

ANNUAL REPORT  
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT  
2001-02 SEASON

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

by

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ABSTRACT

The California Department of Fish and Game's Trinity River Project conducted tagging and recapture operations from June 2001 through March 2002 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 3,690 chinook salmon, 324 coho salmon, 714 fall steelhead and 76 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 19,622 spring chinook salmon migrated into the Trinity River basin upstream of Junction City Weir and that 1,164 (5.9%) of these were caught by anglers, leaving 18,458 fish as potential spawners. We estimated 57,109 fall chinook salmon migrated past Willow Creek Weir and that 1,868 (3.3%) of these were caught by anglers, leaving 55,241 as potential spawners.

The coho salmon run in the Trinity River basin upstream of Willow Creek Weir was estimated to be 32,141 fish. Based on angler tag returns, no coho salmon were estimated to be harvested. The sport harvest of coho salmon has been prohibited since 1994. Thus, we assume all coho were potential spawners.

An estimated 12,638 adult fall run steelhead entered the Trinity River basin upstream of Willow Creek Weir. Anglers harvested 367 (2.9%) of the adult fall steelhead that migrated past Willow Creek Weir, leaving 12,271 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<sup>1/</sup> or Project-tagged<sup>2/</sup> 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.

This is a continuation of studies that began in 1977 with the trapping, tagging, and recapture of fall 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, and Sinnen et al., 2000).

Earlier studies were funded variously 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.

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

<sup>2/</sup> 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 certain of its tributaries, including the South Fork Trinity River and some of its tributaries (Gibbs 1956; La Faunce 1965a, 1965b, 1967; Miller 1975; Moffett and Smith 1950; Rogers 1970, 1972, 1973a, 1973b, 1982; Smith 1975; Weber 1965). Earlier efforts did not include fish which used the mainstem and tributaries of the lower Trinity River or attempt to determine the proportion of hatchery fish in the runs and the rates at which various runs contributed to the fisheries. To develop a comprehensive management plan for the Trinity River basin, all salmon stocks utilizing the basin must be considered.

## METHODS

### Trapping and Tagging

#### Trapping Locations and Periods

Trapping and tagging operations were conducted by TRP and HVT personnel from June through mid November 2001 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 8.4 km upstream from the town of Willow Creek, 48.4 km upstream from the Trinity River's confluence with the Klamath River, and 131.4 km downstream from Trinity River Hatchery (TRH) (Figure 1). The upstream site, Junction City Weir (JCW), was located 5.4 km upstream from the town of Junction City, 132.7 km upstream from the Klamath River confluence, and 47.1 km downstream from TRH (Figure 1). Prior to 1995, JCW was operated from May through November. Currently, JCW is operated from late June through September. WCW is generally operated from mid-August through November.

The WCW is used to obtain Trinity River run-size and angler harvest estimates for fall chinook, coho, and steelhead. The JCW is used to obtain run-size and angler harvest estimates of spring chinook as far downstream as is feasible during periods of high spring flows.

We operated the WCW from August 23 through November 12, 2001 and the JCW from June 13 through September 26, 2001.

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

#### Weir and Trap Design

Since 1989, we have used the Bertoni (Alaskan) weir design at both sites (Figures 2-4). The weir was supported by wooden tripods set 2.5 m apart. Weir panels consisted of 3.0-m X 1.9-

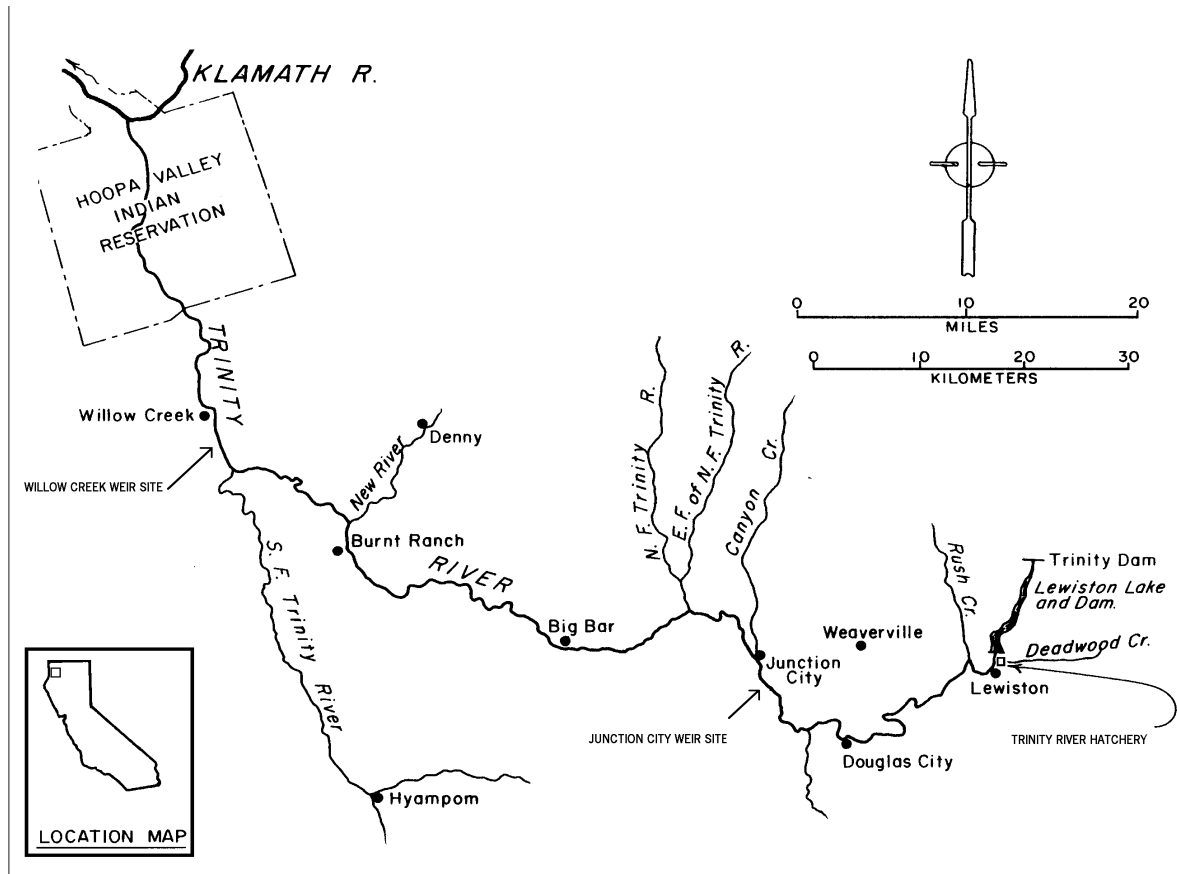


Figure 1. Location of trapping and tagging weirs for anadromous salmonids near Willow Creek and Junction City in the mainstem Trinity River during the 2001-02 season.

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.

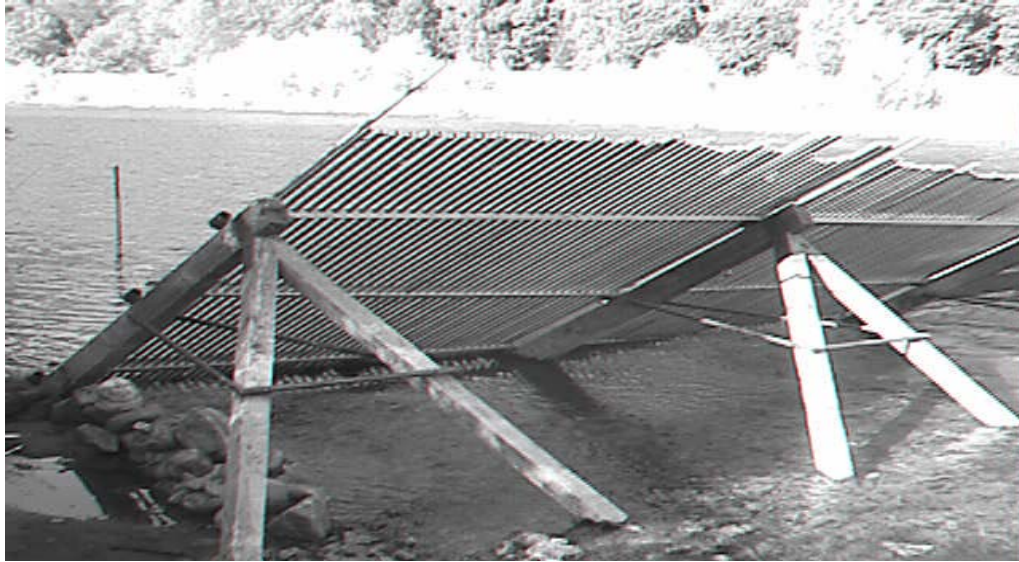


Figure 2. Photograph of Alaskan style weir tripods, support channels and conduit.

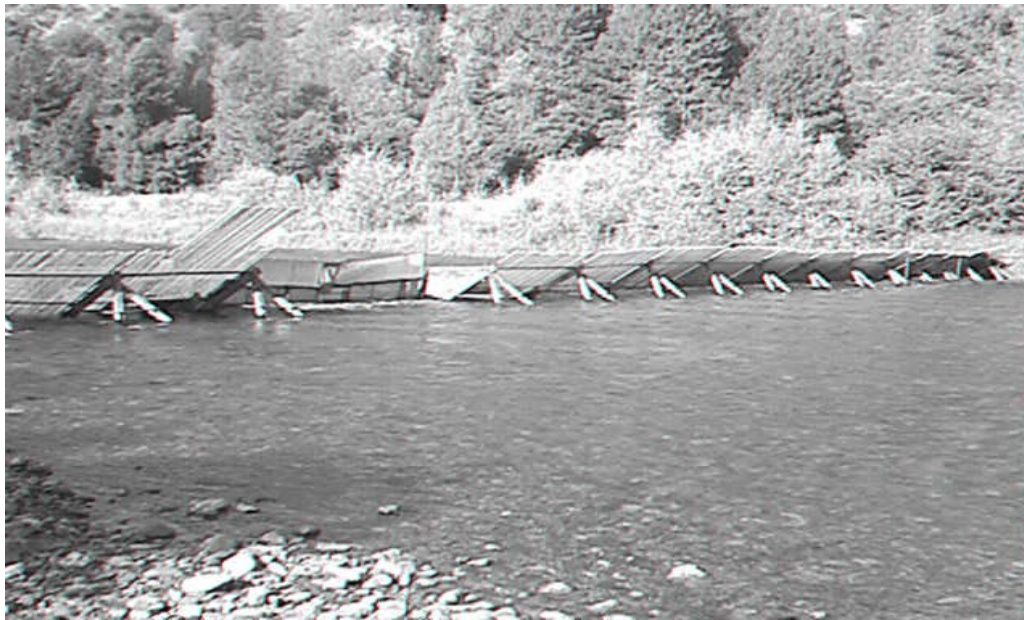


Figure 3. Photograph of upstream view of Alaskan weir. Note the panel boat gate (left center of picture).



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

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

#### Processing of Fish

At both weirs, we identified all trapped salmonids to species, measured them to the nearest cm fork length (FL), and examined them for hook, predator, and gill-net scars, fin clips, and tags. Each untagged salmonid judged in good condition and unspawned was tagged with a serially numbered FT-4<sup>3/</sup> spaghetti tag (Project-tagged). Tags were inserted using an applicator needle through the fishes back approximately 2 cm below the posterior insertion point of the dorsal fin. To determine angler harvest and catch-and-release rates upstream of the weirs, one-third of the chinook salmon received \$10-reward tags, while the remaining tags were non-reward. At WCW, half of the steelhead received reward tags, while the remaining received non-reward. Coho were

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

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, steelhead and coho were not tagged.

#### 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. Generally, the week at which the proportion of fall chinook exceeded spring chinook was designated as the first week of the fall 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 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 were given an adipose fin clip as well. 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-CWTed chinook tagged at the weir and recovered at the hatchery were classified as either spring or fall fish based on the date they entered the hatchery. If they entered the hatchery during the period associated with the spring run (based on CWT recoveries at the hatchery) they were considered spring chinook. Those chinook entering the hatchery during the period associated with the fall run (again, based on CWT recoveries) were considered fall chinook.

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

As at the weirs, there is an overlap in the migration of spring and fall chinook into TRH. To estimate the respective numbers of spring and fall chinook entering TRH, we expanded the numbers of tags recovered from each returning CWT group by the hatchery production multiplier ( $\text{Number CWT'd} + \text{Unmarked} / \text{Number CWT'd}$ ) for chinook that were originally released (same strain, brood year [BY], release site and date). For example, 42,659 fall chinook of CWT group 06-52-43 plus 434,317 unmarked fall chinook were released directly from TRH in June of 1999. The resultant production multiplier of 11.18 ( $(434,317 + 42,659) / 42,659$ ) is applied to all returning Chinook from this particular marked release group to estimate the total returns (marked and unmarked) attributed to this group. In doing so, we assumed that return rates to TRH of both CWT'ed fish and their unmarked counterparts were the same.

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 outnumbered spring chinook based on the expansion of coded-wire tags.

#### Size Discrimination Between Adult and Grilse Chinook Salmon

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

Since we did not coded-wire tag coho salmon, exact ages are unknown. We therefore relied on length frequency analysis to separate grilse and adults. The length data collected at the weirs and TRH were smoothed with a moving average of five, 1-cm increments to determine the nadir separating grilse and adults.

#### Size Discrimination Between Adult and Immature Steelhead

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

### Recovery of Tagged Fish

#### Weir Recovery

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

#### Tagging Mortalities

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

#### Angler Tag Returns

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

Tags returned to us through May 1, 2002 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 10 September 2001 through 12 March 2002. 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 salmon to the nearest cm FL, except those that were Project-tagged fish from the weirs. Project-tagged salmon and steelhead recovered at TRH were assigned the FL recorded for them at the weir where they were originally tagged.

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

### Spawner Surveys

In cooperation with the U.S. Fish and Wildlife Service and Yurok Tribe, we conducted spawner surveys in the upper Trinity River from Cedar Flat (RK 78) upstream to Lewiston Dam (RK 180). Tagged fish recovered in these surveys were examined for spawning success and project tag numbers. Fish which were unspawned and recovered within 30 days of tagging were considered tagging mortalities.

## 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<sup>4/</sup> 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. We were unable to make independent estimates of naturally and hatchery-produced steelhead. Since the 1997 BY, all TRH-produced steelhead have been adipose-fin-clipped. Thus, steelhead aged six or older returning during this season would not bare an adipose fin-clip. We will make independent estimates beginning next season.

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.

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<sup>4/</sup> 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).

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.

The assumptions for the numbers of effectively reward- and non-reward-tagged fish released were the same as those for determining the run-size estimate (See "Run-size Estimates" above).

We computed the catch-and-release rate for each species (and race of chinook) by dividing the number of angler-returned tags from caught and released fish by the number of fish effectively 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. The proportion of fall chinook tagged at the weir exceeded spring chinook for the first time during JW 37 and continued thereafter so the spring chinook run at WCW was limited to the first three weeks of trapping (Figure 5). Fall chinook average weekly catch at WCW peaked (121.2 fish/night) during JW 38 and JW 39. The fall run remained strong through JW 40 then the run began to taper off (Table 1, Figure 6).

Spring chinook were the predominant race at JCW through JW 38. The 741 chinook trapped at JCW prior to and including JW 38 were considered spring chinook (Figure 5). The remaining 18 chinook trapped during JW 39 were considered fall. At JCW, spring chinook catch peaked during JW 27 (29.0 fish/night). Catch declined thereafter but fluctuated through JW 38, the last week of the spring run (Table 2, Figure 7).

