clips a/		Project tags b/	
						Total	C-1	Total	C-1
1	3.2	1,162	363.1	505	642	644	305	37	17
2	7.9	555	70.3	245	294	240	117	11	8
3	10.2	147	14.4	77	64	82	50	4	1
4	10.4	58	5.6	34	24	38	28	5	3
5	15.7	52	3.3	30	21	29	20	6	4
6	7.2	14	1.9	10	4	9	7	1	0
7	8.8	19	2.2	14	2	11	9	2	2
8	9.7	10	1.0	10	0	8	8	0	0
9	14.8	6	0.4	4	2	3	2	0	0
10	13.7	6	0.4	5	1	5	4	0	0
Totals:	101.6	2,029	20.0	934	1,054	1,069	550	66	35

a/ Right-maxillary (RM) clipped coho salmon.

b/ Spaghetti tags applied at Willow Creek weir.

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

d/ Condition-2 (C-2) fish are those with both eyes cloudy and considered to have died more than a week prior to recovery.

Size composition

Only condition-1 and condition-2 fish that were measured were included in the size composition analysis. Condition-3 fish were assumed to have decomposed to a point that their length measurements were no longer accurate. The size separating grilse and adults for spring and fall Chinook and coho was determined using length frequency analysis of fish trapped at WCW, JCW and TRH. For additional information regarding grilse and adult fork length separation see Task 1 of this report.

Spring Chinook

Fork lengths of 1,153 spring Chinook averaged 74.7 cm. and ranged between 33-105 cm. (Figure 3). Grilse accounted for 10.1 % (117/1,153) of the measured spring Chinook. Grilse were considered fish < 57 cm. fork length.

Fall Chinook

Fork lengths obtained from 3,511 fall Chinook averaged 72.1 cm and ranged between 31-108 cm. (Figure 3). Grilse accounted for 10.2% (359/3,511) of measured fall Chinook. Grilse were considered fish < 55 cm. fork length.

Coho

Fork lengths of 2,270 coho salmon averaged 68.2 cm and ranged from 35-91 cm. (Figure 3.). Grilse accounted for 3.6% (82/2,270) of measured coho. Grilse were considered fish < 54cm. fork length.

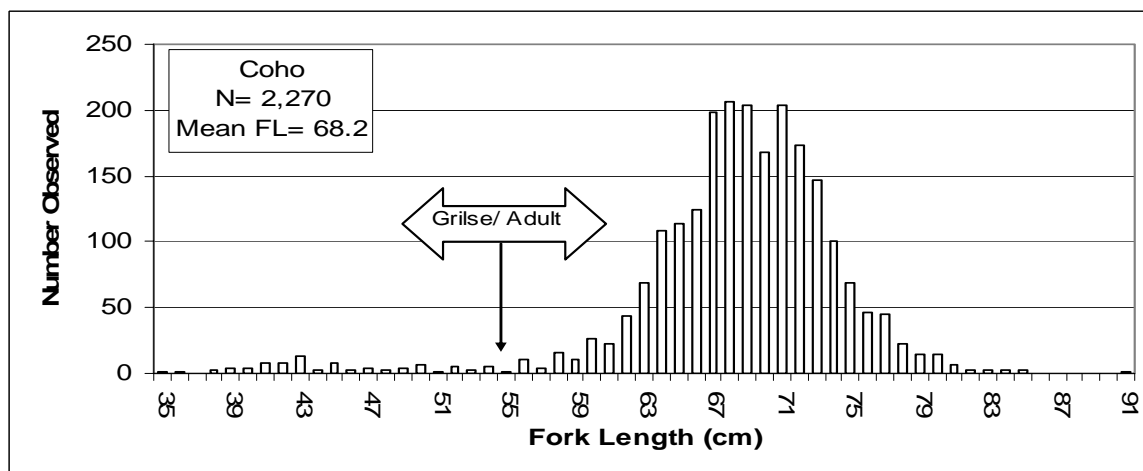
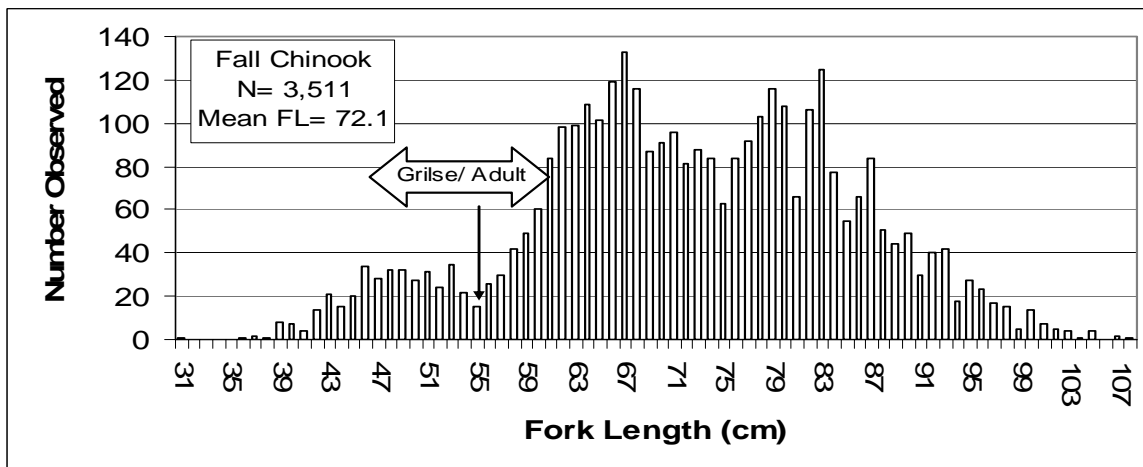
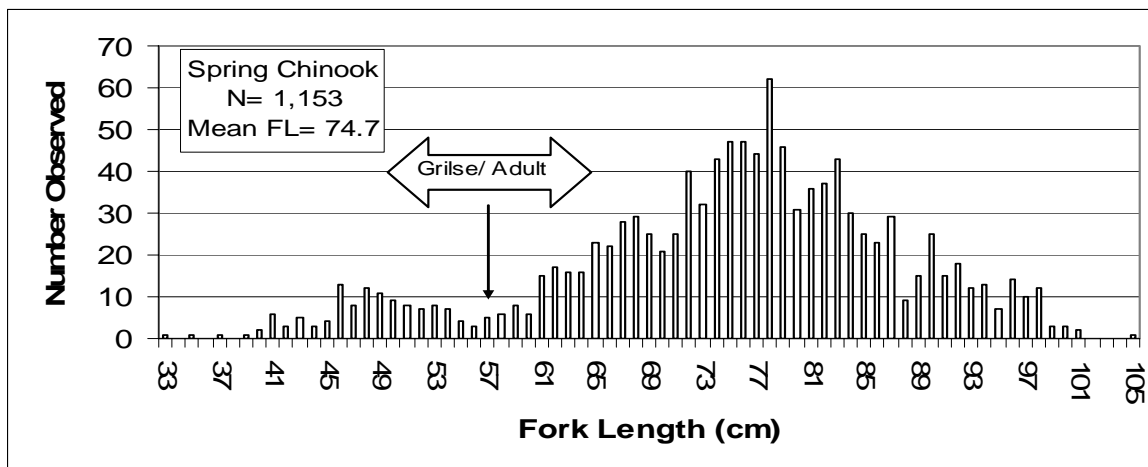


Figure 3. Length frequency histograms for Chinook and coho salmon measured during the 2004-05 mainstem Trinity River spawner survey. Grilse and adult separation was determined using fork length analysis from WCW, JCW and TRH.

Adult sex composition and female pre-spawn mortality

Spring Chinook

Of the adult spring Chinook recovered that were sexed, 335 were sexed as males and 706 as females, a male to female ratio of 0.47 : 1. All of the condition-1 and condition-2 spring Chinook were sexed. Sixty (8.5%) of the 706 condition-1 and condition-2 female spring Chinook carcasses evaluated were determined to be pre-spawn mortalities.

Fall Chinook

Of the 3,161 adult fall Chinook that were sexed, 1,204 were sexed as males and 1,957 were sexed as females, a male: female ratio of 0.62 : 1. There were four condition-1 and condition-2 fall Chinook in which gender was undetermined. One hundred (5.1%) of the 1,964 condition-1 and condition-2 adult female fall Chinook carcasses examined were determined to be pre-spawn mortalities.

Coho salmon

We measured 2,196 adult coho during the survey, of which 974 were males and 1,222 were females, a male to female ratio of 0.80 : 1. There were two of the condition-1 and condition-2 adult coho encountered for which gender was undetermined. One hundred eighty seven (15.4%) of the 1,216 condition-1 and condition-2 adult coho carcasses examined were determined to be pre-spawn mortalities.

Incidence of program marked salmon

Spring Chinook

A total of 18 project tags, applied at Junction City weir, were recovered from spring Chinook, of which, 9 were recovered from condition-1 fish (Table 4). Project tags from spring Chinook were recovered in sections 1 through 5. Although the majority of project tags were recovered in section 1, the proportion of fish bearing project tags increased between section 1 and 5. Proportionally, twice as many spring Chinook at TRH bore project tags (3.14%) than in the carcass survey (1.51%), yet ad-clipped Chinook rates for condition-1 and condition-2 fish were three times less in the carcass survey (8.3) than at TRH (23.19) (Appendices 5-6). The observed clip rates and proportions of spring Chinook bearing project tags indicates that proportionally there are roughly three times the number of wild fish contacted in the upper river carcass survey than recovered at TRH, additionally the fish recovered in the carcass survey bore project tags at a rate of 50% less than that of spring Chinook recovered at TRH.

Fall Chinook

A total of 145 project spaghetti tags were recovered from fall Chinook, of which, 49 were recovered from condition-1 fish (Table 5). Thirty-three of the tags recovered were applied at the JCW and the remaining 112 tags originated from the WCW. The majority of project tags were recovered in section 1, but relative to the total number of fish captured by section project tags were well represented through section 7. Proportionally, twice as many fall Chinook returning to TRH bore project tags applied at WCW (7.02%) than in the carcass survey (3.06%), yet ad-clipped Chinook rates in the carcass survey for condition-1 and condition-2 fish were 2 times less than observed at TRH (Appendices 5-6). The observed clip rates and proportions of fall Chinook bearing project tags indicates that proportionally there are roughly twice the number of wild fish contacted in the upper river carcass survey than recovered at TRH, additionally the fish recovered in the carcass survey bore project tags at a rate of 50% less than that of fall Chinook recovered at TRH.

Coho salmon

A total of sixty-six project spaghetti tags applied at WCW were recovered from coho, of which 35 were recovered from condition-1 fish (Table 6). The majority of project tags were recovered in section one, although the proportion of fish bearing project tags increased between section 1 and 7. Relative to the total captured in each sector more program tags were recovered in the carcass survey (2.85%) than were captured at TRH (2.5%) (Appendix 5). The observed RM clip rate in the carcass survey was 35% less than observed at TRH (Appendix 6).

Incidence of hatchery produced Chinook and coho salmon

Spring Chinook

During the spring period 47 (7.8%) of the condition-one and 96 (8.3 %) of all spring Chinook bore Ad-clips. Observed ad-clip rates in sections 1 and 2 for condition-1 and condition-2 spring Chinook were 14% and 9% respectively. For all sections downstream of section 2 observed clip rates for condition-1 and condition-2 spring Chinook were below 3% (Table 4). CWT's were recovered from 82 of the total Chinook encountered during the spring Chinook recovery period, of which two and 80 CWT's were recovered from fall and spring Chinook respectively. During the period associated with the spring run 15 ad-clipped Chinook were recovered that CWT's were not recovered from. Two yearling release groups, 065279 and 065288 comprised 41.2% of the total spring CWT recovery.

Based on expansion of all CWT codes recovered during the spring period, an estimated 340 (28.6%) of the total 1,187 fish recovered were of TRH origin (Table 7). Based on expansions of all spring CWT groups, the estimated proportioned age structure of TRH spring Chinook recovered in the carcass survey was 8.2% age 2, 37.6% age 3, 52.9% age 4, and 1.2% age 5.

Fall Chinook

During the fall period 213 (15.7%) of the condition one and 451 (12.8%) of all fall Chinook bore ad-clips. Observed ad-clip rates in section 1 and 2 for condition-1 and condition-2 fall Chinook were 15.7% and 9.7% respectively. For all sections downstream of section 2 observed clip rates for condition-1 and condition-2 fall Chinook were at or below 7.6% (Table 5). CWT's were recovered from 377 of the total Chinook encountered during the fall Chinook recovery period, of which five and 372 CWT's were recovered from spring and fall Chinook respectively. During the period associated with the fall run 74 ad-clipped Chinook were recovered that CWT's were not recovered from. Two yearling release groups, 065280 and 065289 comprised 72.9% of the total fall CWT recovery.

Based on expansion of all CWT codes recovered during the fall period, an estimated 1,539 (42.3%) of the total 3,638 fish recovered were of TRH origin (Table 7). Based on expansions of all fall CWT groups, the estimated age structure of TRH fall Chinook recovered in the mainstem Trinity River carcass survey was 9.1% age 2, 53.7% age 3, 36.4% age 4, and 0.8% age 5.

Coho

Five hundred and fifty (58.9%) condition-1 and 1,054 (52.7%) of all coho observed bore RM clips (Table 6). Unlike spring and fall Chinook, coho RM clip rates for condition-1 carcasses remained high throughout sections 1-10. Based on a 100% clip rate of TRH produced juvenile coho, an estimated 58.9% of adult 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, 2004-05 season. a/

Release data					Recovery data				
CWT code	Brood year	Age	Release type b/	Production multiplier c/	Recovery period d/		Total	% of sub-total	Expanded total
					Spring	Fall			
Spring Chinook									
065252	1999	5	Sf	6.40	1		1	1.0	6.4
065260	2000	4	Sf	4.21	1		1	1.0	4.21
065261	2000	4	Sf	4.21	4		4	4.0	16.84
065262	2000	4	Sf	4.21	2		2	2.0	8.42
065263	2000	4	Sf	4.05	1		1	1.0	4.05
065264	2000	4	Sf	4.51	2	1	3	3.0	13.53
065269	2000	4	Sf	4.05	7		7	7.0	28.35
065270	2000	4	Sf	4.51	6		6	6.0	27.06
065279	2000	4	Sy	4.05	20	1	21	21.0	85.05
065281	2001	3	Sf	4.01	5		5	5.0	20.05
065282	2001	3	Sf	4.18	3		3	3.0	12.54
065283	2001	3	Sf	4.09	4		4	4.0	16.36
065288	2001	3	Sy	4.06	17	3	20	20.0	81.2
065295	2002	2	Sf	4.1	4		4	4.0	16.4
065297	2002	2	Sf	4.1	3		3	3.0	12.3
No CWT recovered e/					15		15	15.0	
Sub-totals:					95	5	100		352.76
Fall Chinook									
065257	1999	5	Ff	10.96		1	1	0.2	10.96
065259	1999	5	Fy	2.89		2	2	0.4	5.78
065265	2000	4	Ff	4.17		2	2	0.4	8.34
065266	2000	4	Ff	4.06		2	2	0.4	8.12
065267	2000	4	Ff	4.05		3	3	0.7	12.15
065268	2000	4	Ff	4.12		2	2	0.4	8.24
065271	2000	4	Ff	4.16		2	2	0.4	8.32
065272	2000	4	Ff	4.17		1	1	0.2	4.17
065273	2000	4	Ff	4.05		3	3	0.7	12.15
065274	2000	4	Ff	4.04		3	3	0.7	12.12
065275	2000	4	Ff	4.06		6	6	1.3	24.36
065277	2000	4	Ff	4.11		2	2	0.4	8.22
065278	2000	4	Ff	4.12		2	2	0.4	8.24
065280	2000	4	Fy	4.03	2	101	103	23.0	415.09
065643	2000	4	Ff	4.49		5	5	1.1	22.45
065284	2001	3	Ff	4.08		9	9	2.0	36.72
065285	2001	3	Ff	4.33		5	5	1.1	21.65
065286	2001	3	Ff	4.05		9	9	2.0	36.45
065287	2001	3	Ff	4.11		4	4	0.9	16.44
065289	2001	3	Fy	4.02		174	174	38.8	699.48
065298	2002	2	Ff	4.1		13	13	2.9	53.3
065299	2002	2	Ff	4.02		6	6	1.3	24.12
065306	2002	2	Ff	4.15		3	3	0.7	12.45
065307	2002	2	Ff	4.13		5	5	1.1	20.65
065309	2002	2	Fy	4.03		7	7	1.6	28.21
No CWT recovered e/						74	74	16.5	
Sub-totals:					2	446	448		1,518.18
Grand totals:					97	451	548		1,870.94
Expanded grand totals:					340.08	1,538.92			

a/ Survey was conducted from Lewiston Dam downstream to Cedar Flat between September 7, 2004 through January 20, 2005

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 21. Later recoveries were considered fall Chinook.

e/ CWT was not present or was lost during recovery.

Discussion

During the 2004 season crews encountered 10,747 fewer Chinook carcasses than in 2003 (Appendix 1). This year crews encountered 1,561 more coho carcasses than during the 2003 season (Appendix 2).

Prior to 1996, CDFG conducted mark recapture carcass recovery surveys which allowed for estimation of the total numbers of spawners in each survey section. Due to additional efforts and crew constraints from 1996 to present, carcass totals are solely based on total numbers of carcasses observed. Therefore, any comparisons of data collected under the two sampling designs must proceed with caution.