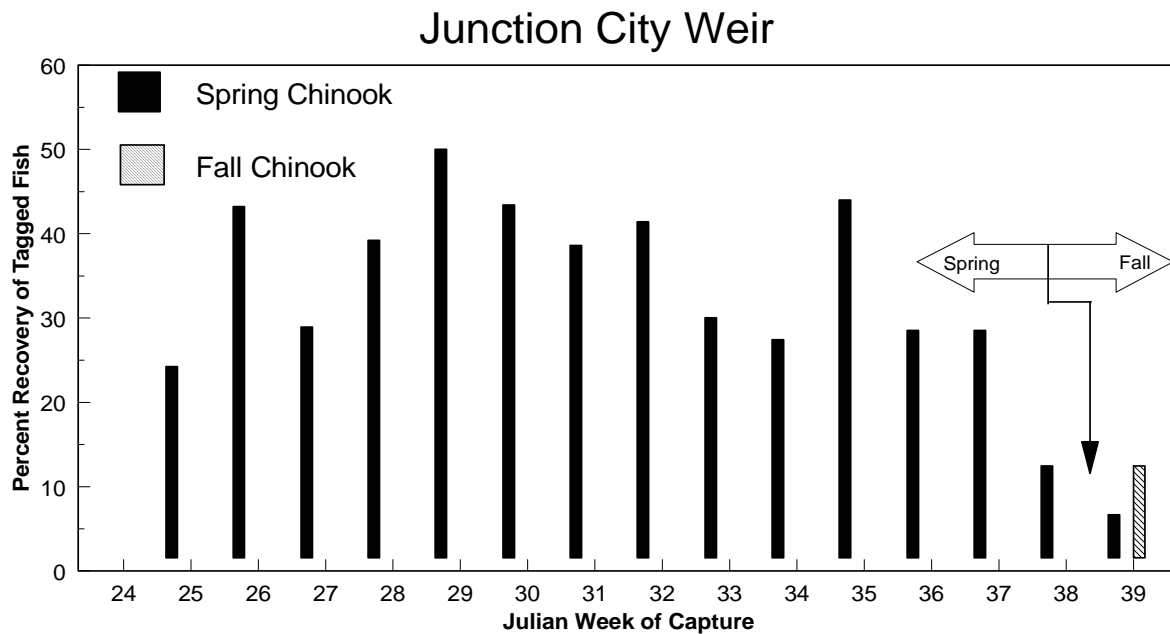
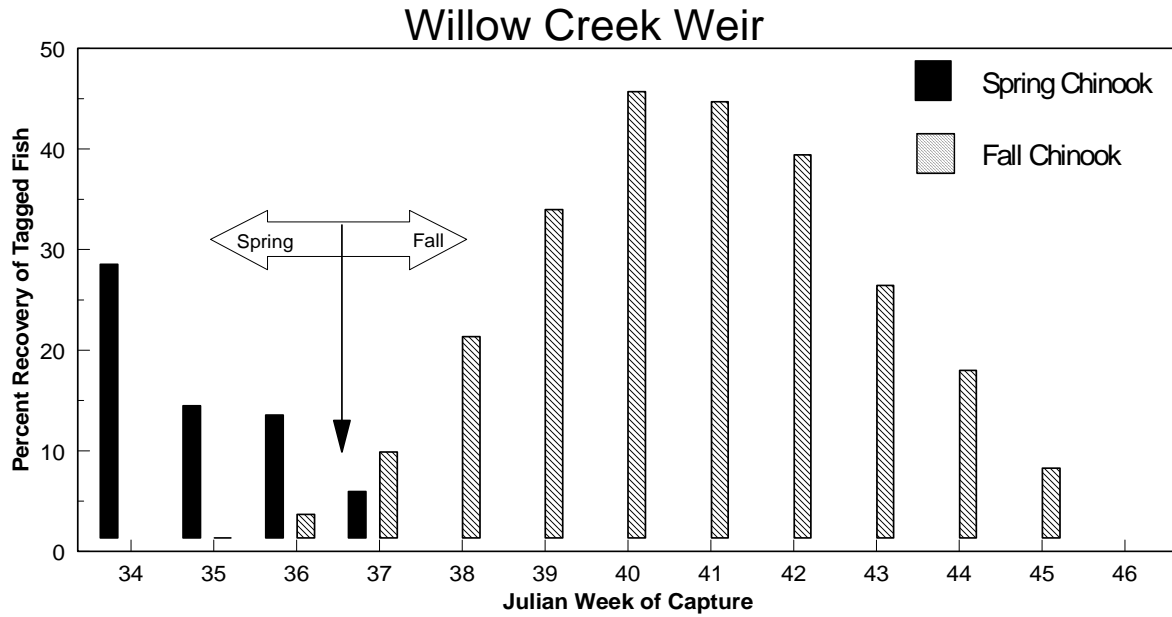


Figure 5. Weekly proportions of spring and fall chinook salmon at the Willow Creek and Junction City weirs during the 2001-02 season. The arrow denotes separation of the runs for analysis. Chinook salmon were designated as either spring or fall run based on recoveries of coded-wire tags and entry timing into Trinity River Hatchery.

Table 1. Weekly summary of spring-run and fall-run chinook trapped in the Trinity River at Willow Creek Weir during the 2001-02 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped			Average catch (fish/night)
			Grilse b/	Adults	Total	
<b>Spring-Run Chinook c/</b>						
34	08/20 - 08/26	2	7	31	38	19.0
35	08/27 - 09/02	4	12	66	78	19.5
36	09/03 - 09/09	5	11	75	86	17.2
	Sub-total:	11	30	172	202	
	Sub-mean:					18.4
<b>Fall-Run Chinook c/</b>						
37	09/10 - 09/16	5	7	198	205	41.0
38	09/17 - 09/23	5	29	577	606	121.2
39	09/24 - 09/30	5	6	600	606	121.2
40	10/01 - 10/07	5	2	568	570	114.0
41	10/08 - 10/14	5	7	273	280	56.0
42	10/15 - 10/21	5	0	115	115	23.0
43	10/22 - 10/28	5	1	118	119	23.8
44	10/29 - 11/04	5	1	202	203	40.6
45	11/05 - 11/11	5	5	12	17	3.4
46	11/12 - 11/18	1		8	8	8.0
	Sub-total:	46	58	2,671	2,729	
	Sub-mean:					59.3
	Grand Total:	57	88	2,843	2,931	
	Combined Mean:					51.4

- a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 12 November (Julian week 46) of 2001.
- b/ Spring-run chinook less than or equal to 57 cm FL were considered grilse; fall-run chinook less than or equal to 55 cm FL were considered grilse.
- c/ There was actually a temporal overlap of spring- and fall-run chinook during Julian weeks 35 through 39. For the purpose of analysis, all chinook caught through Julian week 36 were considered spring-run chinook; those caught after that were considered fall-run chinook.

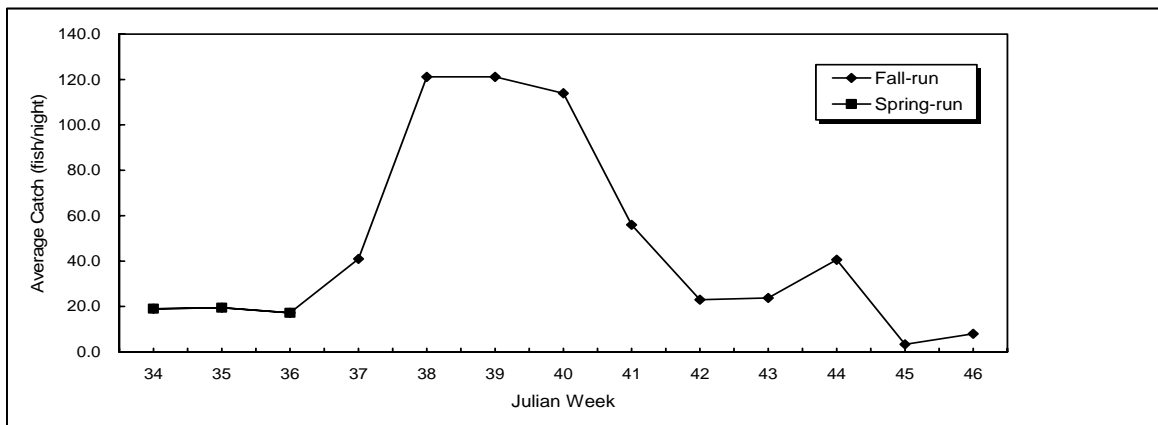


Figure 6. Average catch of spring- and fall-run chinook salmon in the Trinity River at Willow Creek Weir during the 2001-02 trapping season.

Table 2. Weekly summary of spring-run and fall-run chinook trapped in the Trinity River at Junction City Weir during the 2001-02 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped			Average catch (fish/night)
			Grilse b/	Adults	Total	
<b>Spring-Run Chinook c/</b>						
24	06/11 - 06/17	3	1	3	4	1.3
25	06/18 - 06/24	5	0	34	34	6.8
26	06/25 - 07/01	5	1	44	45	9.0
27	07/02 - 07/08	5	2	143	145	29.0
28	07/09 - 07/15	5	4	71	75	15.0
29	07/16 - 07/22	5	0	33	33	6.6
30	07/23 - 07/29	5	10	74	84	16.8
31	07/30 - 08/05	5	8	52	60	12.0
32	08/06 - 08/12	5	8	36	44	8.8
33	08/13 - 08/19	5	9	35	44	8.8
34	08/20 - 08/26	5	14	37	51	10.2
35	08/27 - 09/02	1	1	25	26	26.0
36	09/03 - 09/09	4	14	43	57	14.3
37	09/10 - 09/16	4	1	6	7	1.8
38	09/17 - 09/23	5	5	27	32	6.4
Sub Total:		67	78	663	741	
Sub Mean:						11.1
<b>Fall-Run Chinook c/</b>						
39	09/24 - 09/30	3	6	12	18	6.0
Sub Total:		3	6	12	18	
Sub Mean:						6.0
Grand Total:		<u>70</u>	<u>84</u>	<u>675</u>	<u>759</u>	
Combined Mean:						10.8

- a/ Trapping at Junction City Weir took place from 11 June (Julian week 24) through 26 September (Julian week 39) of 2001.  
b/ Spring-run chinook  $\leq$  57 cm FL and fall-run chinook  $\leq$  55 cm were considered grilse.  
c/ There was actually a temporal overlap of spring- and fall-run chinook during Julian week 39. For the purpose of analysis, all chinook trapped through Julian week 38 were considered spring-run; those caught after that were considered fall-run.

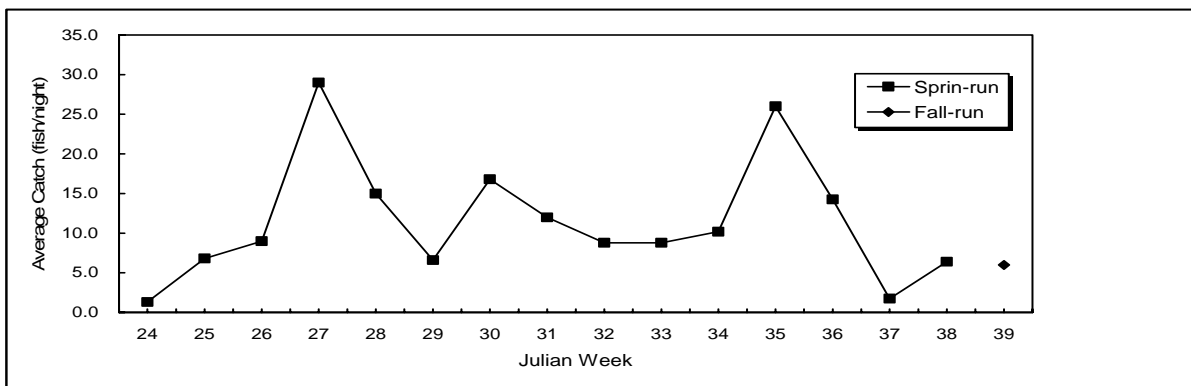


Figure 7. Average catch of spring- and fall-run chinook salmon in the Trinity River at Junction City Weir during the 2001 trapping season.

### Sizes of Trapped Fish.

Spring chinook trapped at JCW averaged 70.7 cm FL and 72.7 cm FL at TRH. Information from known-age, hatchery-marked spring chinook that entered TRH suggested that generally grilse were  $\leq 57$  cm FL and adults were larger (Figure 8, Appendix 2). Grilse comprised 10.5% and 9.0% of the spring chinook observed at JCW and TRH, respectively.

Fall chinook trapped at WCW averaged 76.0 cm FL and 75.3 cm FL at TRH. The FL distribution for the two sites indicated that generally grilse were  $\leq 55$  cm FL and adults were larger (Figure 9). Size data of known-age, hatchery-marked fall chinook entering TRH also supported this size separation (Appendix 3). Therefore, we considered fall chinook in the Trinity River basin  $\leq 55$  cm FL to be grilse. Fall chinook grilse comprised 2.1% and 1.1% of the run observed at WCW and TRH, respectively.

Effectively Tagged Fish. We trapped 741 spring chinook at JCW, of which 717 (77 grilse and 640 adults) were effectively tagged (Appendix 4). Tagging mortalities (12), poor-condition untagged fish (4) and spring chinook from which anglers reported removing tags (8) were not considered effectively tagged. The effectively tagged number included 237 (33.1%) reward-tagged spring chinook (24 grilse and 213 adults).

We trapped 2,729 fall chinook at WCW, 155 of which were released untagged, 28 from which anglers had removed the tags and two which were tagging mortalities. We effectively tagged 2,544 fall chinook (58 grilse and 2,486 adults) at WCW (Appendix 5). We placed reward tags on 843 (22 grilse and 821 adults), or 33.1%, of the effectively tagged fall chinook at WCW.

Incidence of Tags and Fin Clips. Five of the chinook tagged at WCW were subsequently recaptured at JCW this year. Ad-clipped fish comprised 11.9% (24/202) of the spring chinook seen at WCW and 18.5% (137/741) at JCW (Appendix 4). Twelve of the 24 Ad-clipped spring Chinook tagged at WCW were subsequently recovered at TRH. These were predominantly from release groups CWT code 062540, spring chinook released as yearlings in October of 1997 and CWT code 065250, spring Chinook released as yearlings in 1998 (Table 3). Sixty-four of the 137 (46.7%) Ad-clipped JCW-tagged spring chinook were recovered at TRH. These included spring chinook from seven TRH release groups but the majority of the spring run came from the same two release groups observed from WCW-tagged recoveries (Table 3).

Ad-clipped fish comprised 19.6% (536/2,729) of the fall chinook observed at WCW (Appendix 5). Two hundred fifty-one (46.8%) of the Ad-clipped fall chinook tagged at WCW were recovered at TRH (Table 3). Of these, the vast majority were fall chinook released from TRH as yearlings in 1997 and 1998 (CWT code 065241 from BY 1997 and 062641 from BY 1998). Returns to the hatchery of fall chinook were made up of approximately equal numbers of three and four year old fish (Table 3).

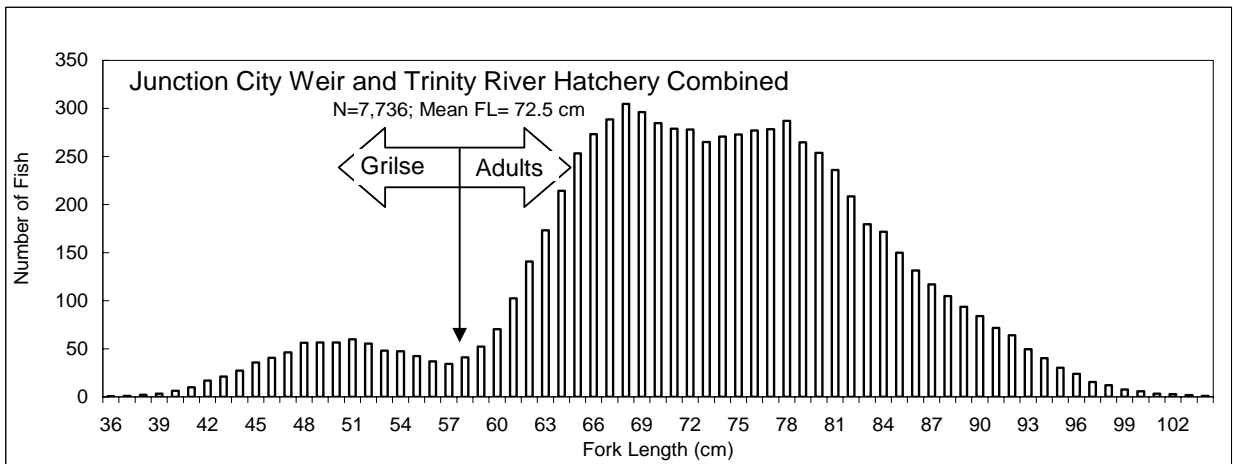
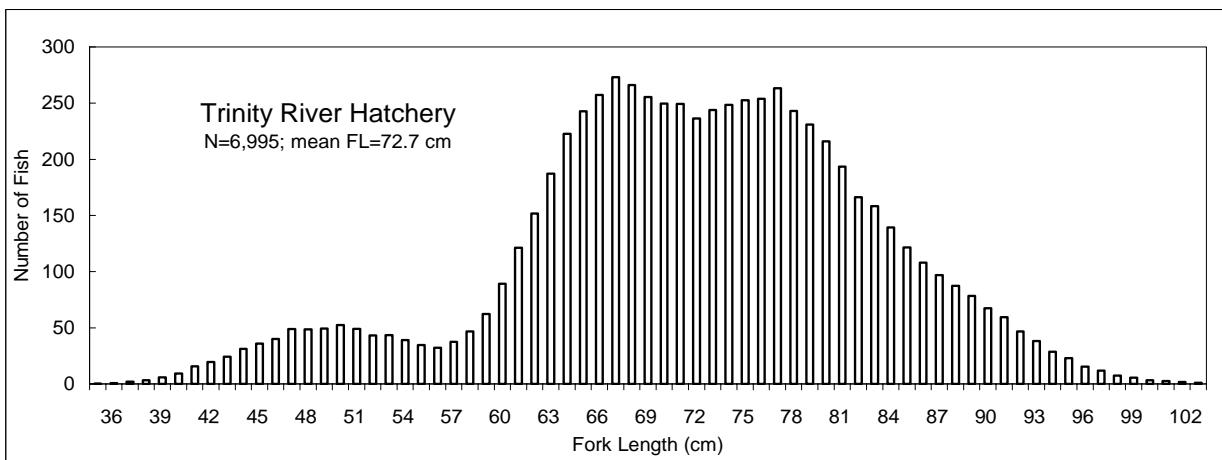
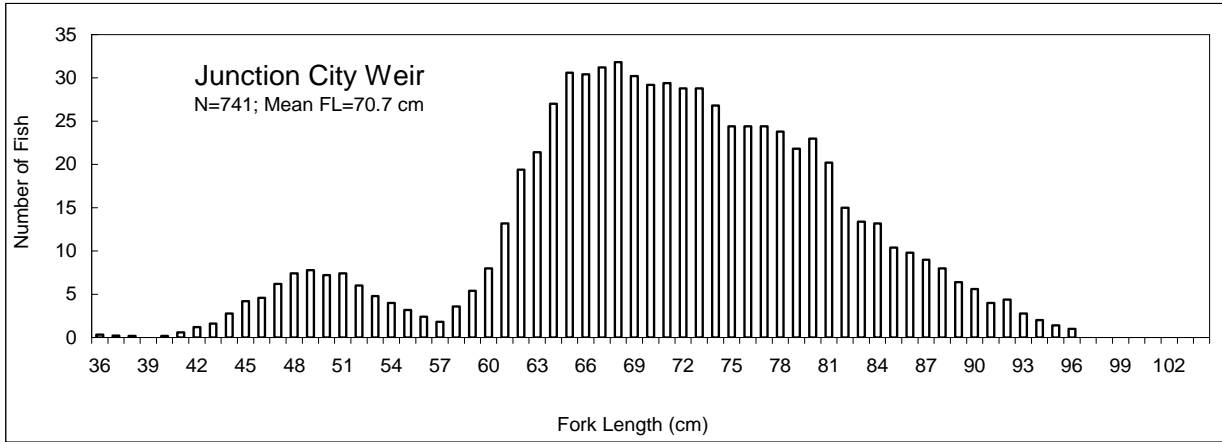