Carcass distribution

As observed in past years, Chinook and coho carcass densities were highest in the upper most sections and were negatively associated with increased distance from Lewiston Dam and TRH (Appendix 1, Appendix 2). Potential factors contributing to the observed high densities in the upper sections may include, but are not limited to; straying of TRH produced fish, proximity to Lewiston Dam, availability of suitable spawning habitat, and perpetual high levels of natural spawning year after year.

Size composition

When compared to recent years, the proportion of Chinook and coho grilse observed at WCW, JCW, TRH and in the carcass survey varied greatly (Appendix 3). In the Salmon River, OR probability of recovering fall Chinook in carcass surveys increased with fish length (Zhou, 2002). Size dependent recovery of carcasses has not been evaluated in the upper Trinity River carcass survey. This factor along with potential sampling bias at the weirs needs to be considered when comparing proportions of grilse observed in each location. During 2004 WCW and JCW both experienced truncated operational windows due to high stream flows. Additionally, carcass surveys downstream of section 4 were not sampled after Julian week 48 (Dec 2nd) and carcass surveys below section 3 ceased after Julian week 51 (Dec 23rd). Carcass survey duration was adequate for Chinook recovery, although surveys ended prior to the completion of coho spawning. If grilse or adult salmon migrate or die at disproportionate rates when compared to each other, the ratios of grilse to adults observed at the weirs and in the carcass survey are not comparable. Likewise age composition of wild and hatchery salmon must be considered when comparing grilse and adult ratios observed at TRH and other sampling areas.

Adult sex composition and female pre-spawn mortality

For spring and fall Chinook and coho salmon, female adults out numbered male adults. Previous studies on the Trinity River presented in Aguilar (1996), suggest this is common for Chinook salmon. If a portion of males return as grilse every year than adult females should make up a higher percentage of adults than males.

Reported Trinity River Chinook salmon pre-spawn mortalities for years when more than 100 females were examined have ranged from 1.0 to 63% for spring Chinook and 0.7 to 43.7% for fall Chinook (Appendix 4). Pre-spawn mortality rates observed this year were 8.5 % and 5.1 % for spring and fall Chinook respectively. It has been noted, most recently by Zuspan (1998), that pre-spawn mortality may be density dependent and is positively related to run-size in the Trinity River. For years in which more than 100 female coho were examined pre-spawn mortality rates have ranged from 8.5 to 15.7%. The coho pre-spawn mortality rate observed this season was 15.2%. It is unclear how this rate is influenced by a truncated survey season, although if pre-spawn mortalities die sooner than successful spawners this rate would be overestimated.

Incidence of program marked salmon

An important component of the carcass survey is recovery of program marks from Chinook and coho salmon applied at the Willow Creek and Junction City weirs. Program marked fish recovered in the carcass survey aid in our understanding of tagging operations at the two mainstem weirs. In Task 1 of this report the assumption is made that fish tagged at the weirs are representative of both hatchery and natural spawning populations within the Trinity River. If this assumption is true then observed tag rates in the carcass survey should be similar to tag rates observed at TRH.

During the 2004 season, the percentage of tags found on both spring and fall Chinook was roughly half of what was observed at TRH. With respect to coho a slightly higher percentage of carcasses bore program tags than were observed at TRH (Appendix 5). Factors that may account for differences in percentages of program marked fish recovered this year at TRH and natural areas include: 1) Weir trapping effectiveness. If a portion of the run is not trapped as efficiently as other segment of the run, and it was composed of a higher proportion of wild or hatchery fish, the recovery percentages of marked fish may vary. This may explain the difference between tag rates observed among Chinook this year. If wild Chinook disproportionably pass through the weirs untagged, while either not installed or on a scheduled opening, the observed tag rates could be explained. Although, with a limited trapping duration at WCW at the end of the trapping season and a truncated carcass survey at the end of the season, observed tag rates of coho in the carcass survey were still higher than at TRH. If the proportion of wild fish in the coho run is lower than in the Chinook runs and wild fish are trapped at a lower rate, then the observed tag rates of coho could be explained in context to Chinook. 2) Tag loss. It is reasonable to expect that as carcasses decompose the tags would be separated from the fish and produce a lower observed tag rate. Additionally, local community members and anglers occasionally walk the banks of the river looking specifically for carcasses with \$10.00 reward tags and collect the tags for payment. Tag loss is effecting the observed tag rate among carcasses found in the survey, although the magnitude is unknown.

Incidence of hatchery produced Chinook

Another important aspect of the carcass survey is to document the magnitude and distribution of hatchery fish in the survey reaches. For all three species monitored, observed TRH clip rates were highest at the hatchery, intermediate at the weirs and lowest in the carcass survey (Appendix 6). Only condition-1 and 2 Chinook and condition-1 coho were used for this year's analysis. These proportions of clipped fish are similar to results obtained in recent years. As in recent years the majority of fish entering TRH are of hatchery origin, and fish captured at the weirs and in the carcass survey are combinations of wild and hatchery origins.

An estimate of the incidence of hatchery produced Chinook and coho found in the main stem Trinity River can be obtained by comparing the ratios of clipped salmon observed at various locations within the river. If the assumption is made that all fish that enter TRH are of hatchery origin, then by dividing observed clip rates in off site areas by observed TRH clip rates, will produce an estimate of the percentage of hatchery fish in the off-site area.

Using the above estimation method and assumption, an estimated 75.1% of spring run above the JCW was of hatchery origin, and 34.7% of spring Chinook observed in the carcass survey was of hatchery origin (Appendix 6). Based on expansion of CWT's an estimated 28.6% (340 of 1,187) of the spring Chinook recovered during the carcass survey were of hatchery origin (Table 7). If the 15 ad-clipped Chinook recovered in the carcass survey that CWT's were not recovered from were included in the CWT expansion, then 33.7% of the spring run could be explained through this method. Had CWT's been recovered from these ad-clipped fish and their expansion was 4.0 then both methods of accounting for hatchery contribution in the carcass survey would yield similar results.

Using the observed clip rate method, an estimated 93.5% of fall Chinook above WCW and 53.5% of fall Chinook observed in the carcass survey were of hatchery origin (Appendix 6). Based on expansion of CWT's an estimated 42.3% (1,539 of 3,638) of the fall Chinook recovered during the carcass survey were of hatchery origin (Table 7). If the 74 ad-clipped Chinook recovered in the carcass survey that CWT's were not recovered from were included in the CWT expansion, then 50.4% of the fall run could be explained through this method. Had CWT's been recovered from these ad-clipped fish and their expansion was 4.0 then both methods of accounting for hatchery contribution in the carcass survey would yield similar results.

Using the observed clip rate method, an estimated 85.1% of coho above WCW and 65.3% of coho observed in the carcass survey were of hatchery origin (Appendix 6). It is unknown as to the origin of the 9.8% of adults that entered TRH. It is reasonable to expect that some if not most of these unmarked fish were wild. If a large portion of the 1,080 unmarked adult coho that entered TRH were wild then the assumption that all or the majority of fish entering TRH were of hatchery origin would be violated.

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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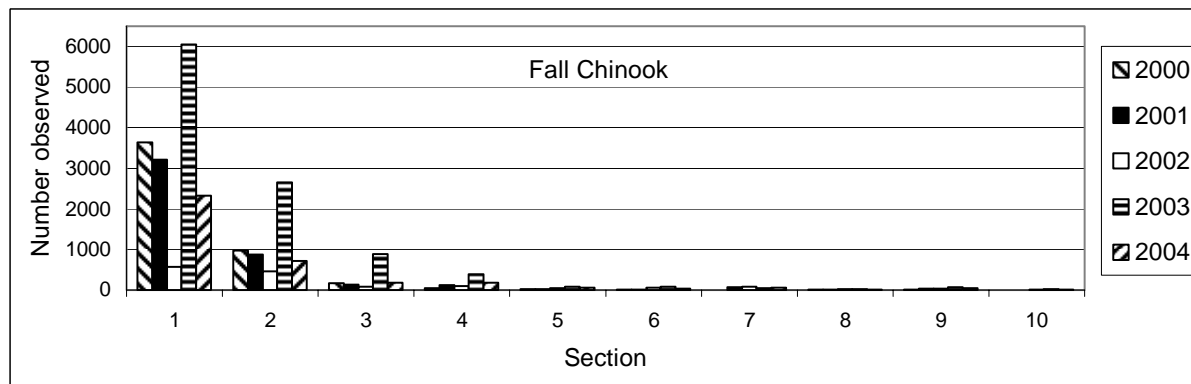
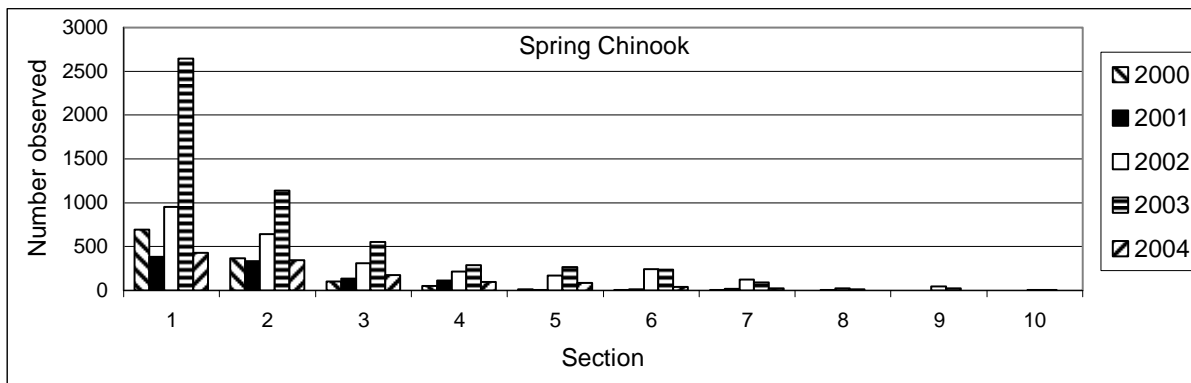
Appendix 1. Total spring and fall Chinook carcasses recovered by section in the upper mainstem Trinity River from Lewiston Dam to Cedar Flat, 2000-2004.