Figure 8. Analysis of spring-run chinook salmon fork lengths observed at the Junction City Weir and the Trinity River Hatchery during the 2001-2002 season. The number of fish at each fork length is shown as moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.



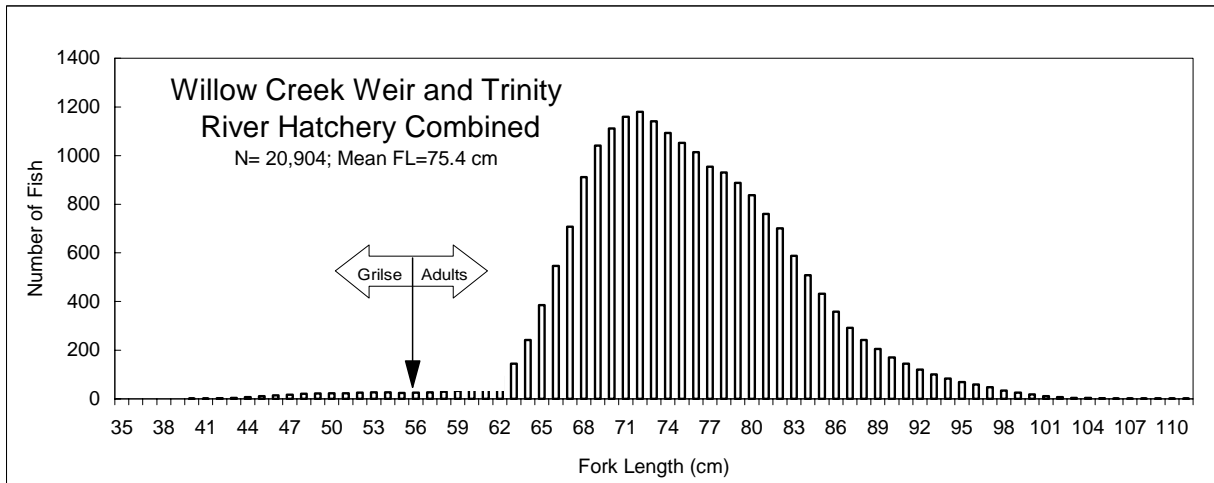
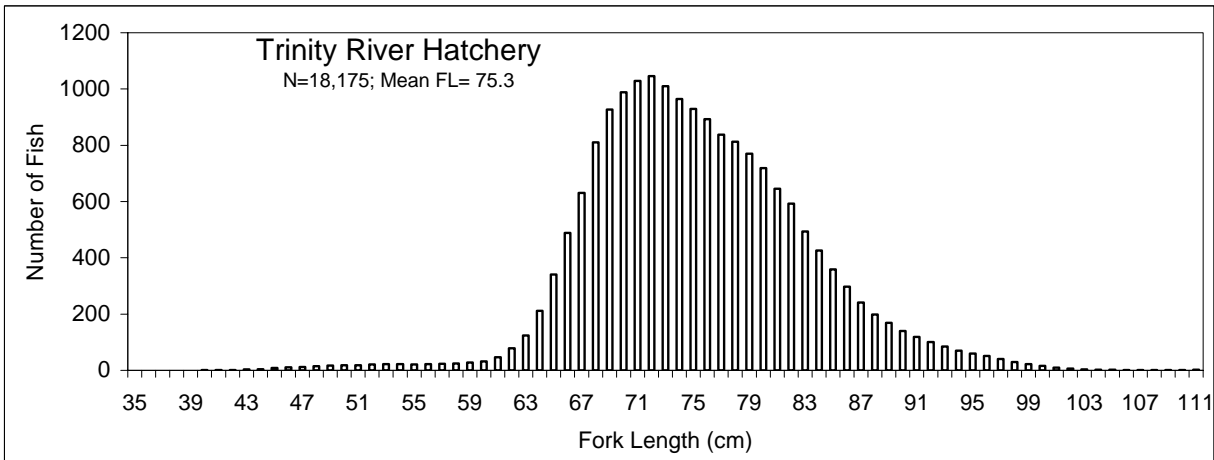
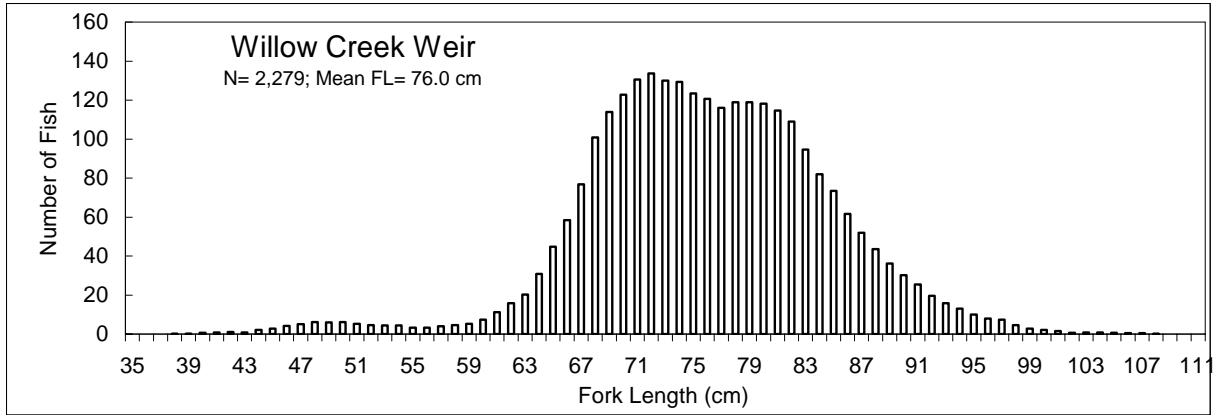


Figure 9. Analysis of fall-run chinook salmon fork lengths observed at Willow Creek Weir and the Trinity River Hatchery during the 2001-2002 season. The number of fish at each fork length is shown as moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Table 3. Release data and recoveries for coded-wire tagged (CWT) and maxillary-clipped salmon trapped in the Trinity River at Willow Creek and Junction City weirs, and recovered at Trinity River Hatchery during the 2001-02 season.

CWT a/ number	Species	Race	Release data		Number of fish	Site c/	Numbers recovered from tagging site: b/	
			Brood year	Date			WCW	JCW
065229	chinook	spring	1996	06/02-06/97	222,950	TRH	0	0
065231	chinook	spring	1996	10/01-07/97	112,464	TRH	0	0
065237	chinook	spring	1997	06/15/98	104,577	TRH	0	0
065238	chinook	spring	1997	06/15/98	104,578	TRH	0	4
065240	chinook	spring	1997	10/01-07/98	147,507	TRH	8	17
065247	chinook	spring	1998	06/01-07/99	54,378	TRH	0	2
065248	chinook	spring	1998	06/01-07/99	61,516	TRH	0	4
065249	chinook	spring	1998	06/01-07/99	61,074	TRH	1	3
065250	chinook	spring	1998	10/4-13/99	137,602	TRH	5	25
065251	chinook	spring	1999	06/01-07/00	49,421	TRH	1	0
065252	chinook	spring	1999	06/01-07/00	51,993	TRH	0	0
065253	chinook	spring	1999	06/01-07/00	46,966	TRH	0	0
065258	chinook	spring	1999	10/03-06/00	129,919	TRH	0	2
shed tag d/	chinook	spring					0	7
<b>Total spring-run chinook:</b>							<u>15</u>	<u>64</u>
065230	chinook	fall	1996	06/05-12/97	217,981	TRH	0	0
065232	chinook	fall	1996	10/01-07/97	112,746	TRH	0	0
065233	chinook	fall	1997	06/15/98	50,947	TRH	0	0
065234	chinook	fall	1997	06/15/98	49,353	TRH	3	0
065235	chinook	fall	1997	06/15/98	49,786	TRH	2	0
065236	chinook	fall	1997	06/15/98	48,382	TRH	3	0
065239	chinook	fall	1997	06/15/98	18,304	TRH	2	0
065241	chinook	fall	1997	10/01-07/98	313,080	TRH	114	0
062641	chinook	fall	1998	10/4-13/99	334,726	TRH	107	0
065242	chinook	fall	1998	06/01-07/99	46,399	TRH	2	0
065642	chinook	fall	1998	10/4-13/99	16,673	TRH	5	0
065243	chinook	fall	1998	06/01-07/99	42,659	TRH	1	0
065244	chinook	fall	1998	06/01-07/99	49,332	TRH	2	0
065245	chinook	fall	1998	06/01-07/99	46,391	TRH	1	0
065254	chinook	fall	1999	06/01-07/00	44,654	TRH	0	0
065255	chinook	fall	1999	06/01-07/00	42,549	TRH	0	0
065257	chinook	fall	1999	06/01-07/00	50,533	TRH	0	0
065256	chinook	fall	1999	06/01-07/00	43,565	TRH	0	0
065259	chinook	fall	1999	10/03-06/00	296,892	TRH	0	1
shed tag d/	chinook	fall					9	0
<b>Total fall-run chinook:</b>							<u>251</u>	<u>1</u>
RM e/	coho		1998	03/15-20/00	493,727	TRH	94	0
RM e/	coho		1999	03/15-22/01	513,500	TRH	8	0
<b>Total coho:</b>							<u>102</u>	<u>0</u>

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 <59 cm were classified as brood year 1999 and coho >58 cm were classified as brood year 1998.

Age cutoff was based upon fork length distribution.

Incidence of Gill-net Wounds, Hook Scars, and Predator Wounds. One hundred forty-seven (19.8%) of the 741 spring chinook trapped at JCW had gill-net wounds. The average size of gill-net-wounded vs. spring chinook without gill net wounds was 68.5 and 71.0 cm FL, respectively. Five fresh hooking scars, six ocean hooking scars, eight predator scars, and ten spring chinook wounds of unknown origin were observed on five spring chinook at JCW.

For fall Chinook, 7.4% (203/2,729) of the fish trapped at WCW were gill-net-wounded. The average size of gill-net-wounded fish was 75.1 cm FL and non-gill-net-wounded fall Chinook averaged 76.1 cm, FL. Hooking scars, 10 ocean and 46 fresh, were observed on fall Chinook at WCW. Predator wounds were observed on 396 of the fall Chinook and 44 fish had wounds of unknown origin.

### Coho Salmon

Run timing. We trapped the first coho at WCW on 20 September, 2001 (JW 38). Coho trapping peaked during JW 43 when average catch was 26.5 fish/night (Table 4, Figure 10). We trapped 324 coho salmon (37 grilse and 287 adults) at WCW.

Size of Fish Trapped. Coho trapped at WCW ranged from 38 to 89 cm, FL and averaged 69.3 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  $\leq 58$  cm FL were considered grilse, while larger coho were adults. Grilse coho comprised 11.4% and 9.5% of the coho trapped at WCW and TRH respectively.

Effectively Tagged Fish. Of the 324 coho salmon trapped at WCW, 312 were effectively tagged (Appendix 6). To discourage anglers from harvesting coho, all fish received non-reward tags.

Incidence of Tags and Fin Clips. Eighty nine percent (290/394) of the coho salmon we trapped at WCW (34 grilse and 256 adults) bore right maxillary (RM) clips (Appendix 6). One hundred two of the project tagged, RM-clipped coho, were recovered at TRH (Table 3).

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. Ten (3.1%) of the coho observed at WCW were gill-net-wounded, four had fresh hook wounds, five had wounds of unknown origin, and 31 were observed to have predator scarring.

### Fall Steelhead

Run Timing. We trapped steelhead every week of trapping at WCW (Table 5, Figure 12). There were peaks in late September and late October with trapping rates of over 21 steelhead/night and we trapped a total of 565 steelhead (10 half-pounders and 555 adults). We trapped steelhead during every week at JCW but average catch rates never exceeded 7 fish/night (Table 6, Figure 13). We trapped six half-pounders and 143 adult steelhead at JCW.

Table 4. Weekly summary of coho salmon trapped in the Trinity River at Willow Creek Weir during the 2001-02 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped			Average catch (fish/night)
			Grilse b/	Adults	Total	
34	08/20 - 08/26	3	0	0	0	0.0
35	08/27 - 09/02	4	0	0	0	0.0
36	09/03 - 09/09	5	0	0	0	0.0
37	09/10 - 09/16	3	0	0	0	0.0
38	09/17 - 09/23	5	1	0	1	0.2
39	09/24 - 09/30	5	0	0	0	0.0
40	10/01 - 10/07	6	2	3	5	0.8
41	10/08 - 10/14	5	8	52	60	12.0
42	10/15 - 10/21	5	9	68	77	15.4
43	10/22 - 10/28	4	12	94	106	26.5
44	10/29 - 11/04	4	5	48	53	13.3
45	11/05 - 11/11	4	0	18	18	4.5
46	11/12 - 11/18	2	0	4	4	2.0
Totals:		55	37	287	324	
Mean: c/						8.1

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 12 November (Julian week 46) of 2001.

b/ Coho less than or equal to were 58 cm FL were considered grilse; larger fish were considered adults.

c/ Based on trapping data from Julian weeks 38 through 46.

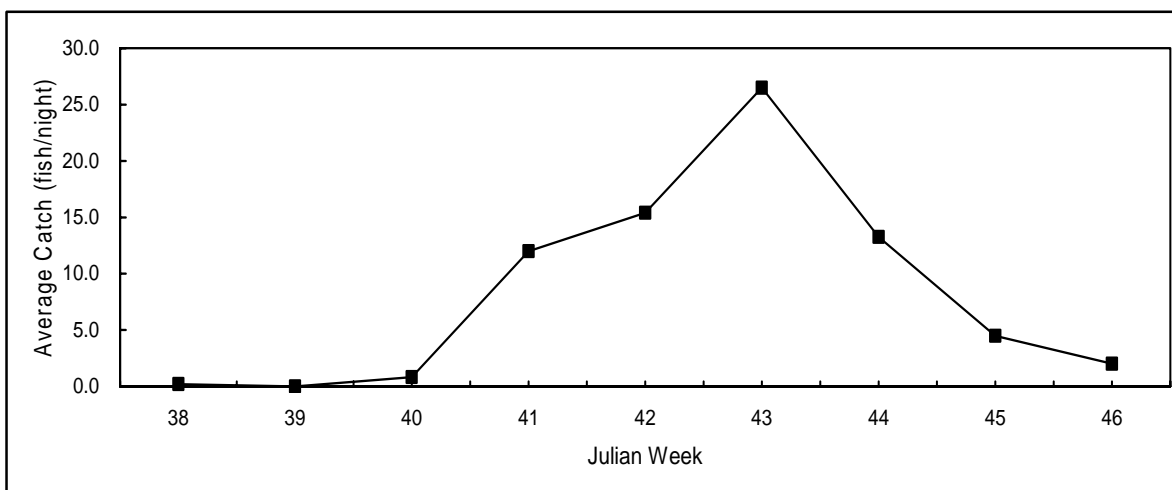


Figure 10. Average catch of coho salmon in the Trinity River at Willow Creek Weir during the 2001-02 trapping season.

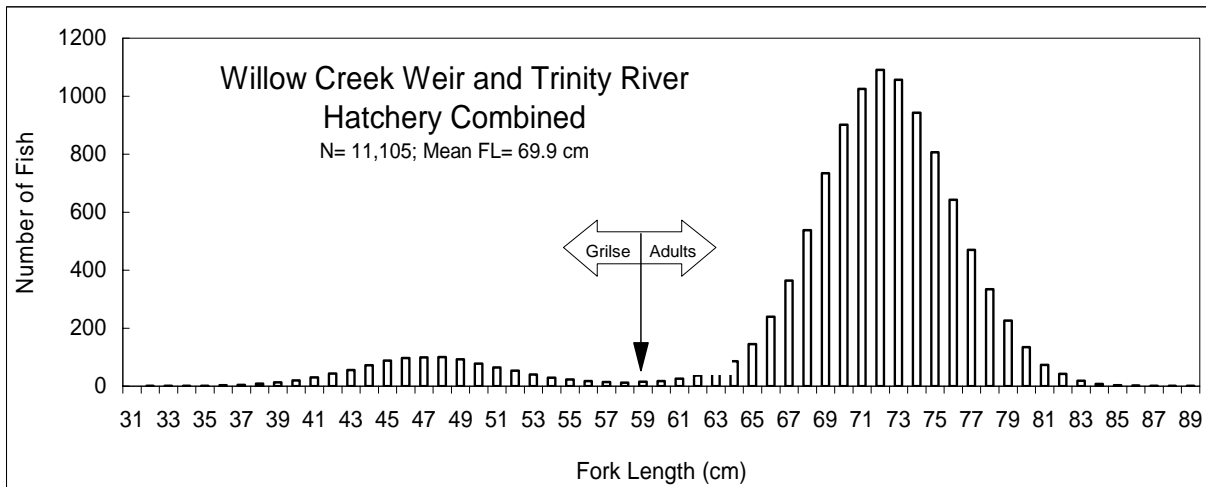
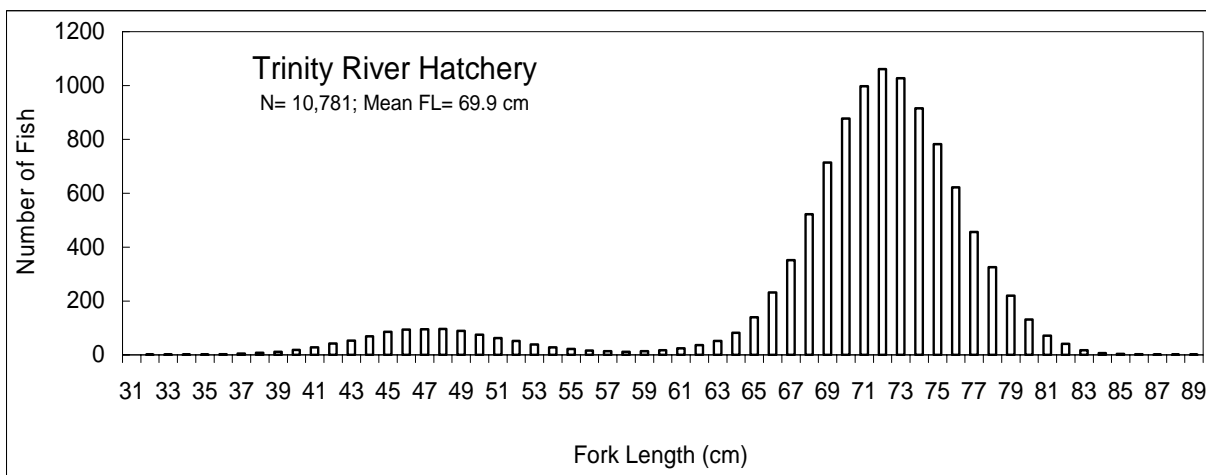
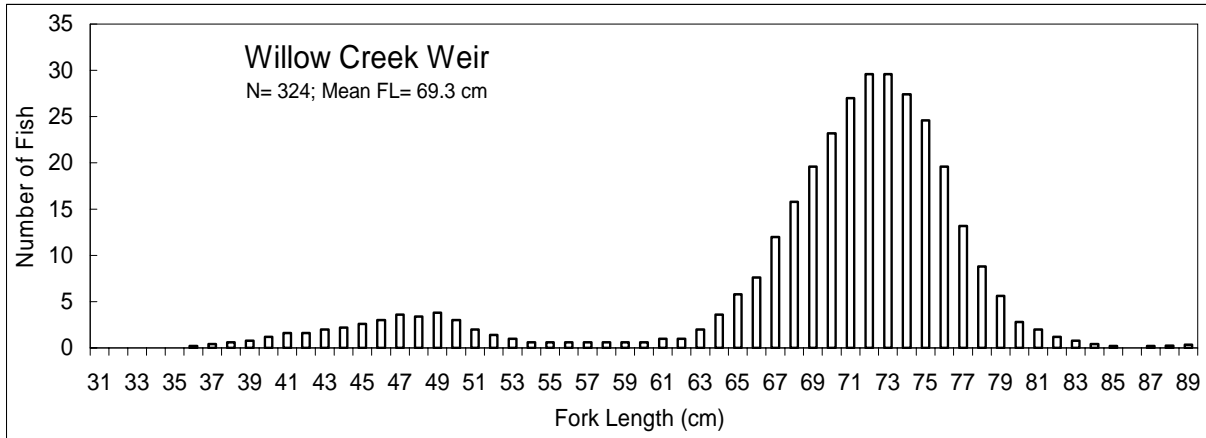


Figure 11. Analysis of coho salmon fork lengths observed at Willow Creek Weir and the Trinity River Hatchery during the 2001-2002 season. The number of fish at each fork length is shown as moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Table 5. Weekly summary of steelhead trapped in the Trinity River at Willow Creek Weir during the 2001-02 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped			Average catch (fish/night)
			1/2 lbers b/	Adults	Total	
34	08/20 - 08/26	2		6	6	3.0
35	08/27 - 09/02	4	1	56	57	14.3
36	09/03 - 09/09	5	2	52	54	10.8
37	09/10 - 09/16	5	0	24	24	4.8
38	09/17 - 09/23	5	2	107	109	21.8
39	09/24 - 09/30	5	0	22	22	4.4
40	10/01 - 10/07	5	0	22	22	4.4
41	10/08 - 10/14	5	1	25	26	5.2
42	10/15 - 10/21	5	1	49	50	10.0
43	10/22 - 10/28	5	2	50	52	10.4
44	10/29 - 11/04	5	0	117	117	23.4
45	11/05 - 11/11	5	1	16	17	3.4
46	11/12 - 11/18	1		9	9	9.0
Totals:		57	10	555	565	
Mean:						9.9

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 12 November (Julian week 46) of 2001.

b/ Steelhead less than or equal to 41 cm FL were considered half-pounders; larger steelhead were considered adults.

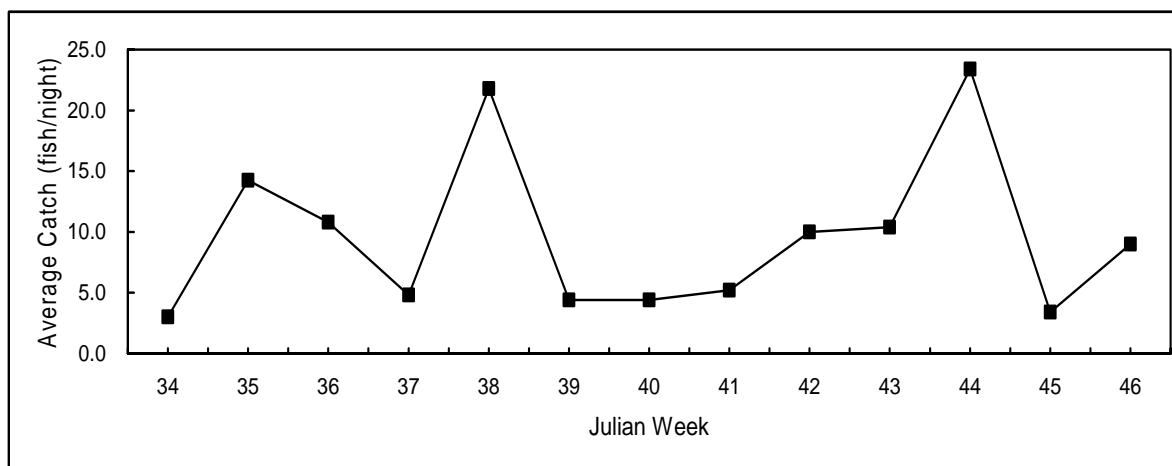


Figure 12. Average catch of steelhead in the Trinity River at Willow Creek Weir during the 2001-02 trapping season.

Table 6. Weekly summary of steelhead trapped in the Trinity River at Junction City Weir during the 2001-02 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped			Average catch (fish/night)
			Half-pounders b/	Adults	Total	
24	06/11 - 06/17	3	1	8	9	3.0
25	06/18 - 06/24	5	0	11	11	2.2
26	06/25 - 07/01	5	0	14	14	2.8
27	07/02 - 07/08	5	0	33	33	6.6
28	07/09 - 07/15	5	0	10	10	2.0
29	07/16 - 07/22	5	0	5	5	1.0
30	07/23 - 07/29	5	0	11	11	2.2
31	07/30 - 08/05	5	0	8	8	1.6
32	08/06 - 08/12	5	0	1	1	0.2
33	08/13 - 08/19	5	0	1	1	0.2
34	08/20 - 08/26	5	1	3	4	0.8
35	08/27 - 09/02	1	0	5	5	5.0
36	09/03 - 09/09	4	0	4	4	1.0
37	09/10 - 09/16	4	0	1	1	0.3
38	09/17 - 09/23	5	3	9	12	2.4
39	09/24 - 09/30	3	1	19	20	6.7
Totals:		70	6	143	149	
Mean:						2.1

a/ Trapping at Junction City Weir took place from 11 June (Julian week 24) through 26 September (Julian week 39) of 2001.

b/ Steelhead were less than or equal to 41 cm FL were considered half-pounders; larger steelhead were considered adults.

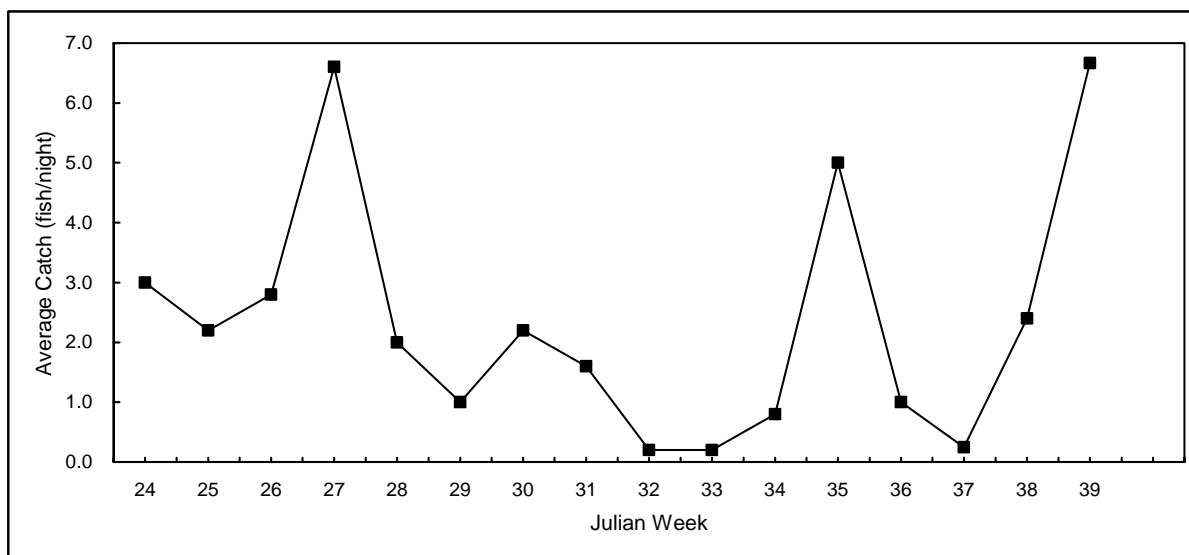


Figure 13. Average catch of steelhead in the Trinity River at Junction City Weir during the 2001-02 trapping season.

Size of Fish Trapped. Steelhead caught at WCW, JCW, and TRH averaged 63.1, 59.3 and 62.5 cm FL, respectively (Figure 14). Adult steelhead (> 41 cm, FL) made up 96.0%, 98.2% and 96.8% of the steelhead trapped at JCW, WCW and TRH respectively.

Effectively Tagged Fish. We trapped 555 adult steelhead at WCW, of which 508 were effectively tagged (Appendix 7). We detected no tagging mortalities, 12 fish were not tagged, and 35 from which anglers reported removing tags. Two hundred forty 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 adipose-fin-clips on 326 (57.8 %) steelhead at WCW, and 79 (53.7 %) at JCW (Appendix 8). All steelhead released from TRH have been adipose-fin-clipped prior to release since brood year 1997.

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. Nine of the steelhead trapped at WCW and seven steelhead trapped at JCW had gill-net wounds. Two of the steelhead at WCW bore fresh hook-scars. No hooking scars were observed on steelhead trapped at JCW. Predator wounds were observed on 61 and two of the steelhead trapped at WCW and JCW respectively.

### Recovery of Tagged Fish

Total Recoveries. Fish tagged at JCW and WCW were recovered from four different sources; at TRH, during upper Trinity River spawner surveys, from angler returns, and as 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.

Slightly less than half of the effectively tagged spring Chinook at JCW (43.2%) and fall Chinook at WCW (41.3%) were recovered, while only about a third (39.7%) of the coho were recovered. Tagged adult steelhead had the lowest recovery rate (21.4%). As expected, 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 2001-02 season was 9,933 fish, split equally between the lower River (Weitchpec to Cedar Flat) and the upper River (Cedar Flat to Lewiston). Additionally, anglers were allowed to retain adipose-fin-clipped steelhead only. The take of coho was prohibited.