Spring Chinook

Year	Section										Total
	1	2	3	4	5	6	7	8	9	10	
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
2004	431	345	172	96	83	37	20	1	0	2	1,187

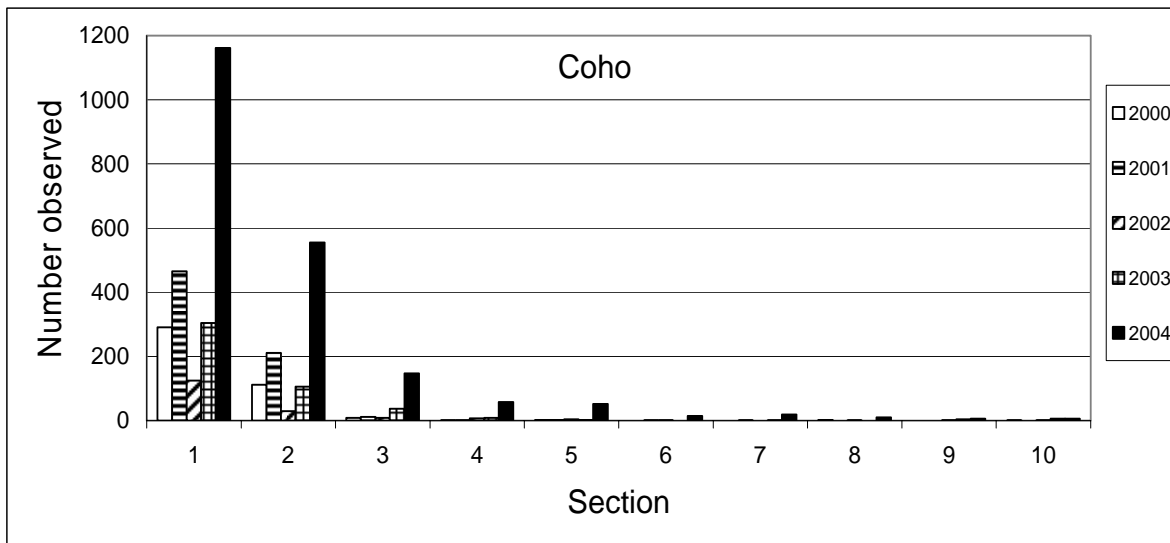
Fall Chinook

Year	Section										Total
	1	2	3	4	5	6	7	8	9	10	
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
2004	2,319	714	188	178	58	40	64	17	44	16	3,638



Appendix 2. Total coho carcasses recovered by section in the upper mainstem Trinity River from Lewiston Dam to Cedar Flat 2000-2004.

Year	Section										Total
	1	2	3	4	5	6	7	8	9	10	
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
2004	1,162	555	147	58	52	14	19	10	6	6	2,029



Appendix 3. Total grilse and adult Chinook and coho salmon observed during the upper mainstem Trinity River spawner survey and at the Junction City Weir, Willow Creek Weir and Trinity River Hatchery during 2004-2005.

Spring Chinook

	Recovery site			Total
	JC Weir	Trinity River Hatchery	Spawner survey d/	
Grilse a/	240	985	117	1,342
Adults	278	5,251	1,036	6,565
% Grilse	46.3	15.8	10.1	17.0

Fall Chinook

	Recovery site				Total
	WC Weir	JC Weir	Trinity River Hatchery	Spawner Survey d/	
Grilse b/	378	138	1,059	359	1,934
Adults	1,759	242	12,384	3,152	17,537
% Grilse	17.7	36.3	7.9	10.2	9.9

Coho

	Recovery site				Total
	WC Weir	JC Weir	Trinity River Hatchery	Spawner Survey d/	
Grilse c/	151	5	1,077	82	1,315
Adults	858	44	9,906	2,187	12,995
% Grilse	15.0	10.2	9.8	3.6	9.2

a/ Spring Chinook grilse were < 57 cm, FL; larger fish were adults.

b/ Fall Chinook grilse were < 55 cm, FL; larger fish were adults.

c/ Coho grilse were < 54 cm, FL; larger fish were adults.

d/ Only condition-1 and condition-2 carcasses were used in this analysis.

Appendix 4. Female Chinook and coho salmon pre-spawning mortality rates observed in the upper mainstem Trinity River spawner surveys from selected years from 1955 through 2004.

Study year	Literature source	Spring Chinook			Fall Chinook			Total Chinook			Coho		
		Spawned	Unspawned	% Unspawned	Spawned	Unspawned	% Unspawned	Spawned	Unspawned	% Unspawned	Spawned	Unspawned	% 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			
1972 a/	Miller (1972)							791	110	12.2			
1987 b/	Stempel (1988)			49.9			18.8						
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	16.0	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	3.0	1,940	146	7.0	2,499	163	6.1	89	13	12.7
2001	Sinnen (2004)	327	22	6.3	963	98	9.2	1,290	120	8.5	236	22	8.5
2002	Sinnen/ Currier (2004)	1,117	67	5.7	625	11	1.7	1,742	77	4.2	56	8	12.5
2003	Sinnen/ Currier (2005)	3,173	220	6.5	5,526	730	11.7	8,699	950	9.8	210	39	15.7
2004	Current Study	646	60	8.5	1,864	100	5.1	2,510	160	6.0	1,042	187	15.2

a/ Spring and fall Chinook salmon were not separated during these years.

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

Appendix 5. Total number of program tagged Chinook and coho salmon recovered in the mainstem Trinity River spawner survey and at Trinity River Hatchery during 2004-2005.

Tag Site a/	Mainstem spawner survey								
	Spring Chinook			Fall Chinook			Coho		
	Program tags	Total observed	% Program tags	Program tags	Total observed	% Program tags	Program tags	Total observed	% Program tags
JCW	18	1,194	1.51	33	3,631	0.91	----	----	----
WCW	----	----	----	112	3,631	3.08	66	2,319	2.85
Totals:	18	1194	1.51	145	3,631	3.99	66	2,319	2.85
Tag Site a/	Trinity River Hatchery								
	Program tags	Total observed	% Program tags	Program tags	Total observed	% Program tags	Program tags	Total observed	% Program tags
	Program tags	Total observed	% Program tags	Program tags	Total observed	% Program tags	Program tags	Total observed	% Program tags
JCW	196	6,236	3.14	69	13,443	0.51	----	----	----
WCW	----	----	----	944	13,443	7.02	275	10,983	2.50
Totals:	196	6,236	3.14	1,013	13,443	7.54	275	10,983	2.50

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

Appendix 6. Total marked and unmarked condition 1 and 2 Chinook and condition-1 coho salmon observed in the mainstem Trinity River spawner survey (TR) and at Junction City Weir (JCW), Willow Creek Weir (WCW) and Trinity River Hatchery (TRH) during 2004-2005.

Tag Site	Spring Chinook			Fall Chinook			Coho		
	Ad-clips	Total	% Ad-clips	Ad-clips	Total	% Ad-clips	RM-clips	Total	% RM-clips
JCW	93	518	17.95	62	380	16.32	44	49	89.80
WCW	----	----	----	480	2,137	22.46	774	1,009	76.71
TRH	1,491	6,236	23.91	3,227	13,443	24.01	9,903	10,983	90.17
TR	96	1,157	8.30	451	3,513	12.84	550	934	58.89

Appendix 7. Estimate of hatchery contributions for spring and fall Chinook salmon observed in the 2004 mainstem Trinity River Carcass survey. Estimates based on the ratio of adipose fin-clip rates observed in the carcass survey and at Trinity River Hatchery.