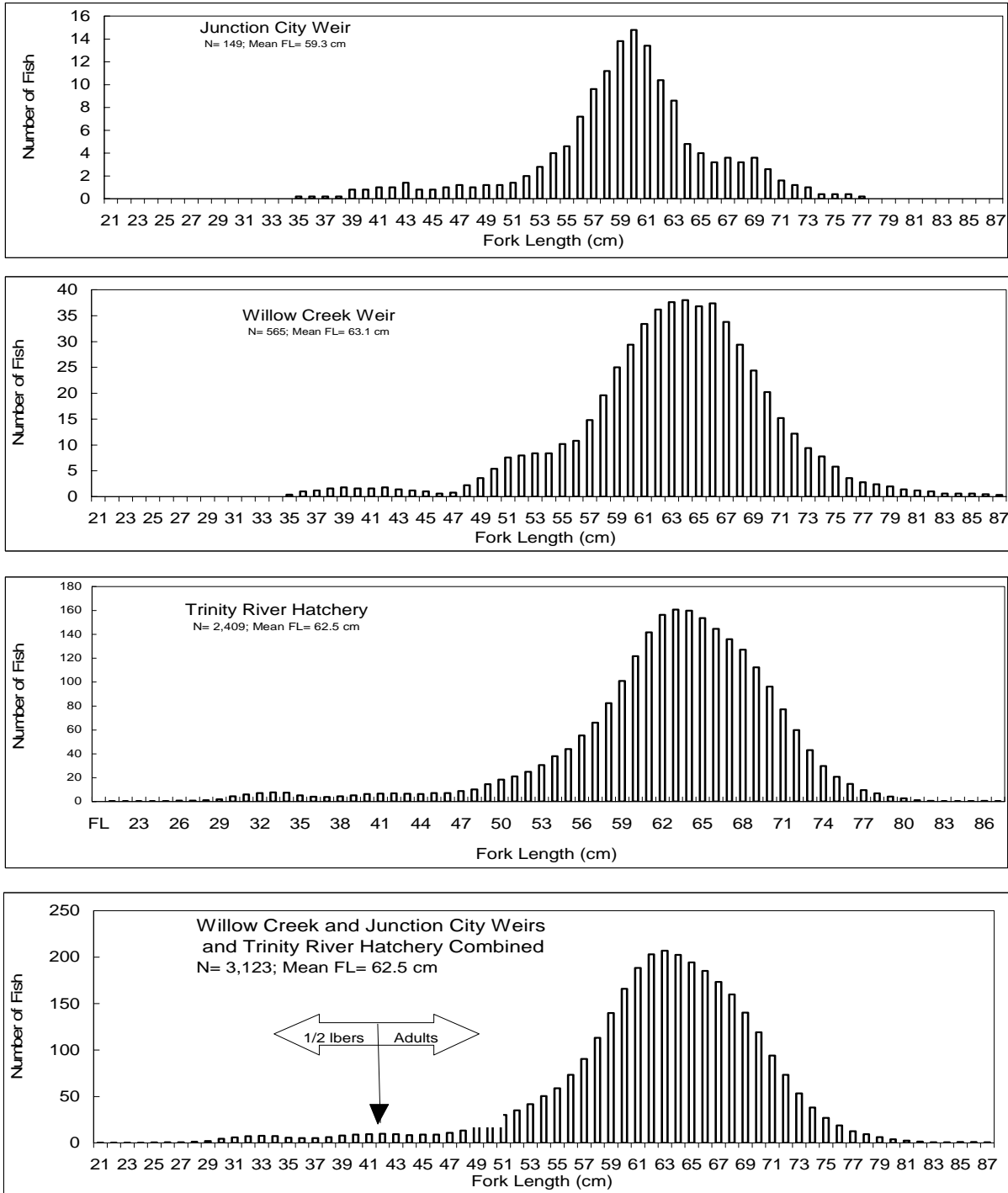


Figure 14. Analysis of fall-run steelhead fork lengths observed at Willow Creek Junction City Weirs and the Trinity River Hatchery during the 2001-2002 season. The number of fish at each fork length is shown as moving average of five, 1-cm increments. The arrow denotes the size we used to separate 1/2 pounders and adults for analysis.

Spring Chinook. Anglers returned 14 reward and 13 non-reward tags from harvested spring Chinook tagged at JCW from six grilse and 21 adults (appendix 9). We estimated harvest rate, based on the return of reward tags, at 12.5% for grilse and 5.2% for adults. Anglers reported releasing five reward-tagged adult spring Chinook. Using reward tagged fish; we estimated the catch-and-release rate to be 2.3% for adult spring Chinook. No tags were returned from released grilse spring Chinook.

Fall Chinook. Anglers returned 64 tags from harvested fall Chinook salmon tagged at WCW (appendix 10). Based on the return of reward tags, the estimated harvest rate of fall Chinook upstream of WCW was 3.8% (31/821). None of the tags on fall Chinook grilse were returned. Anglers returned an additional 28 reward tags from fish that were caught and released (appendix 10). Using reward tagged fish; we estimated that the catch-and-release rate of fall Chinook upstream of WCW was 1.9%. No tags were returned for fall Chinook salmon grilse.

Coho Salmon. To discourage the harvest of threatened coho salmon, we tagged coho at WCW with non-reward tags only. Only one tag was returned from coho and that fish was released. Therefore, we conclude that no coho salmon were harvested above WCW. No coho were tagged at JCW.

Fall Steelhead. Anglers returned 12 tags from harvested WCW-tagged steelhead (appendix 12). Based on the reward tags returned, we estimated that anglers harvested 2.9% (7/240) of the steelhead migrating upstream of WCW. None of the steelhead captured at JCW were tagged this year. Anglers returned 35 tags from steelhead reported as caught and released (appendix 12). Based on the return of reward tags, we estimated that anglers caught and released 9.4% (25/265) of the steelhead migrating upstream of the WCW.

### Spawner Surveys

Spring Chinook. A total of 19 adult and 3 grilse spring Chinook tagged at JCW were subsequently recovered during spawner carcass surveys (appendix 9). Mean FL of these fish was 69.4 cm while spring fish tagged at the JCW averaged 70.4 cm FL.

Fall Chinook. One grilse and 145 adults were recovered during the spawner survey (appendix 10). The mean fork length of these fish was 76.3 cm while fall Chinook salmon tagged at WCW averaged 76.0 cm FL.

Coho. Nineteen adult and no grilse coho salmon tagged at WCW were subsequently recovered during the spawner surveys this year (appendix 11). Mean FL for coho recovered was 74.2 cm while the mean of coho tagged at WCW was 69.3 cm. Since coho spawn later in the year (December through February), it is likely that the time frame of the spawner surveys (October through December) inhibited full recovery of coho salmon.

Steelhead. No steelhead were recovered during spawner surveys.

## Trinity River Hatchery

Operation Dates. The fish ladder and trapping facilities at TRH were generally operational from September 10<sup>th</sup>, 2001 (JW 37) through March 12<sup>th</sup>, 2002 (JW 11). The ladder and trap were closed for a two week period from October 11 through October 25. The closure was implemented to allow for separation of the spring and fall runs of Chinook. The ladder can also be occasionally closed at the discretion of the hatchery manager for fish health concerns or labor constraints.

Spring Chinook. Based on CWT recoveries, spring Chinook began entering TRH during JW 36 (3-9 Sept 2001) and continued through JW 45 (Figure 15, Table 7). Based upon CWT expansion, we estimated that 7,006 spring Chinook entered TRH (Figure 15). For the purpose of estimating spring Chinook run-size, the 6,995 Chinook which entered TRH prior to Julian week 43 were considered spring.

We recaptured 35.7% (256/717) effectively tagged spring Chinook from JCW at TRH (Table 8). The mean FL of effectively tagged JCW fish (70.3 cm) was approximately the same as fish recovered at TRH (69.6 cm) (appendix 4).

We recovered 36 (17.9%) of 201 WCW effectively tagged fish considered spring Chinook at WCW. Project-tagged spring Chinook from WCW that entered TRH were slightly larger (74.1 cm) than those tagged at the weir (71.1 cm) (Appendix 4). Spring Chinook tagged at WCW were not used to generate a spring Chinook run-size estimate for the basin.

Fall Chinook. Based on the recovery of CWTs, the first fall Chinook entered TRH during JW 37 2001. The run peaked during JW 45 when approximately 6,000 Chinook entered the facility, decreasing thereafter until the last Chinook entered during JW 51 (Figure 15, Table 9). We estimated that 18,164 fall Chinook entered TRH (Figure 15). For the purpose of estimating fall Chinook run-size, the 18,175 Chinook which entered TRH after JW 42 were considered fall run.

Hatchery recovery of fall Chinook tagged at WCW consisted of 5 grilse and 824 adults. This total represented 32.6% (829/2544) of those effectively tagged at WCW (Table 8, Appendix 5). The mean FL of effectively tagged Chinook at WCW (75.9 cm) and TRH recoveries (76.3 cm) was essentially the same.

We recovered 5,403 Ad-clipped fall Chinook at TRH, from which we recovered 5,115 CWTs (Table 9). Similar to spring Chinook, the age structure of TRH fall Chinook was dominated by a mix of age three and four year old returns.

Coho Salmon. The first coho entered TRH on Oct. 11, 2001. The coho run peaked during Julian week 45 and the last coho entered TRH on January 29th, 2002 (Table 8). We recovered 10,781 coho (1,026 grilse and 9,755 adults) at TRH. We recovered 104 WCW-tagged coho (8 grilse

and 96 adults) at TRH (33.3 % of those effectively tagged). The mean FL of WCW-tagged coho recovered at TRH was 71.0 cm, which was approximately the same size as those effectively tagged (Appendix 6). Coho were not tagged at JCW this year.

Of the 10,781 coho recovered at TRH, 10,649 (98.8%) were observed to have right maxillary (RM) clips, indicating they were of TRH origin (Table 10). Based on length frequency analysis, we apportioned TRH-produced, RM-clipped coho, into two brood years. Coho  $\leq$  58 cm, FL were considered grilse (age 2) from the 1999 brood year and accounted for 9.6% (1,024/10,649) of the total, the remaining 9,625 were considered adults (age 3), progeny of the 1998 brood year. The 132 unmarked coho which entered the hatchery were also considered grilse or adults based on their length (Appendix 14). Unmarked coho entering TRH had a slightly larger mean fork length (73.2 cm) than marked coho (69.9 cm).

Fall Steelhead. Appreciable numbers of steelhead did not enter the hatchery until early October (Table 11). A total of 76 sub-adults (<42 cm, FL) and 2,333 adult steelhead entered TRH and 95 WCW-tagged steelhead (18.3% of those effectively tagged) entered TRH (Table 11).

At WCW, 326 of 564 (57.8%) steelhead were Ad-clipped, averaging 63.4 cm, FL, slightly larger than their unmarked counterparts, which averaged 62.7 cm. At JCW, 79 of the 147 (53.7%) steelhead were Ad-clipped. Ad-clipped steelhead trapped at JCW also had a larger mean fork length than their unmarked counterparts (60.6 vs. 57.9 cm). Steelhead recovered at TRH were composed of 2,395 Ad-marked fish and 13 unmarked fish. Unmarked steelhead were 1.0 cm smaller, on average, than Ad-clipped fish. Sub-adult steelhead, less than 42 cm, FL, comprised 3.2% of the total number of steelhead entering TRH. All of the sub-adults were Ad-marked fish (Appendix 8). Beginning with the 1997 brood year, all steelhead released from TRH have been adipose-fin-clipped prior to their release. Recoveries of these fish were made at both weirs and TRH (Appendix 8).

# Trinity River Hatchery

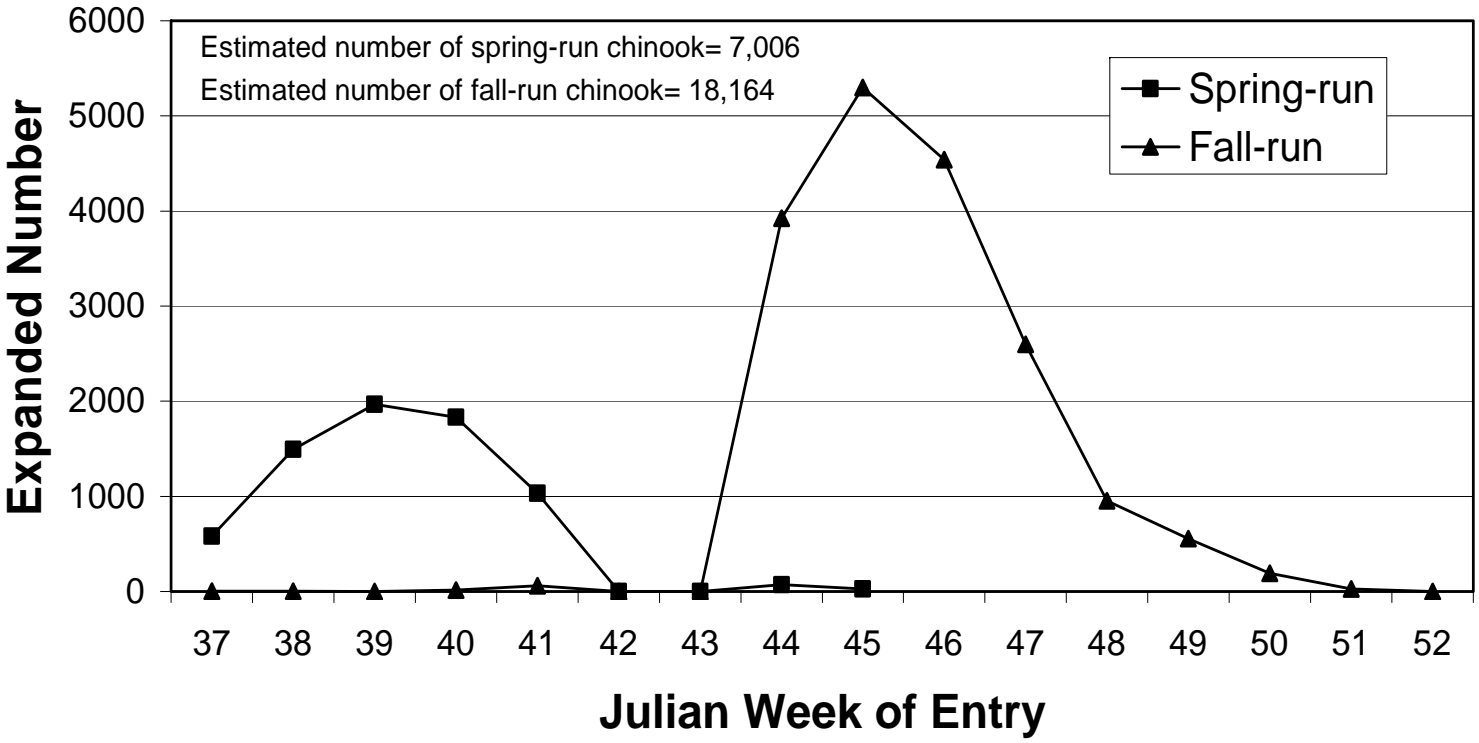


Figure 15. Estimated numbers of spring- and fall-run chinook salmon that entered Trinity River Hatchery during the 2001-02 season, based on expansion of coded-wire tagged fish recovered.

Table 7. Recoveries of coded-wire-tagged, Trinity River Hatchery-produced, spring-run chinook salmon at Trinity River Hatchery during the 2001-02 season. a/

		Brood year and coded-wire tag number												Shed	
julian week of entry b/	Inclusive dates	1996	1997			1998				1999				tags c/	Total
		065231	065237	065238	065240	065247	065248	065249	065250	065251	065252	065253	065258		
37	09/10 - 09/16	1	3	6	45	10	6	5	46	1	2		8	19	152
38	09/17 - 09/23		13	18	184	22	21	14	84	10	4	1	7	30	408
39	09/24 - 09/30		15	20	186	30	26	26	93	12	8	2	8	38	464
40	10/01 - 10/07		9	9	232	22	24	29	97	4	10	3	23	24	486
41	10/08 - 10/14		5	4	104	9	18	7	89	1	1	3	11	22	274
42	10/15 - 10/21				0			0	0						0
43	10/22 - 10/28				0			0	0						0
44	10/29 - 11/04				11			2	9						22
45	11/05 - 11/11				3			2	1						6
		1	45	57	765	93	95	85	419	28	25	9	57	133	1,812

a/ The fish ladder was open from 10 September 2001 through 12 March 2002 (Julian week 37 through 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/ No CWTs were recovered from these Ad-clipped fish. Chinook with shed tags recovered after 21 October 2001 (JW 42) were considered fall-run chinook and are shown in Table 9.

Table 8 . Total numbers and numbers of Project-tagged chinook and coho salmon that entered Trinity River Hatchery (TRH) during the 2001-02 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		Total entering TRH d/	From tagging site WCW
			WCW	JCW	WCW	JCW		
37	09/10/01 - 09/16/01	230		18				
38	09/17/01 - 09/23/01	758	2	49				
39	09/24/01 - 09/30/01	1334	8	73				
40	10/01/01 - 10/07/01	3021	15	78				
41	10/08/01 - 10/14/01	1652	26	38		2		
42	10/15/01 - 10/21/01	0				0		
43	10/22/01 - 10/28/01	0				0		
44	10/29/01 - 11/04/01	3605			207	5	130	
45	11/05/01 - 11/11/01	5709			268		313	
46	11/12/01 - 11/18/01	4539			204		3161	
47	11/19/01 - 11/25/01	2596			97		1438	
48	11/26/01 - 12/02/01	953			28		951	
49	12/03/01 - 12/09/01	554			9		1556	
50	12/10/01 - 12/16/01	191			3		1358	
51	12/17/01 - 12/23/01	27			1		482	
52	12/24/01 - 12/31/01	1					858	
1	01/01/02 - 01/07/02						404	
2	01/08/02 - 01/14/02						92	
3	01/15/02 - 01/21/02						24	
4	01/22/02 - 01/28/02						8	
5	01/29/02 - 02/04/02						4	
Totals:		25,170	51	256	817	5	10,781	104

a/ The fish ladder was open 10 September 2001 through 12 March 2002.

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 in the same week.

TABLE 9. Recoveries of coded-wire-tagged, Trinity River Hatchery-produced, fall-run chinook salmon at Trinity River Hatchery during the 2001-02 season. a/

		Brood year and coded-wire tag number																						
		1996	1997						1998						1999									
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		
		5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
		2	2	2	2	2	2	6	2	2	2	2	6	2	2	2	2	2	2	2	2	2		
		3	3	3	3	3	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5		
Julian week of entry b/	Inclusive dates	0	3	4	5	6	9	1	1	2	3	4	5	2	4	5	6	7	9	Shed tags c/	Total			
37	09/10 - 09/16							1																1
38	09/17 - 09/23							1																1
39	09/24 - 09/30							0																0
40	10/01 - 10/07							5																5
41	10/08 - 10/14							15	3															18
42	10/15 - 10/21							0	0															0
43	10/22 - 10/28							0	0															0
44	10/29 - 11/04							657	302	8	6	4	3	9	4		1		1	4	49		1,108	
45	11/05 - 11/11	1						607	674	16	7	5	7	22	2	1			1	1	106		1,496	
46	11/12 - 11/18							369	803	7	9	5	7	37	2	1			3	6	82		1,359	
47	11/19 - 11/25							123	592	3	2	5	5	16						2	24		779	
48	11/26 - 12/02							26	254	0		0	2	13							13		309	
49	12/03 - 12/09							8	200	1		1		16							9		236	
50	12/10 - 12/16							1	67					6							5		79	
51	12/17 - 12/23							1	11														12	
Totals:		1	32	40	29	17	25	1,814	2,906	35	24	20	24	119	8	2	1		5	13	288		5,403	

a/ The fish ladder was open from 10 September 2001 through 12 March 2002 (Julian week 37 through 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/ No CWT were recovered from the Ad-clipped fish. Chinook with shed tags recovered before 22 October 2001 (Julian week 43) were considered spring-run and are shown in Table 7.



Table 10. Recovery of maxillary-clipped coho salmon that returned to Trinity River Hatchery during the 2001-02 season. a/

Julian week of entry c/	Inclusive dates		Brood year b/		Total
			1998	1999	
41	10/08/02	10/14/02	1	1	2
42	10/15/02	- 10/21/02	0	0	0
43	10/22/02	- 10/28/02	0	0	0
44	10/29/02	- 11/04/02	11	119	130
45	11/05/02	- 11/11/02	149	162	311
46	11/12/02	- 11/18/02	2839	280	3,119
47	11/19/02	- 11/25/02	1324	99	1,423
48	11/26/02	- 12/02/02	874	72	946
49	12/03/02	- 12/09/02	1424	90	1,514
50	12/10/02	- 12/16/02	1260	81	1,341
51	12/17/02	- 12/23/02	458	21	479
52	12/24/02	- 12/30/02	800	56	856
1	12/31/02	- 01/06/03	364	37	401
2	01/07/03	- 01/13/03	86	5	91
3	01/14/03	- 01/20/03	23	1	24
4	01/21/03	- 01/27/03	8		8
5	01/28/03	- 02/03/03	4		4
Totals:			9,625	1,024	10,649

a/ The fish ladder was open 10 September 2001 through 12 March 2002.

b/ Brood year determinations were estimated using length frequency analysis; coho less than or equal to 58 cm, FL were considered to be from the 1999 brood year, larger coho from the 1998 brood year.

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

TABLE 11. Total numbers and numbers of Project-tagged, fall-run steelhead, that entered Trinity River Hatchery (TRH) each week during the 2001-02 season. a/

Julian week of entry c/	Inclusive dates		Number entering TRH			Recoveries from tagging site b/
			Adults	Sub-adults d/	Total	WCW
37	09/10/00	- 09/16/00	2	1	3	
38	09/17/00	- 09/23/00	2	0	2	
39	09/24/00	- 09/30/00	6	0	6	
40	10/01/00	- 10/07/00	15	0	15	
41	10/08/00	- 10/14/00	19	0	19	1
42	10/15/00	- 10/21/00	0	0	0	0
43	10/22/00	- 10/28/00	0	0	0	0
44	10/29/00	- 11/04/00	4	0	4	0
45	11/05/00	- 11/11/00	13	0	13	1
46	11/12/00	- 11/18/00	39	0	39	1
47	11/19/00	- 11/25/00	13	0	13	0
48	11/26/00	- 12/02/00	9	0	9	2
49	12/03/00	- 12/09/00	3	0	3	0
50	12/10/00	- 12/16/00	3	0	3	1
51	12/17/00	- 12/23/00	4	0	4	0
52	12/24/00	- 12/31/01	152	0	152	6
1	01/01/02	- 01/07/02	361	6	367	18
2	01/08/02	- 01/14/02	371	0	371	18
3	01/15/02	- 01/21/02	296	26	322	10
4	01/22/02	- 01/28/02	191	16	207	7
5	01/29/02	- 02/04/02	132	5	137	7
6	02/05/02	- 02/11/02	85	8	93	4
7	02/12/02	- 02/18/02	236	9	245	9
8	02/19/02	- 02/25/02	144	1	145	5
9	02/26/02	- 03/04/02	136	1	137	3
10	03/05/02	- 03/11/02	65	2	67	2
11	03/12/02	- 03/18/02	32	1	33	
Totals:			2,333	76	2,409	95

a/ The fish ladder was open 10 September 2001 through 12 March 2002.

b/ Tagging site: WCW=Willow Creek 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/ Steelhead less than or equal to 41 cm FL were considered sub-adults; larger fish were adults.

## Run-size, Angler Harvest, and Spawner Escapement Estimates

We tagged and recovered too few grilse salmon to stratify our estimates by adults and grilse so we combined the numbers of adults and grilse tagged and recovered for calculating the population estimate and stratified the estimate based on the ratio of adults and grilse observed at each of the respective weirs.

### Spring Chinook Salmon

We estimated that 19,622 (17,556 adults and 2,065 grilse) spring Chinook (including those harvested) migrated into the Trinity River basin upstream of JCW. Based on the Poisson Approximation, the 95% confidence interval for the run-size estimate was 17,403-22,243 fish (Table 12). The spawning escapement above JCW was estimated to be 18,458 adult fish, including 6,995 adult spring Chinook that entered TRH (Table 13). Mean spring Chinook run-size since 1978, excluding two years in which no estimate was made, is 16,825. Estimated spring Chinook run-size has ranged from 62,692 fish in 1988 to 2,381 fish in 1991 (Appendix 15). Anglers caught and kept an estimated 258 (12.5 %) of the grilse and 906 (5.2 %) of the adults from the spring run (Table 13). Based on reward tagged fish, anglers caught- and- released an estimated 403 (2.3%) adults. No grilse were reported as caught- and- released.

### Fall Chinook Salmon

We estimated that 57,109 (55,895 adults and 1,214 grilse) fall Chinook (including those harvested) 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 Willow Creek Weir was 53,353-61,236 (Table 12). We estimated the Trinity River fall Chinook spawner escapement at 55,241 adult fish upstream of WCW, including 18,175 adult fall Chinook that entered TRH (Table 13). The estimated total fall Chinook run-size upstream of WCW has ranged from 147,888 fish in 1986 to 9,207 fish in 1991. Estimated adult escapement has ranged from a high of 120,382 in 1986 to a low of 7,104 in 1991 (Appendix 16). Mean fall Chinook escapement since 1977 is 44,010 fish, including grilse. We estimated that anglers harvested 1,772 adults (3.2%) and 96 grilse (7.9%) (Table 13). Anglers caught and released 1,068 adults (1.9%). No grilse were reported caught and released.

### Coho Salmon

We estimated that 32,141 (28,470 adults and 3,671 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 26,712 - 39,221 fish (Table 12). The spawning escapement estimate for coho upstream of WCW this year was 32,141 fish, 10,781 of which entered TRH (Table 13). Estimated coho salmon run size upstream of WCW has ranged from 59,079 fish in 1987 to 852 fish in 1994 (Appendix 17). The mean run-size since 1977 is 16,590 fish. None of the tags applied to coho salmon at WCW were returned by anglers this year. We therefore estimate that none of the coho migrating upstream of WCW were harvested (Table 13).

### Adult Fall Steelhead

We estimated that 12,638 adult steelhead migrated upstream of WCW. The 95% confidence interval for our estimate, based on the Poisson Approximation, was between 10,411-15,627 adult steelhead upstream of WCW (Table 12). The adult steelhead spawning escapement was composed of 2,333 fish which entered TRH and 9,938 fish that spawned in natural areas (Table 13).

Intermittent fall steelhead run-size estimates made since 1980 have ranged from 37,276 in 1989 to 3,046 in 1992 (Appendix 18). Mean run-size for fall adult steelhead, for years in which we have estimates, is 9,913 fish. Anglers harvested an estimated 367 (2.9%) adult steelhead (Table 13). Anglers caught-and-released an estimated 1,168 fish (9.4%).

## DISCUSSION

Anadromous fish runs in the Trinity River were good this year, relative to the last 25 years. All the species and races we monitored this season had run size estimates higher than their respective mean run sizes since 1977. The good ocean conditions that bolstered last year's runs continued and the 2001-02 estimated run-sizes for fall Chinook and coho salmon and steelhead to the Trinity Basin all increased over last year. Run-size estimates for spring Chinook were slightly lower than last year. Runs of Chinook this year appear to have been bolstered by a mix of age three returns and age four returns. Run-timing of fall Chinook past WCW was similar to previous years.

Tagging numbers used to make population estimates for spring Chinook, coho salmon and steelhead were less than optimum. We trapped too few coho and steelhead at WCW and were unable to trap spring Chinook at JCW during the earliest part of their immigration to the upper Trinity River. Consequently, our 95% confidence intervals were  $\pm \sim 21\%$  for coho salmon,  $\pm \sim 21\%$  for steelhead, and  $\pm \sim 13\%$  spring run Chinook salmon. Our weirs are not able to capture the beginning of the spring Chinook run or the end of the coho salmon and steelhead runs. This could create bias in the estimates because we assume the weirs capture naturally produced and hatchery fish at equal rates. We do not know if the run timing of naturally produced and hatchery fish varies.

TABLE 12. Run-size estimates and confidence limits for Trinity River basin spring- and fall-run chinook and coho salmon, and fall-run steelhead during the 2001-02 season.

Species/ race	Area of Trinity River basin for run- size estimate	Stratum a/	Number effectively- tagged b/	Trinity River Hatchery recoveries		Run-size estimate d/	Confidence limits 1- P=0.95	Confidence limit estimator
				Number examined for tags c/	Number of tags in sample			
Spring-run chinook	Upstream of Junction City Weir	Grilse	77	629	26	2,065	17,403 - 22,243	Poisson Approximation
		Adults	<u>640</u>	<u>6,366</u>	<u>229</u>	<u>17,556</u>		
		Total	<u>717</u>	<u>6,995</u>	<u>255</u>	<u>19,622</u>		
Fall-run chinook	Upstream of Willow Creek Weir	Grilse	58	204	4	1,214	53,353 - 61,236	Poisson Approximation
		Adults	<u>2,486</u>	<u>17,971</u>	<u>805</u>	<u>55,895</u>		
		Total	<u>2,544</u>	<u>18,175</u>	<u>809</u>	<u>57,109</u>		
Coho	Upstream of Willow Creek Weir	Grilse	37	1,026	8	3,670	26,712 - 39,221	Poisson Approximation
		Adults	<u>275</u>	<u>9,755</u>	<u>96</u>	<u>28,470</u>		
		Total	<u>312</u>	<u>10,781</u>	<u>104</u>	<u>32,141</u>		
Fall-run steelhead	Upstream of Willow Creek Weir	Adults	508	2,333	93	12,638	10,411 - 15,627	Poisson Approximation

a/ Stratum: Grilse = two-year-old salmon, Adults = three years and older salmon. 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 by anglers).

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- and fall-run chinook and coho salmon were based on proportioning the total run-size by the ratio of grilse to adults observed at the respective weirs.

TABLE 13. 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 2001-02 season.

Species/ race	Area of Trinity River basin for run- size estimate	Stratum a/	Run size	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	2,065	12.5%	258	1,178	629	1,807
		Adults	<u>17,556</u>	5.2%	<u>906</u>	<u>10,284</u>	<u>6,366</u>	<u>16,650</u>
		Total	<u>19,622</u>	5.9%	<u>1,164</u>	<u>11,462</u>	<u>6,995</u>	<u>18,458</u>
Fall-run chinook	Upstream of Willow Creek Weir	Grilse e/	1,214	7.9%	96 e/	914	204	1,118
		Adults	<u>55,895</u>	3.2%	<u>1,772</u>	<u>36,152</u>	<u>17,971</u>	<u>54,123</u>
		Total	<u>57,109</u>	3.3%	<u>1,868</u>	<u>37,066</u>	<u>18,175</u>	<u>55,241</u>
Coho	Upstream of Willow Creek Weir	Grilse	3,670	0.0%	0	2,644	1,026	3,670
		Adults	<u>28,470</u>	0.0%	<u>0</u>	<u>18,715</u>	<u>9,755</u>	<u>28,470</u>
		Total	<u>32,141</u>	0.0%	<u>0</u>	<u>21,359</u>	<u>10,781</u>	<u>32,140</u>
Fall-run steelhead	Upstream of Willow Creek Weir	Adults	12,638	2.9%	367	9,938	2,333	12,271

a/ Stratum: Grilse = two-year-old salmon, Adults = three years and older salmon.

b/ Harvest rates were based on the return of reward-tags, except for grilse fall-run chinook which was estimated from a separate creel survey and coho salmon which was 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.

e/ Creel census estimate.

A potential positive bias associated with all mark-recapture studies is unaccounted tagging mortality. Although we attempt to account for these mortalities through recovery of tagged fish found dead at the weirs or in carcass surveys, we can not be sure that all mortalities are recovered. Since 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.

During the 2001-02 sport fishing season, a quota system for fall Chinook salmon was instituted for the Trinity River. With the exception of fall Chinook grilse harvest, we reported harvest based on the return of reward tags placed on fish at the weirs as opposed to using harvest numbers generated by a separate creel census conducted on the Trinity this year. We did use the creel census estimate for grilse fall Chinook because we tagged very few grilse fall Chinook at WCW and we did not receive any tag returns from anglers for grilse fall Chinook. It is our hope to continue using both methods for several years to validate our tagging/harvest rate methodology.

## RECOMMENDATIONS

1. Tagging and recapture operations for adult spring and fall Chinook and coho salmon, and adult fall steelhead in the Trinity River basin should be continued during the migration season, using the capture sites near Willow Creek and Junction City.
2. An alternate weir site for the Junction City area should be investigated. The current site does not allow for trapping at flows that exceed approximately 800 cfs. Current releases from Lewiston Dam do not subside to this level until late June or early July which is after spring Chinook have already begun migrating to the upper Trinity basin. Ideally, we should commence trapping in mid to late May.
3. Continue to trap five (instead of four) nights-per-week with mid-day weir openings at the weirs. Preliminary data indicates that our trapping efficiency was 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	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.

Appendix 2. Fork length (FL) distribution of coded-wire-tagged, Trinity River Hatchery-produced, spring-run chinook salmon recovered at Trinity River Hatchery during the 2001-02 season. a/

FL (cm)	Brood year												Total	
	1996		1997			1998			1999					
	Coded-wire tag number and age at release b/													
	065231-y	065237-f	065238-f	065240-y	065247-f	065248-f	065249-f	065250-y	065251-f	065252-f	065253-f	065258-y		
40													3	3
41													3	3
42													4	4
43										1			6	7
44									0	2			8	10
45									1	0			7	8
46								1	1	0			6	8
47								1	1	1			7	10
48								1	0	2			4	7
49				1				0	3	4			2	10
50				0				1	3	2	2		1	9
51				0				0	3	1	1		2	7
52				0				0	2	1	2		1	6
53				1				0	3	1	2		1	8
54				0				2	3	2	0		1	8
55				0				0	3	3	0		1	7
56				1				2	2	1	1		7	7
57				1				2	6	1	2	1	13	13
58				1			1	0	3	0	3		8	8
59				1		1	1	1	4	0			0	8
60				1		1	1	0	17	0			20	20
61		1		0		0	1	1	16	0			19	19
62		0		1		1	1	0	26	1			30	30
63		0		0		5	3	5	31				44	44
64		0	1	2		5	5	1	36				50	50
65		1	1	4		6	6	3	29				50	50
66		0	0	2		7	4	5	34				52	52
67		0	0	6		7	6	3	30				52	52
68		0	1	7		7	8	8	33				64	64
69		0	2	5		7	7	6	18				45	45
70		0	1	9		6	9	10	36				71	71
71		0	1	16		6	3	7	23				56	56
72		3	2	17		9	5	11	13				60	60
73		1	0	19		6	6	2	14				48	48
74		3	2	26		5	8	3	10				57	57
75		1	1	38		2	2	3	8				55	55
76		2	3	44		4	5	5	6				69	69
77		2	3	49		2	2	2	3				63	63
78		2	4	51		0	4	2	5				68	68
79		7	6	47		2	3	0	2				67	67
80		0	3	48		3	0	2	1				57	57
81		2	2	38		0	0	1	2				45	45
82		1	4	33		0	3	1	1				43	43
83		1	2	42		0	1	0	0				46	46
84		2	1	36		1		1	2				43	43
85		3	1	35					1				40	40
86		1	3	26					0				30	30
87		2	3	12					1				18	18
88		1	1	25									27	27
89		0	0	21									21	21
90	1	2	2	20									25	25
91		2	1	16									19	19
92		2	3	18									23	23
93		1	0	16									17	17
94		1	0	11									12	12
95		1	1	1									3	3
96			0	9									9	9
97			1	2									3	3
98			1	1									2	2
99				2									2	2
100				1									1	1
101				1									1	1
102				0									0	0
103				0									0	0
104				1									1	1
Totals:	1	45	57	765	93	95	85	419	28	25	9	57	1,679	
Mean FL:	90.0	81.2	80.6	80.8	69.8	70.4	70.3	66.8	51.9	52.0	52.7	45.6	73.3	

a/ The fish ladder was open from 10 September 2001 through 12 March 2002.