Survey section	Spring Chinook a/				Fall Chinook b/				Total Chinook			
	Total Chinook	Observed Ad clips	Ad clip rate	Hatchery contribution c/	Total Chinook	Observed Ad clips	Ad clip rate	Hatchery contribution d/	Total Chinook	Observed Ad clips	Ad clip rate	Hatchery contribution e/
1	422	59	0.14	0.58	2,277	357	0.16	0.65	2,699	416	0.15	0.64
2	338	31	0.09	0.38	679	66	0.10	0.40	1,017	97	0.10	0.40
3	169	4	0.02	0.10	176	12	0.07	0.28	345	16	0.05	0.19
4	90	0	0.00	0.00	171	9	0.05	0.22	261	9	0.03	0.14
5	80	2	0.03	0.10	55	1	0.02	0.08	135	3	0.02	0.09
6	36	0	0.00	0.00	36	2	0.06	0.23	72	2	0.03	0.12
7	20	0	0.00	0.00	56	1	0.02	0.07	76	1	0.01	0.05
8	0	0	0.00	0.00	13	1	0.08	0.32	13	1	0.08	0.32
9	0	0	0.00	0.00	37	1	0.03	0.11	37	1	0.03	0.11
10	2	0	0.00	0.00	12	0	0.00	0.00	14	0	0.00	0.00
Totals:	1,157	96	0.08	0.35	3,512	450	0.13	0.53	4,669	546	0.12	0.49

a/ Condition-1 and condition-2 Chinook recovered prior to October 22.

b/ Condition-1 and condition-2 Chinook recovered after October 21.

c/ Ad-clip rate divided by .2391 (Spring Chinook Ad-clip rate at TRH).

d/ Ad-clip rate divided by .2401 (Fall Chinook Ad-clip rate at TRH).

e/ Ad-clip rate divided by .2397 (Chinook Ad-clip rate at TRH)

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2004-05 SEASON

Task 5
ANGLER CREEL SURVEYS IN THE LOWER KLAMATH RIVER

By
Sara Borok

ABSTRACT

During August 6th through November 4th, 2004 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 2,350 (or 4,700 for the basin) was met this season on September 26th, 2004. A total of 4,439 (2,421 adults and 2,018 grilse) Chinook salmon and 297 (272 adults and 25 half-pounders) steelhead were harvested. We did not start counting fish toward the fall quota until August 13th. During the first week of the creel 31 (20 adult and 11 grilse) spring-run Chinook salmon were harvested. The total of fall-run Chinook harvested was 4,408 (2,401 adults and 2,007 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 an attempt made to estimate Chinook harvest by anglers throughout the Klamath River basin (Boydston, 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 (Boydston 1979, 1980; Lee 1984a, 1984b, 1985, Lau 1992-1997; Pisano 1998; Borok 1999-2003).

This report covers the period July 1, 2004 through June 30, 2005. 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 Highway 96 Bridge at Weitchepac (formerly 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 into 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 or model 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. In abundant seasons this portion may be adjusted. This year the in-river sport anglers received the 15% of the non-tribal harvest allocation or 4,700 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 2004 season these percentages worked out to 2,350 fish for the Lower Klamath River, 799 for the upper Klamath River and 775 for each section on the Trinity River (1,550 total for Trinity River).

During the 2004 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.

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 2004 season fishing at the mouth was not closed. The 15% (705 adult Chinook salmon) of the basin quota was met below the Hwy 101 bridge, but fish were being caught above the bridge and thus not counted against the mouth closure. 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 Highway 96 Bridge at Weitchepc (rm 40). The division was formerly the falls at Coon Creek (54.4 rkm, 34 rm) near the community of Johnsons (Pecwan Creek), but to make the distinction clearer for anglers it was changed this season. 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 and a 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 2004 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 access 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 and

upstream of bridge or down stream?

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 the HWY 96 bridge at Weitchepc 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 a portion of the boat anglers, we need to account for the unsampled portion. The boat expansion formula is:

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

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 this 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 scientific aid obtains the boat count every day we sample in Area 1. This count does not

include any boats used in the Indian gill-net fishery and any un-rented boats. 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 2004. Chinook salmon harvested in the creel fishery ranged in size from 32 to 110 cm in fork length (FL) and averaged 59 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.

The grilse component of the angler harvest ranged in size from 32 to 55 cm FL and averaged 46.4 cm FL. The adult Chinook salmon component of the harvest ranged in size from 56 to 110 cm FL and averaged 70.3 cm FL (Figure 1). This separation slightly larger than that was used by Trinity River Hatchery and the Willow Creek Weir. They made the separation at 55 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 32 to 76 cm FL and averaged 58.8 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 32 to 41 cm FL and averaged 37 cm FL. The adult steelhead ranged in size from 42 to 76 cm FL and averaged 61.8 cm FL. This is slightly larger than the 2003 season.

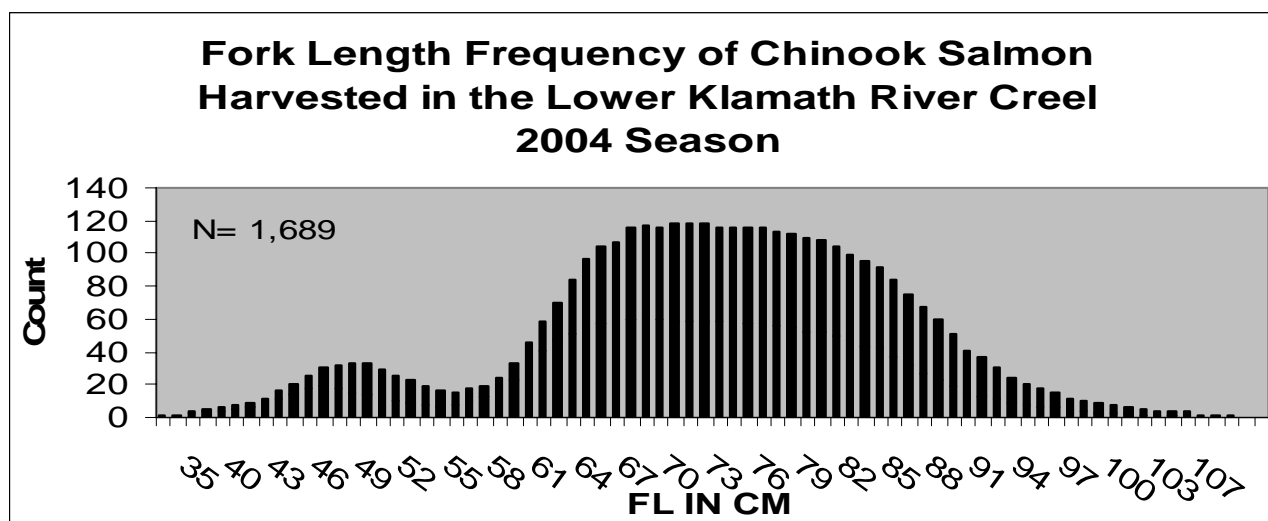


Figure 1. Fork Length Frequency of Chinook Salmon Harvested in the Lower Klamath River Creel During the 2004 Season.

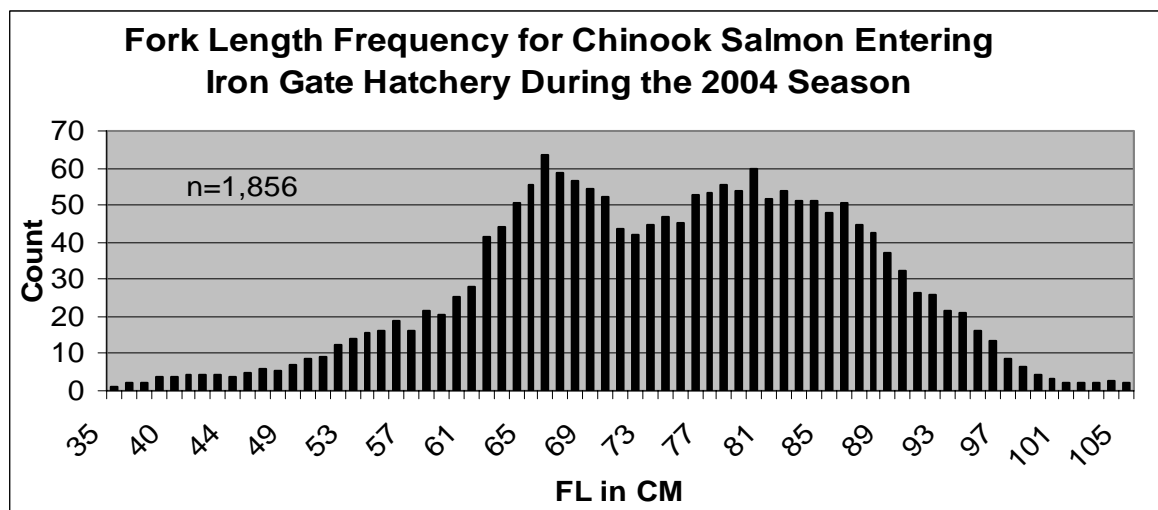


Figure 2. Fork Length Frequency of Chinook Salmon Sampled at Iron Gate Hatchery During the 2004 Season.