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 Trinity River Hatchery during the 2001-02 season a/

FL (cm)	Brood year																Total		
	1996	1997					1998					1999							
	Coded-wire tag number- age at release b/																		
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
45	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	1		
46	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1		
47	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1		
48	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	1		
49	0	3	4	5	6	9	1	2	3	4	5	2	1	4	5	6	7		
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
51	f	f	f	f	f	f	y	f	f	f	f	y	y	f	f	f	y		
52																	1		
53																	1		
54																	1		
55																	1		
56																	1		
57																	1		
58																	1		
59																	1		
60																	1		
61																	1		
62																	1		
63																	1		
64																	1		
65																	1		
66																	1		
67																	1		
68																	1		
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99																	1		
100																	1		
101																	1		
102																	1		
103																	1		
104																	1		
105																	1		
106																	1		
107																	1		
108																	1		
109																	1		
110																	1		
111																	1		
Totals:	1	32	40	29	17	25	1,814	35	24	20	24	119	2,906	8	2	1	5	13	5,115
Mean FL:	83.0	81.8	81.3	83.3	77.3	80.3	81.5	74.2	72.7	72.3	72.4	71.5	71.7	52.4	52.5	51.0	50.6	48.7	75.3

a/ The fish ladder was open from 10 September 2001 through 12 March 2002.  
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 Willow Creek and Junction City weirs, and recovered at Trinity River Hatchery (TRH) during the 2001-02 season.

FL (cm)	Willow Creek Weir a/				Junction City Weir a/			
	Total trapped	Ad-clips b/	Effective tags c/	TRH recoveries	Total trapped	Ad-clips b/	Effective tags c/	TRH recoveries
36					1		1	
37					0		0	
38					0		0	
39					0		0	
40					0		0	
41					0		0	
42	3		3		1	1	1	1
43	2		2		2	1	2	1
44	0		0		3	1	3	1
45	2		2		2	0	2	0
46	2	1	2		6	0	6	2
47	4	0	4		8	1	8	2
48	2	0	2		4	0	4	2
49	0	0	0		11	3	11	3
50	4	0	4		8	0	8	3
51	2	0	2		8	0	8	2
52	4	1	4	2	5	0	5	3
53	2	0	2	0	5	0	4	2
54	0	0	0	0	4	0	4	1
55	1	0	1	0	2	0	2	0
56	1	1	1	0	4	0	4	3
57	0	0	0	0	1	0	1	1
58	0	0	0	0	1	1	1	0
59	1	0	1	0	1	1	1	1
60	1	0	1	0	11	2	11	4
61	2	0	2	0	13	5	13	4
62	3	0	3	0	14	2	13	4
63	2	0	2	1	27	8	27	14
64	6	0	5	0	32	12	31	15
65	6	2	6	3	21	4	20	8
66	5	2	4	0	41	11	39	17
67	15	2	15	2	32	4	31	18
68	6	1	6	2	26	3	25	9
69	10	0	9	4	36	3	36	8
70	7	1	6	2	24	5	24	12
71	9	3	8	3	33	5	32	15
72	9	1	9	3	27	2	27	6
73	3	0	3	0	27	2	26	11
74	8	0	7	0	33	5	31	10
75	7	1	6	0	24	5	24	3
76	2	0	2	1	23	5	23	9
77	3	0	3	0	15	2	14	7
78	9	0	9	0	27	6	27	8
79	5	0	5	2	33	5	32	15
80	4	0	4	0	21	5	20	8
81	5	3	5	2	13	2	13	1
82	9	0	9	0	21	6	20	4
83	4	0	4	1	13	3	12	5
84	3	0	2	0	7	1	5	0
85	4	1	4	2	13	0	12	4
86	5	0	5	1	12	5	11	2
87	5	1	5	1	7	0	6	0
88	2	1	2	1	10	2	9	3
89	2	0	2	1	3	2	3	0
90	1	0	1	0	8	2	8	2
91	3	0	2	0	4	0	3	1
92	0	0	0	0	3	0	3	3
93	1	1	1	1	2	1	2	1
94	1	0	1	0	5		5	
95	0	0	0	0				
96	1	0	1	0				
97	0	0	0	0				
98	0	0	0	0				
99	2	0	2	1				
100	0	0	0	0				
101	0	0	0	0				
102	1	1	1	1				
Totals d/:	201	24	192	36	738	137	714	259
Mean FL:	71.2	72.8	71.1	74.1	70.7	71.0	70.6	69.5
Total grilse e/:	29	3	29	2	75	7	74	27
Total adults:	172	21	163	34	663	130	640	232

a/ Trapping at Willow Creek Weir took place from Julian week 34 (23 August) through Julian week 46 (12 November) of 2001. Only chinook trapped through Julian week 36 were considered spring-run chinook. Trapping at Junction City Weir took place from Julian week 24 (13 June) through Julian week 39 (26 September) of 2001. Chinook trapped through Julian week 38 were considered spring-run.

b/ Ad-clip=Adipose fin-clipped fish.

c/ The number of effectively tagged fish excludes fish that were not tagged, tagging mortalities, and fish which had their tags removed (caught and released by anglers).

d/ Totals do not include one fish at WCW and three fish at JCW that were tagged and not measured.

e/ Spring-run chinook salmon less than or equal to 57 cm FL were considered grilse; larger fish were adults.

Appendix 5. Fork length (FL) distribution of fall-run chinook salmon trapped and tagged in the Trinity River at Willow Creek and Junction City weirs, and recovered at Trinity River Hatchery (TRH) during the 2001-02 season.

FL (cm)	Willow Creek Weir a/			TRH recoveries	Junction City Weir a/			TRH recoveries
	Total trapped	Ad-clips b/	Effective tags c/		Total trapped	Ad-clips b/	Effective tags c/	
40	1		1					
41	0		0					
42	2		2					
43	1		1					
44	1		1					
45	0		0					
46	7		7	1				
47	5		5	1	1			
48	8		8	0	1	1	1	1
49	5	1	5	1	0	0	0	0
50	6	0	6	0	0	0	0	0
51	6	0	6	0	2	0	2	0
52	6	0	6	0	0	0	0	0
53	3	1	3	1	0	0	0	0
54	2	0	2	0	0	0	0	0
55	5	0	5	1	0	0	0	0
56	6	1	6	2	0	0	0	0
57	0	0	0	0	0	0	0	0
58	3	0	3	0	0	0	0	0
59	6	2	6	2	0	0	0	0
60	8	0	7	0	0	0	0	0
61	9	1	9	3	0	0	0	0
62	11	1	10	0	0	0	0	0
63	22	4	20	4	0	0	0	0
64	29	3	27	7	1	0	1	0
65	30	6	29	7	0	0	0	0
66	62	11	59	22	0	0	0	0
67	81	9	74	23	1	0	0	0
68	90	14	81	26	1	1	1	0
69	121	23	112	34	1	0	1	0
70	150	37	138	42	1	0	1	0
71	127	30	122	46	0	0	0	0
72	126	24	121	39	0	0	0	0
73	129	32	124	56	0	0	0	0
74	136	36	130	48	1	0	0	0
75	132	24	123	48	1	1	1	1
76	124	24	115	39	0	0	0	0
77	96	18	94	28	0	0	0	0
78	115	23	108	34	1	0	1	0
79	113	22	104	35	0	0	0	0
80	147	27	135	48	0	0	0	0
81	124	25	120	35	1	0	1	0
82	92	24	85	36	0	0	0	0
83	97	18	86	23	0	0	0	0
84	85	18	76	24	0	0	0	0
85	75	14	71	20	2	0	2	0
86	61	9	55	20	1	0	1	0
87	49	10	42	16				
88	38	6	36	12				
89	37	8	31	10				
90	33	5	30	7				
91	24	5	23	7				
92	19	4	17	5				
93	14	3	12	4				
94	8	4	6	1				
95	14	5	14	4				
96	10	1	9	4				
97	4	0	2	2				
98	4	0	4	0				
99	5	2	5	0				
100	0	0	0	0				
101	1	0	1	0				
102	1	0	1	0				
103	1	0	1	0				
104	0	0	0	0				
105	1	0	1	1				
106	1	1	1	1				
Totals d/:	2,729	536	2,544	829	16	3	13	2
Mean FL:	76.0	76.7	75.9	76.3	68.7	63.7	70.1	61.5
Total grilse e/:	58	2	58	5	4	1	3	1
Total adults:	2,671	534	2,486	824	12	2	10	1

a/ Trapping at Willow Creek Weir took place from Julian week 34 (23 August) through Julian week 46 (12 November) of 2001. Only chinook trapped after Julian week 36 (9 September) were considered fall-run chinook. Trapping at Junction City Weir took place from Julian week 24 (13 June) through Julian week 39 (26 September) of 2001. Chinook trapped after Julian week 38 were considered fall-run.

b/ Ad-clip=Adipose fin-clipped fish.

c/ The number of effectively tagged fish excludes fish that were not tagged, tagging mortalities, and fish which had their tags removed (caught and released by anglers).

d/ Totals do not include two fish that were caught at Junction City Weir and not measured.

e/ Fall-run chinook salmon less than or equal to 55 cm FL were considered grilse; larger fish were adults.



Appendix 6. Fork Length (FL) distribution of coho salmon trapped and tagged in the Trinity River at Willow Creek Weir, and recovered at Trinity River Hatchery (TRH) during the 2001-02 season.

FL (cm)	Willow Creek Weir a/			
	Total trapped	RM-clips b/	Effective tags c/	TRH recoveries
38	1	1	1	
39	1	1	1	1
40	1	1	1	1
41	1	1	1	0
42	2	2	2	0
43	3	3	3	0
44	1	1	1	0
45	3	3	3	1
46	2	2	2	1
47	4	3	4	0
48	5	5	5	3
49	4	4	4	0
50	2	2	2	0
51	4	4	4	1
52	0	0	0	0
53	0	0	0	0
54	1	1	1	0
55	0	0	0	0
56	2	0	2	0
57	0	0	0	0
58	0	0	0	0
59	1	1	1	0
60	0	0	0	0
61	2	2	2	0
62	0	0	0	0
63	2	2	2	1
64	1	1	1	0
65	5	5	5	1
66	10	7	9	1
67	11	9	9	2
68	11	10	10	2
69	23	22	21	6
70	24	24	23	9
71	29	22	28	9
72	29	28	27	8
73	30	25	29	14
74	36	33	36	13
75	24	22	23	8
76	18	16	18	7
77	15	13	15	8
78	5	4	5	1
79	4	4	4	2
80	2	2	2	1
81	2	2	2	1
82	1	1	1	1
83	1	0	1	0
84	0	0	0	0
85	0	0	0	0
86	0	0	0	0
87	0	0	0	0
88	0	0	0	0
89	1	1	1	1
Totals:	324	290	312	104
Mean FL:	69.3	69.1	69.3	71.0
Total grilse d/:	37	34	37	8
Total adults:	287	256	275	96

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 12 November (Julian week 46) of 2001.

b/ RM-clip= Right maxillary-clipped fish.

c/ The number of effectively tagged fish excludes fish that were not tagged, tagging mortalities and fish which had their tags removed (caught and released by anglers).

d/ Coho salmon less than or equal to 57 cm FL were considered grilse; larger fish were adults.

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 2001-02 season.

FL (cm)	Willow Creek Weir a/				Junction City Weir a/	
	Total trapped	Fin-clips b/	Effective tags c/	TRH recoveries	Total trapped	Fin-clips b/
37	2	2			1	
38	3	3			0	
39	1	1			0	
40	2	1			0	
41	1	1			3	1
42	1	1	1		1	1
43	3	3	3		1	0
44	2	2	2	1	0	0
45	0	0	0	0	2	0
46	0	0	0	0	0	0
47	0	0	0	0	1	0
48	1	0	0	0	2	0
49	3	0	2	0	1	0
50	7	3	6	0	1	1
51	7	3	7	1	1	0
52	9	3	7	0	1	0
53	12	5	9	1	3	2
54	5	3	4	2	4	3
55	9	5	9	0	5	3
56	7	4	6	1	7	5
57	18	11	17	7	4	1
58	15	5	15	2	16	6
59	25	14	22	1	16	10
60	33	18	29	7	13	5
61	34	25	31	11	20	14
62	40	20	38	4	9	4
63	35	21	32	4	9	6
64	39	19	36	1	1	1
65	40	20	36	7	4	3
66	36	23	34	10	1	1
67	34	17	31	6	5	2
68	38	25	36	6	5	2
69	21	12	20	3	3	2
70	18	11	17	5	2	2
71	11	8	11	3	3	2
72	13	10	12	4	0	0
73	13	9	12	2	0	0
74	6	3	6	1	1	1
75	4	4	4	1	1	1
76	3	2	2	0		
77	3	2	1	0		
78	2	2	2	1		
79	2	1	2	1		
80	2	2	2			
81	1	1	1			
82	0	0	0			
83	1	0	1			
84	1	1	1			
85	0		0			
86	1		1			
Totals: d/	564	326	508	93	147	79
Mean FL:	63.1	63.4	63.6	64.3	59.3	60.6
Total half-pounders e/:	9	8	0	0	4	1
Total adults:	555	318	508	93	143	78

a/ Trapping at Willow Creek Weir took place from 23 August through 12 November of 2001. Trapping at Junction City Weir from 13 June through 26 September 2001. Steelhead were not tagged at Junction City Weir.

b/ For brood years 1989 through 1994 and 1997 to 2001, all steelhead released from Trinity River Hatchery have been fin-clipped

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

d/ Totals do not include one steelhead from the Willow Creek Weir and two from the Junction City Weir that were tagged and not measured.

e/ Fall-run steelhead less than or equal to 41 cm FL were considered half-pounders; larger fish were adults.

Appendix 8. Fork length (FL) distribution of Ad-clipped and non-Ad-clipped fall-run steelhead trapped in the Trinity River at Willow Creek and Junction City weirs and that entered Trinity River Hatchery during the 2001-02 season.

FL (cm)	Recovery site					
	Willow Creek Weir a/		Junction City Weir b/ Fin-clip d/		Trinity River Hatchery c/	
	Unmk	AD	Unmk	AD	Unmk	AD
21						1
22						0
23						0
24						0
25						0
26						1
27						1
28						2
29						0
30						2
31						5
32						13
33						10
34						6
35						4
36						4
37		2	1			2
38		3	0			4
39		1	0			5
40	1	1	0			7
41	0	1	2			8
42	0	1	0	1		8
43	0	3	1	0		6
44	0	2	0	0		6
45	0	0	2	0		5
46	0	0	0	0		7
47	0	0	1	0		12
48	1	0	2	0		6
49	3	0	1	0		14
50	4	3	0	1		12
51	4	3	1	0		29
52	6	3	1	0	1	30
53	7	5	1	2	1	19
54	2	3	1	3	0	33
55	4	5	2	3	1	39
56	3	4	2	5	2	64
57	7	11	3	1	0	61
58	10	5	10	6	0	77
59	11	14	6	10	1	85
60	15	18	8	5	0	122
61	9	25	6	14	0	159
62	20	20	5	4	0	165
63	14	21	3	6	0	177
64	20	19	0	1	1	158
65	20	20	1	3	1	143
66	13	23	0	1	2	152
67	17	17	3	2	2	132
68	13	25	3	2	0	132
69	9	12	1	2	0	116
70	7	11	0	2	0	100
71	3	8	1	2	0	80
72	3	10		0	0	53
73	4	9		0	1	36
74	3	3		1		30
75	0	4		1		15
76	1	2				14
77	1	2				8
78	0	2				7
79	1	1				4
80	0	2				2
81	0	1				0
82	0	0				0
83	1	0				0
84	0	1				1
85	0					0
86	1					0
87						1
Totals: e/	238	326	68	79	13	2,395
Mean FL:	62.7	63.4	57.9	60.6	61.5	62.5
Total subadults f/:	1	8	3	1	0	75
Total adults:	237	318	65	78	13	2,320

a/ Trapping at Willow Creek Weir took place from 23 August through 12 November 2001.

b/ Trapping at Junction City Weir took place from 13 June through 26 September 2001.

c/ The fish ladder was open 10 September 2001 through 12 March 2002.

d/ Unmk = Unmarked steelhead

AD = Adipose clip; All steelhead reared at Trinity River Hatchery have been adipose fin-clipped since 1998 (1997 brood year).

e/ Totals do not include one fish from the Willow Creek Weir, one fish from the Junction City Weir, and one fish from Trinity River Hatchery that were not measured.

f/ Subadults were steelhead less than or equal to 41 cm FL; larger fish were adults.