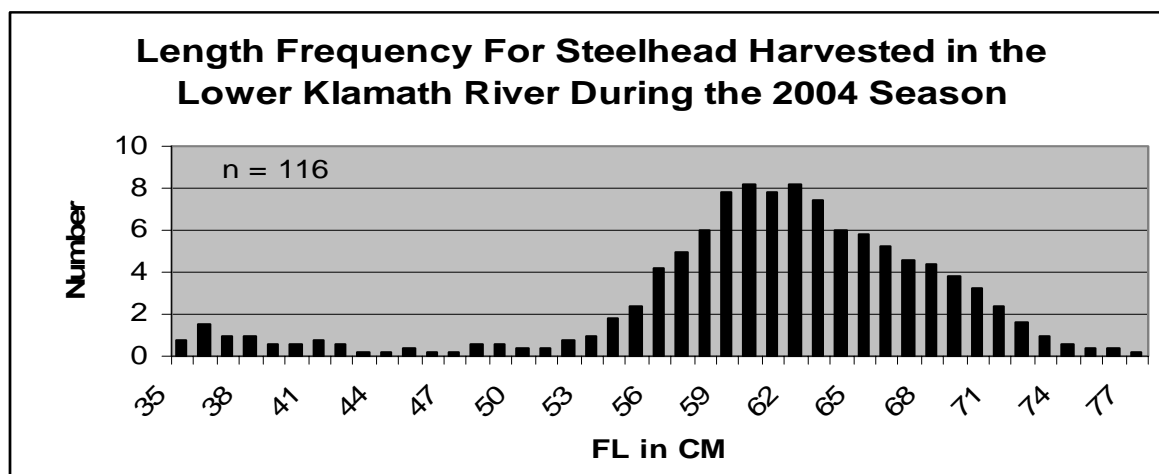


Figure 3. Length Frequency of Steelhead Caught in the Lower Klamath River Creel during the 2004 Season.

Estimated Angler Effort and Harvest

During the 2004 season, I estimate that anglers made a total of 15,180 trips in both Areas combined. Of the 15,180 trips; 6,827 were in Area 1, and 8,352 were in Area 2 (Table 1). These trips resulted in a total of 71,397 fishing hours. As in previous seasons, boat anglers outnumbered shore anglers in both Areas (Table 1). A total of 4,439 (2,421 adults and 2,018 grilse) Chinook salmon and 297 (272 adults and 25 half-pounders) steelhead were harvested. We did not start counting fish toward the quota until August 13th. During the first week of the creel 31 (20 adult and 11 grilse) spring-run Chinook salmon were harvested. The total of fall-run Chinook harvested was 4,408 (2,401 adults and 2,007 grilse) fish. Adults composed 54.4 % (2,401/4,408) of the estimated fall-run Chinook harvest. Adult steelhead trout composed 91.6 % (272/297; Table 1) of the steelhead harvest. In addition, 47 (35 adult and 12 grilse) coho salmon were harvested this season.

Table 1. Summary of Estimated Angler Effort and Harvest During the 2004 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	1,754	5,751	2	6	12	209
Boats	5,073	21,056	4	37	573	679
Total	6,827	26,807	6	43	585	888
Area 2 - Highway 101 to Coon Creek Falls						
Shore	2,007	6,671	16	29	64	60

Boats	6,345	37,920	2	200	1,369	1,473
Total	8,352	44,591	18	229	1,433	1,533
Grand Total	15,180	71,397	25	272	2,018	2,421
2003	16,514	79,228	27	162	736	4,812
2002	18,376	85,925	5	393	638	7,275

2004 Harvest and Effort Patterns

The average length of each trip (4.7 hours per trip) was up just a bit from last two seasons. It is our hypothesis that the larger quotas and brought the anglers back to the Klamath Area to fish (Table 2). The Daily bag limit was the same as in the 2003 season (one adult and two grilse),

During the 2004 season, Area 2 anglers harvested more fish than Area 1 (Table 1). Anglers (boat and shore) in Area 2 accounted for 66.1% (2,966/4,439) of the total Chinook salmon and 83.2% (247/297) of the steelhead harvested. Anglers in Area 1 harvested the remainder. Area 1 anglers accounted for 44.9% (6,827/15,180) of angler trips and only 37.5% of the angler hours (26,807/ 71,397). Of the total Chinook harvest, 4.9 % 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 Thirteen Seasons, 1992-2004

Year	Total Trips	Total Hours	Average Trip
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
2004	15,180	71,397	4.7

The harvest per hour of adult Chinook salmon slightly over the average for the last twenty five years. The harvest of grilse Chinook in the 2004 season was well over the 25 year average (Figure 4). Regulations for the harvest of grilse has remained constant for the last four years. Anglers reported more grilse present in the river this season.

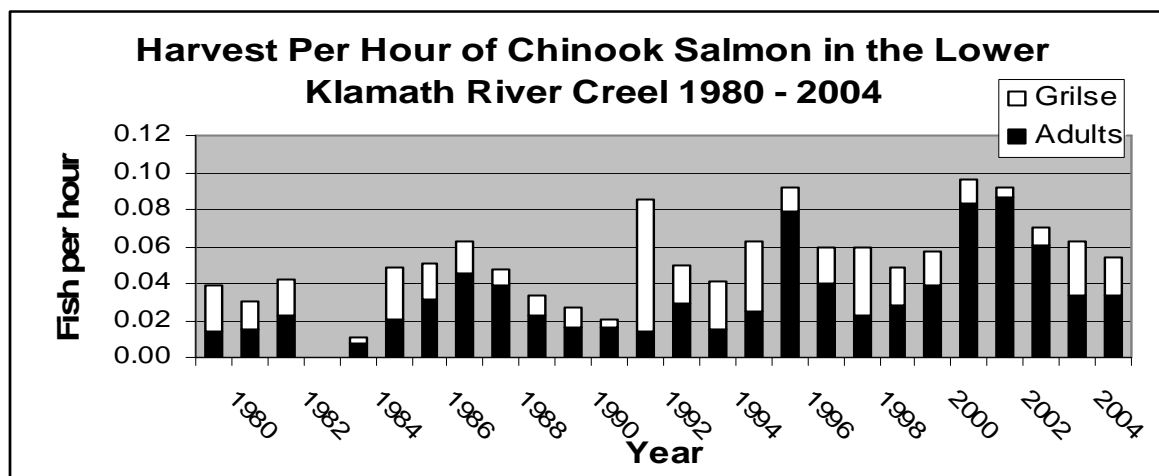


Figure 4. Harvest Per Hour of Chinook Salmon from the Sport Harvest on the Lower Klamath River Creel 1980 – 2004.

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 5,976 half-pounders, 1,526 adult steelhead, 415 grilse, and 578 adult Chinook salmon (Tables 3 and 4). In addition, 29 grilse and 135 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.

Table 3 Number of Chinook and Coho Salmon and Steelhead Caught and Released from the Lower Klamath River Creel for the Last Nine Seasons 1994-2004.

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
2004	509	688	6,223	1,577	29	135

Table 4. Summary of Estimated Catch and Releases During the 2004 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	1,754	5,751	90	21	2	7
Boats	5,073	21,056	156	29	92	103
Total	6,827	26,807	246	50	94	110
Area 2 - Highway 101 to Coon Creek Falls						
Shore	2,007	6,671	3,713	666	36	23
Boats	6,345	37,920	2,263	860	379	555
Total	8,352	44,591	5,976	1526	415	578
Grand Total	15,180	71,397	6,223	1,577	509	688
2003	16,514	79,228	3,791	1,553	303	3,970
2002	18,376	85,925	4,783	6,036	405	2,985

Run Timing

Adult fall-run Chinook salmon harvest below the Highway 96 Bridge at Weitchepet (Areas 1 and 2) peaked during Julian week 37. This was the same as the 2003 season and a week later than both the 2002 and 2001 season. For grilse Chinook the peak harvest occurred also during Julian Week 37 for both Areas (Figure 5). Grilse harvest made up 45.5% of total Chinook harvest. This is up considerably from the 13.2 % in the 2003 season

Labor Day was in Julian Week 36 this season. The peak week of adult Chinook harvested was in Julian Week 37. The peak week of adult Chinook released was in Julian Week 39 (Figure 6). The quota was met 2 days into Julian Week 39 or Sept 26, 2004. For grilse Chinook, the peak harvest occurred during Julian Week 37 and releases occurred in Julian week 38 (Figure 6).

More adult steelhead (272) were harvested than half-pounders (25). The peak of the adult steelhead harvested was Julian week 35 (Figure 7). The peak for releases for both half-pounders and adults was Julian Week 33 (Figure 8). 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 1,577 adult and 6,223 half-pounders this season (Table 5). Area 2 is where the majority of steelhead are harvested and released. Julian Week 33 was the peak week for half-pounders released (Figure 8). For adult steelhead released Julian Week 33 was the largest peak (Figure 8).

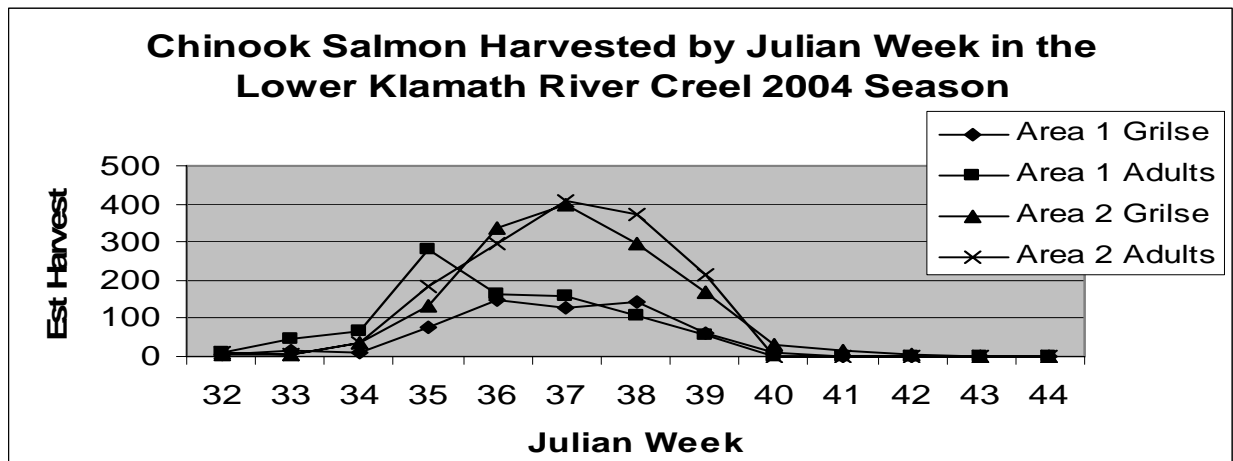


Figure 5. Chinook Salmon Harvest By Julian Week in Lower Klamath River for the 2004 Creel Season.

Table 5. Fish Harvested and Released by Julian Week During the 2004 Lower Klamath River Creel Census.

JULIAN WEEK	Trips	Hours	Harvest				Released			
			Steelhead ½ lb Adult		Chinook Grilse Adult		Steelhead ½ lb Adult		Chinook Grilse Adult	
32	575	2,269	5	27	11	20	367	117	2	9
33	965	3,401	2	14	21	53	1562	644	8	2
34	1,625	5,528	0	24	45	103	765	255	19	5
35	2,457	9,957	5	56	207	463	912	135	27	42
36	3,450	16,353	0	39	484	458	741	114	150	40
37	2,583	13,400	5	22	524	570	471	64	72	126
38	1,829	10,415	2	45	440	479	708	97	106	133
39	1,001	6,083	6	33	230	275	272	81	58	183
40	396	2,427	0	6	38	0	117	51	30	137
41	188	947	0	2	14	0	156	5	12	9
42	102	602	0	4	4	0	151	11	25	0
43	7	9	0	0	0	0	0	4	0	0
44	4	7	0	0	0	0	0	0	0	0
Total	15,180	71,397	25	272	2,018	2,421	6223	1577	509	688

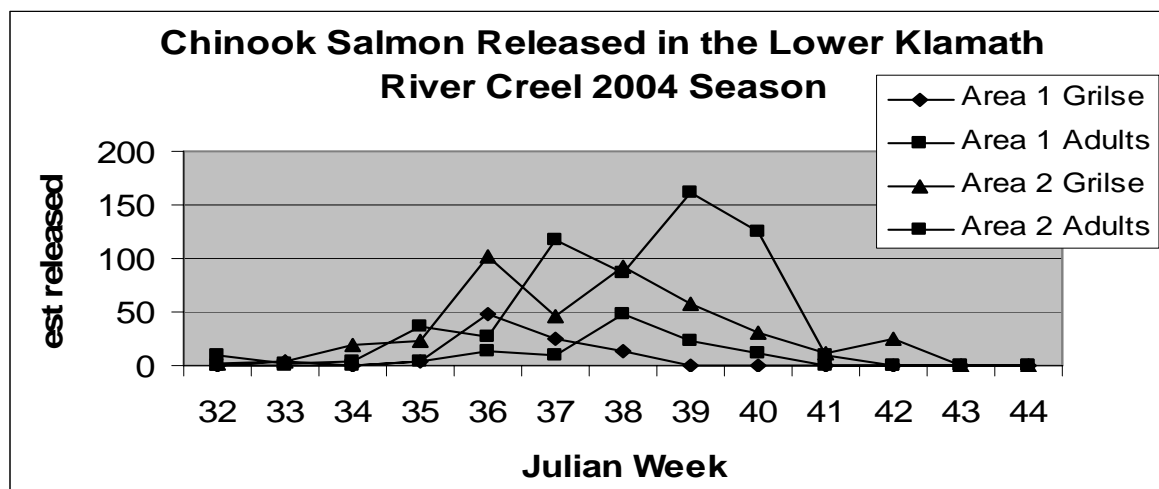


Figure 6. Chinook Salmon Released By Julian Week in the Lower Klamath River for the 2004 Creel Season.

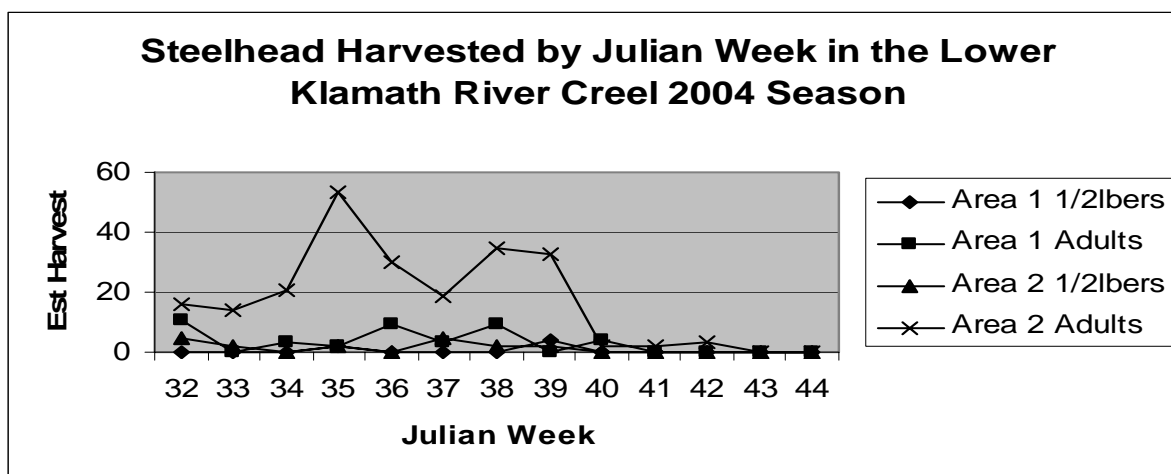


Figure 7. Steelhead Harvested During the 2004 Lower Klamath River Creel Season.

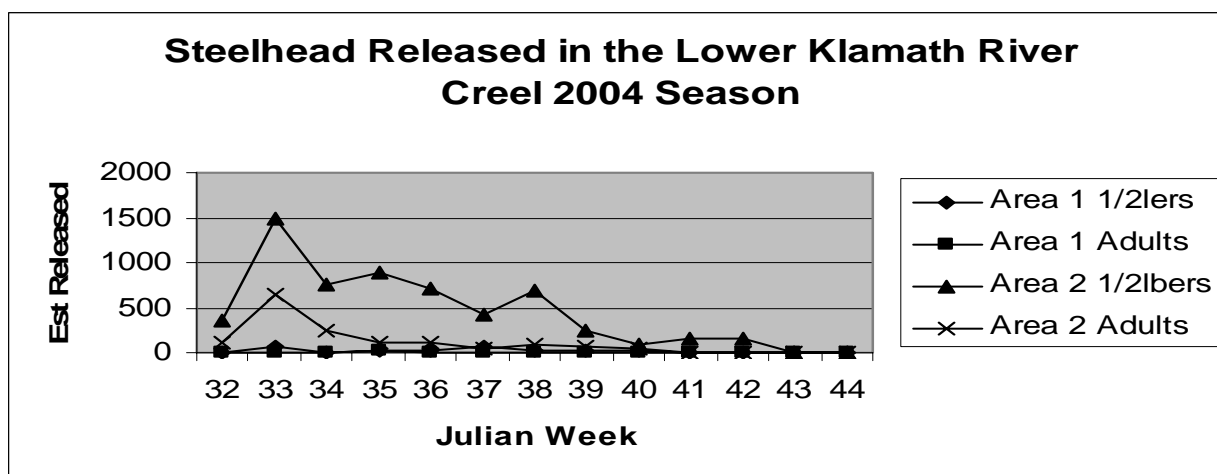


Figure 8. Steelhead Released By Julian Week During the Lower Klamath River 2004 Creel Season.

Coded-Wire Tag Recovery

Klamath River Project personnel recovered 188 heads of adipose fin-clipped (Ad+CWT) Chinook salmon during Julian Weeks 32 through 40 of the 2004 season. There were seven 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 188 tags, 117 were adult salmon while 71 were grilse salmon.

Fin-clipped fall run grilse ranged in size from 41 to 73 cm. Fin-clipped fall-run adults ranged in size from 46 to 95 cm. All fin-clipped fish observed in the angler survey were assigned an individual head tag number which allowed tracking of each head 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, thirteen heads had no tags recovered (100000), three were lost during extraction (200000), and one tag was unreadable (400000), while the 171 remaining were all decoded.

Hatchery Contribution

Randomly recovered, marked Chinook composed 9.6 % (188/1,877) of the actual Chinook harvested. With expansions made for sampling and production, I estimate 2,227 hatchery fish were harvested (Table 7). Hatchery fish represented an estimated 50.1% (2,227/4,439) of the entire sport harvest in the lower Klamath River. All 188 random recovered tags were from Klamath and Trinity Basin origin Chinook.

In addition to the random recovered tags, we had 7 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. Of these 7 NRR tags, four were from adults and 3 from grilse verified by tag code.

Klamath River Origin Chinook Salmon

We decoded 36 random recovered tags from Klamath River origin Chinook (1 five-year-old, 12 four-year-olds, 17 three-year-olds and 6 two-year-olds). These Chinook represent twelve marked groups from Iron Gate Hatchery (Table 6). When expanded by sampling and by production Iron Gate Hatchery origin fish account for 21.7% (963/4,439) of the sport harvest (Table 7).

The peak for Klamath River origin Chinook harvest was Julian Week 36. Personnel recovered Klamath River coded-wire-tagged fish between Julian week 33 and Julian week 38 (Figure 9).

Trinity River Origin Chinook Salmon

We decoded a total of 128 random recovered tags from Trinity River origin Chinook (0 five-year-olds, 7 four-year-olds, 68 three-year-olds and 53 two-year-olds). From the 128 tags, two were spring-run Trinity River Hatchery origin Chinook (0 five-year-olds, 0 four-year-olds, 1 three-year-old and 1 two-year-old, Table 6). Of the rest of these tags, 10 fall-run and 2 spring-run Trinity River Hatchery mark groups were represented. Trinity River origin fish represented

28.4% (1,264/4,439) (28.0% fall-run and 0.4% spring-run) of the sport harvest (Table 7).

Trinity River spring-run Chinook tag recovery began during Julian Week 32 and extended through Julian Week 33. Fall-run fish began to appear in tag recoveries during Julian week 34 and continued through Julian Week 40. Trinity River fall-run tags peaked during Julian week 38 (Figure 9).

During the 2004 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 36. The bulk of the Trinity River fall-run tags were collected during Julian week 38. No more coded-wire tagged Chinook were recovered after Julian week 40 (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 2004 Season.

CWT Codes	Release Data			Recovery Data			
	Strain	B Y	Site	Creel	N R R	FL- Range	Date - Range
Adult Chinook							
06-63-51	Fall	99	IGH	1	0	88	8/30
06-52-78	Fall	00	TRH	1	0	84	9/4
06-52-80	Fall	00	TRH	6	1	72 - 83	8/20-9/22
06-63-53	Fall	00	IGH	2	0	81,82	8/27-9/5
06-63-54	Fall	00	IGH	8	1	78-95	8/18-9/22
0601020306	Fall	00	IGH	1	0	--	8/20
0601020308	Fall	00	IGH	1	0	93	8/20
06-52-56	Fall	01	IGH	0	1	--	9/10
06-52-85	Fall	01	TRH	2	0	72,74	9/12
06-52-86	Fall	01	TRH	1	0	61	8/29
06-52-88	SPR	01	TRH	1	0	56	8/11
08-52-89	Fall	01	TRH	64	0	57-79	8/28-9/28
06-63-55	Fall	01	IGH	4	1	61-68	8/22-9/18
06-63-56	Fall	01	IGH	8	0	46-87	9/4-9/18
06-63-57	Fall	01	IGH	5	0	62-71	8/28-9/13
100000	no tag found			6	0	59-79	9/4-9/11
200000	Tag lost			2	0	65,88	8/28,8/31

400000	Tag un-readable			0	0		
Total				113	4		
Grilse Chinook							
06-52-97	SPR	02	TRH	1	0	48	8/15
06-52-98	Fall	02	TRH	18	0	44-73	8/25-10/6
06-52-99	Fall	02	TRH	6	1	47-55	9/5-9/25
06-53-06	Fall	02	TRH	8	0	43-52	9/6-9/26
06-53-07	Fall	02	TRH	9	2	45-51	9/5-9/28
06-53-09	Fall	02	TRH	11	0	41-51	9/8-9/26
06-63-58	Fall	02	IGH	1	0	47	9/8
06-63-60	Fall	02	IGH	2	0	42,45	9/19,9/20
0601020405	Fall	02	IGH	2	0	48,56	9/4,9/18
0601020407	Fall	02	IGH	1	0	49	9/4
100000	no tag found			7	0	48-52	9/4-9/22
200000	Tag lost			1	0	47	9/8
400000	Tag lost			1	0	53	9/12
Totals				68	3		
Grand Total				181	7		

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 2004 Creel Season. Expanded for sampling and by hatchery production multiplier.

Hatchery Run	Estimated Total By Brood Year				Total	% by Hatchery Run	% of total harvest (4,439)
	1999	2000	2001	2002			
TRH SPR			9	10	19	0.85	0.42
TRH Fall		67	648	530	1,245	55.9	28.0
IGH Fall	27	346	399	191	963	43.2	21.7
Total	27	413	1,056	731	2,227		50.1
% by year	1.2	18.5	47.4	32.8			

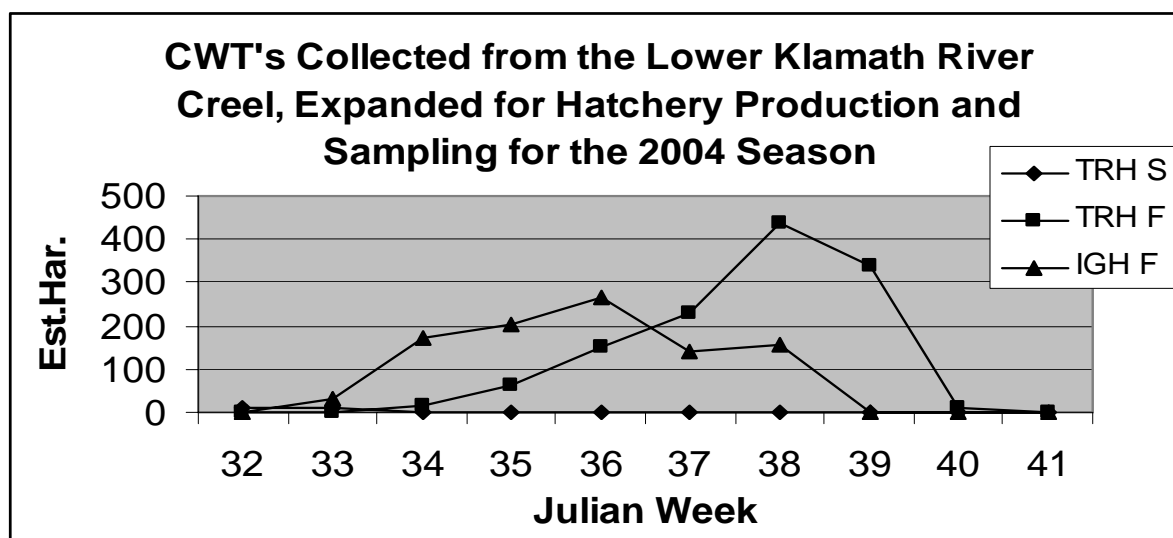


Figure 9. Timing by Julian Week of Coded Wire Tags, Expanded for Sampling and by Individual Tag Code, Recovered from Chinook Salmon in the Lower Klamath River 2004 Creel Season.

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 earlier in September. Further consideration will be given to future regulations with respect to the size of quota and mouth configuration.

Warm water temperatures and low flow conditions in Mid August had all fisheries professionals concerned about the 2004 run of salmon and steelhead. An additional 13,700 acre feet of water was released from August 22 through September 12 from Lewiston Dam to provide water 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. A smaller volume of water was released out of Iron Gate Dam. The additional water and a small storm event kept the flows above 3000 cfs at the Terwer Gauge and decreased the average daily water temperature 1.5 C or below 21 C.

CONCLUSION

The 2004 season resulted in the 12th lowest run-size for fall-run Chinook salmon in the Klamath Basin over the last 27. This season had a higher grilse to adult ratio (10.9%) than has been seen in the last four years. This bodes well for the next season.

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Appendix 1. List of Julian weeks and their calendar 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.