Appendix 9. Fork length distribution of known recoveries of all spring chinook tagged at the Junction City Weir during the 2001-02 season a/.

Fork length (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/		
36	1							0	0.0%
37	0							0	---
38	0							0	---
39	0							0	---
40	0							0	---
41	0							0	---
42	1			1				1	100.0%
43	2			1				1	50.0%
44	3			1				1	33.3%
45	2		1	0				1	50.0%
46	6		1	2		1		4	66.7%
47	8		0	2		2		4	50.0%
48	4		0	2		0		2	50.0%
49	11		0	3		0		3	27.3%
50	8		0	3		1		4	50.0%
51	8		0	2		0		2	25.0%
52	5		0	3		1		4	80.0%
53	4		0	2		0		2	50.0%
54	4		1	1		0		2	50.0%
55	2		0	0		1		1	50.0%
56	4		0	3		0		3	75.0%
57	1		0	1		0		1	100.0%
58	1		0	0		0		0	0.0%
59	1		0	1		0		1	100.0%
60	11		0	4		0		4	36.4%
61	13		1	4		0	1	6	46.2%
62	14		0	4	1	0	0	5	35.7%
63	27		0	14	0	2	0	16	59.3%
64	31		2	15	0	1	0	18	58.1%
65	21	1	0	8	0	0	0	9	42.9%
66	41	1	1	17	1	2	0	22	53.7%
67	31	0	2	18	0	1	0	21	67.7%
68	26	0	0	9	1	0	0	10	38.5%
69	36	0	0	8	0	4	0	12	33.3%
70	24	0	3	12	0	0	0	15	62.5%
71	33	1	1	15	0	0	0	17	51.5%
72	27	0	2	6	0	0	0	8	29.6%
73	27	1	1	11	0	0	0	13	48.1%
74	33	1	0	10	1	2	1	15	45.5%
75	24	0	0	3	0	1		4	16.7%
76	23	0	0	9	0	1		10	43.5%
77	15	1	0	7	0	0		8	53.3%
78	27	0	1	8	0	1		10	37.0%
79	33	1	0	15	0	1		17	51.5%
80	21	1	1	8	0	0		10	47.6%
81	13	0	0	1	0	2		3	23.1%
82	21	1	3	4	0	0		8	38.1%
83	13	0	0	5	1	0		6	46.2%
84	7	2	0	0	0	1		3	42.9%
85	12	0	0	4	0	1		5	41.7%
86	12	0	0	2	1	0		3	25.0%
87	7	0	0	0	1	0		1	14.3%
88	10	0	0	3	1	0		4	40.0%
89	3	0	0	0		0		0	0.0%
90	8	0	1	2		1		4	50.0%
91	4	1		1				2	50.0%
92	3			3				3	100.0%
93	2			1				1	50.0%
94	5							0	0.0%
Grilse: /h	74	0	3	27	0	6	0	36	48.6%
Adults:	660	12	19	232	8	21	2	294	44.5%
Total i/:	734	12	22	259	8	27	2	330	45.0%

a/ Trapping at Junction City Weir took place from 13 June through 26 September, 2001. Only chinook tagged prior to

23 September, 2001 were considered spring chinook.

b/ Tagged fish found dead and unspawned within 30 days of tagging.

c/ Fish recovered in upper Trinity River spawner surveys.

d/ TRH=Trinity River Hatchery

e/ Fish reported as caught-and-released by anglers.

f/ Fish reported as harvested by anglers.

g/ Tags found on dead fish or found unattached.

h/ Grilse were considered fish less than or equal to 57 cm in FL.

i/ Totals do not include three fish that were not measured at Junction City Weir.

Appendix 10. Fork length distribution of known recoveries of all fall chinook tagged at the Willow Creek Weir during the 2001-20 season a/.

Fork length (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		
40	1							0	0.0%
41	0							0	---
42	2		1					1	50.0%
43	1		0					0	0.0%
44	1		0					0	0.0%
45	0		0					0	---
46	7		0	1				1	14.3%
47	5		0	1				1	20.0%
48	8		0	0				0	0.0%
49	5		0	1				1	20.0%
50	6		0	0				0	0.0%
51	6		0	0				0	0.0%
52	6		0	0				0	0.0%
53	3		0	1				1	33.3%
54	2		0	0				0	0.0%
55	5		0	1				1	20.0%
56	6		0	2				2	33.3%
57	0		0	0				0	---
58	3		0	0				0	0.0%
59	6		0	2				2	33.3%
60	7		0	0				0	0.0%
61	9		0	3		1		4	44.4%
62	11		0	0	1	0		1	9.1%
63	20		0	4	0	2		6	30.0%
64	28		0	7	1	0		8	28.6%
65	29		2	7	0	0		9	31.0%
66	60		5	22	1	0	1	29	48.3%
67	76	1	4	23	1	3	1	33	43.4%
68	82	0	3	26	1	2	0	32	39.0%
69	114	0	5	34	2	5	0	46	40.4%
70	141	0	7	42	3	8	0	60	42.6%
71	122	0	7	46	0	6	2	61	50.0%
72	122	0	8	39	1	2	0	50	41.0%
73	126	0	11	56	3	5	0	75	59.5%
74	131	0	5	48	1	6	2	62	47.3%
75	125	0	7	48	2	2	1	60	48.0%
76	117	0	13	39	2	2	1	57	48.7%
77	94	0	6	28	0	4		38	40.4%
78	110	0	6	34	2	5		47	42.7%
79	105	1	8	35	0	3		47	44.8%
80	135		9	48	0	3		60	44.4%
81	120		6	35	0	1		42	35.0%
82	86		6	36	1	2		45	52.3%
83	89		4	23	3	0		30	33.7%
84	77		6	24	1	0		31	40.3%
85	72		5	20	1	0		26	36.1%
86	56		2	20	1	1		24	42.9%
87	42		3	16	0	2		21	50.0%
88	36		3	12	0	1		16	44.4%
89	31		3	10	0	0		13	41.9%
90	31		1	7	1	0		9	29.0%
91	23			7		1		8	34.8%
92	17			5				5	29.4%
93	12			4				4	33.3%
94	6			1				1	16.7%
95	14			4				4	28.6%
96	9			4				4	44.4%
97	2			2				2	100.0%
98	4			0				0	0.0%
99	5			0				0	0.0%
100	0			0				0	---
101	1			0				0	0.0%
102	1			0				0	0.0%
103	1			0				0	0.0%
104	0			0				0	---
105	1			1				1	100.0%
106	1							0	0.0%
Grilse: /h	58	0	1	5	0	0	0	6	10.3%
Adults:	2,516	2	145	824	28	64	8	1,075	42.7%
Total:	2,574	2	146	829	28	64	8	1,081	42.0%

- a/ Trapping at Willow Creek Weir took place from 23 August through 12 November, 2001. Only chinook tagged after 9 August, 2001 were considered fall chinook.
- b/ Tagged fish found dead and unspawned within 30 days of tagging.
- c/ Fish recovered in upper Trinity River spawner surveys.
- d/ TRH=Trinity River Hatchery
- e/ Fish reported as caught-and-released by anglers.
- f/ Fish reported as harvested by anglers.
- g/ Tags found on dead fish or found unattached.
- h/ Grilse were considered fish less than or equal to 55 cm, FL; larger fish were adults.

Appendix 11. Fork length distribution of known recoveries of all coho salmon tagged at the Willow Creek Weir during the 2001-02 season a/.

Fork length (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/		
38	1							0	0.0%
39	1			1				1	100.0%
40	1			1				1	100.0%
41	1			0				0	0.0%
42	2			0				0	0.0%
43	3			0				0	0.0%
44	1			0				0	0.0%
45	3			1				1	33.3%
46	2			1				1	50.0%
47	4			0				0	0.0%
48	5			3				3	60.0%
49	4			0				0	0.0%
50	2			0				0	0.0%
51	4			1				1	25.0%
52	0			0				0	---
53	0			0				0	---
54	1			0				0	0.0%
55	0			0				0	---
56	2			0				0	0.0%
57	0			0				0	---
58	0			0				0	---
59	1			0				0	0.0%
60	0			0				0	---
61	2			0				0	0.0%
62	0			0				0	---
63	2			1				1	50.0%
64	1			0				0	0.0%
65	5			1				1	20.0%
66	9			1				1	11.1%
67	9			2				2	22.2%
68	10		1	2				3	30.0%
69	22		0	6	1		1	8	36.4%
70	23		3	9				12	52.2%
71	28		1	9				10	35.7%
72	27		1	8				9	33.3%
73	29		1	14				15	51.7%
74	36		4	13				17	47.2%
75	23		1	8				9	39.1%
76	18		0	7				7	38.9%
77	15		5	8				13	86.7%
78	5		1	1				2	40.0%
79	4		0	2				2	50.0%
80	2		0	1				1	50.0%
81	2		1	1				2	100.0%
82	1			1				1	100.0%
83	1			0				0	0.0%
84	0			0				0	---
85	0			0				0	---
86	0			0				0	---
87	0			0				0	---
88	0			0				0	---
89	1			1				1	100.0%
Grilse h/:	37	0	0	8	0	0	0	8	21.6%
Adults:	276	0	19	96	1	0	1	117	42.4%
Total:	313	0	19	104	1	0	1	125	39.9%

a/ Trapping at Willow Creek Weir took place from 23 August through 12 November, 2001.

b/ Tagged fish found dead and unspawned within 30 days of tagging.

c/ Fish recovered in upper Trinity River spawner surveys.

d/ TRH=Trinity River Hatchery

e/ Fish reported as caught-and-released by anglers.

f/ Fish reported as harvested by anglers.

g/ Tags found on dead fish or found unattached.

h/ Grilse were considered fish less than or equal to 58 cm, FL.

Appendix 12. Fork length distribution of known recoveries of all fall-run adult steelhead tagged at the Willow Creek Weir during the 2001-02 season a/.

Fork length (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	3					1		1	33.3%
44	2			1		0		1	50.0%
45	0			0		0		0	---
46	0			0		0		0	---
47	0			0		0		0	---
48	1			0	1	0		1	100.0%
49	3			0	1	0		1	33.3%
50	7			0	1	0		1	14.3%
51	7			1	0	1		2	28.6%
52	8			0	1	0		1	12.5%
53	12			2	3	0		5	41.7%
54	5			2	1	0		3	60.0%
55	9			1	0	0		1	11.1%
56	7			1	1	0		2	28.6%
57	18			7	1	0		8	44.4%
58	15			2	0	0		2	13.3%
59	23			1	1	1		3	13.0%
60	33			7	4	2		13	39.4%
61	33			11	2	2		15	45.5%
62	40			4	2	0		6	15.0%
63	34			4	2	2		8	23.5%
64	38			1	2	0		3	7.9%
65	39			7	3	0		10	25.6%
66	36			10	2	1		13	36.1%
67	34			6	3	0		9	26.5%
68	37			6	1	0		7	18.9%
69	21			3	1	1		5	23.8%
70	17			5	0	0		5	29.4%
71	11			3	0	0		3	27.3%
72	13			4	1	1		6	46.2%
73	12			2	0			2	16.7%
74	6			1	0			1	16.7%
75	4			1	0			1	25.0%
76	3			0	1			1	33.3%
77	1			0				0	0.0%
78	2			1				1	50.0%
79	2			1				1	50.0%
80	2							0	0.0%
81	1							0	0.0%
82	0							0	---
83	1							0	0.0%
84	1							0	0.0%
85	0							0	---
86	1							0	0.0%
Total h/ g/:	543	0	0	95	35	12	0	142	26.2%

a/ Trapping at Willow Creek Weir took place from 23 August through 12 November, 2001.

b/ Tagged fish found dead and unspawned within 30 days of tagging.

c/ Fish recovered in upper Trinity River spawner surveys.

d/ TRH=Trinity River Hatchery

e/ Fish reported as caught-and-released by anglers.

f/ Fish reported as harvested by anglers.

g/ Tags found on dead fish or found unattached.

h/ Only adult steelhead greater than 41 cm, fl were tagged.

g/ Totals do not include one fish that was tagged but not measured.

Appendix 13. California Fish and Game Commission regulations that affected salmonid harvest in the Trinity River during the 2001-02 season.<sup>a/</sup>

Body of Water	Open Season and Special Regulations.	Daily Bag and Possession Limit
(G) Trinity River		
2. Lewiston Dam to 250 feet downstream from Lewiston Dam.	Closed to all fishing all year.	
3. From 250 feet below Lewiston Dam to Old Lewiston bridge.	Last Saturday in April through September 15. Only artificial flies with barbless hooks may be used.	0 trout, 0 salmon
4. From Old Lewiston bridge to Highway 299 West bridge at Cedar Flat.	Fourth Saturday in May through March 31. <b>i)Closed to the take of all King salmon over 24 inches total length Sept. 9 through Sept. 18 and Oct. 12 through Nov. 30***.</b>	1 hatchery trout or 1 hatchery steelhead. 2 King salmon.
5. From the Highway 299 West bridge at Cedar Flat downstream to the Hawkins Bar Bridge (Road to Denny).	Fourth Saturday in May through August 31 and Nov. 16 through Mar. 31.	No more than 4 salmon over 24 inches in any 7 consecutive days.
6. From Hawkins Bar Bridge (Road to Denny) to the mouth of the South Fork Trinity.	Fourth Saturday in May through Mar. 31 <b>i)Special king salmon seasons: Sept. 9 through Sept. 30 and Oct. 29 through Nov. 30***</b>	No more than 8 salmon may be possessed, of which no more than 4 may be over 24 inches total length.
7. The main stem Trinity River downstream from mouth of the South Fork of the Trinity.	All year. <b>i)Special king salmon season: Sept. 9 through Sept. 30 and Oct. 29 through Nov. 30***</b>	
8. South Fork of the Trinity River downstream from the mouth of Grouse Creek.	Saturday preceding Memorial Day through Mar. 14. <b>i)Special king salmon seasons: Sept. 9 through Sept. 30 and Oct. 29 through Nov. 30***</b>	1 hatchery trout or steelhead. 0 king salmon.
9. South Fork Trinity River main stem above the South Fork Trinity River bridge near Hyampom.	Closed to all fishing all year.	
9D. Hayfork Creek mainstem, from hwy 3 bridge in Hayfork downstream to the mouth.	Fourth Saturday in May through March 31. Only artificial lures with barbless hooks may be used.	0 bag limit
10. North Fork Trinity River main stem.	Closed to all fishing all year.	
11. New River main stem.	Closed to all fishing all year.	
12. All tributaries of the Trinity River not listed above.	Last Saturday in Apr. through Nov. 15; Maximum size limit: 14 inches total length.	2 trout, 0 salmon
Anglers may only use barbless hooks and may not remove any adult king salmon from the water by any means, such as by dragging or pushing the fish on shore or using a net of any type.		

<sup>a/</sup> From State of California, Fish and Game Commission, California Code of Regulations for 2001, Title 14. Natural Resources, Division 1. Fish and Game Commission-Department of Fish and Game, Chapter 3, Article 3, Section 91.1(Alphabetical List of Waters with Special Fishing Regulations).



Appendix 14. Fork length (FL) distribution of coho salmon recovered at Trinity River Hatchery during the 2001-02 season. a/

FL (cm)	Unmarked	Right maxillary clip b/	Total
31		1	1
32		0	0
33		0	0
34		2	2
35		1	1
36		3	3
37		1	1
38		6	6
39		10	10
40		21	21
41		23	23
42		33	33
43		56	56
44	1	76	77
45	0	77	77
46	0	104	104
47	0	116	116
48	1	96	97
49	0	83	83
50	0	85	85
51	0	65	65
52	0	44	44
53	0	36	36
54	0	29	29
55	0	22	22
56	0	12	12
57	0	15	15
58	0	7	7
59	0	13	13
60	0	12	12
61	1	23	24
62	0	30	30
63	0	46	46
64	0	70	70
65	0	91	91
66	1	176	177
67	3	312	315
68	3	504	507
69	3	666	669
70	10	934	944
71	17	1121	1138
72	9	1124	1133
73	18	1089	1107
74	19	965	984
75	14	760	774
76	7	572	579
77	8	459	467
78	8	301	309
79	2	152	154
80	2	118	120
81	2	50	52
82	1	21	22
83	0	8	8
84	2	2	4
85		2	2
86		2	2
87		1	1
88		0	0
89		1	1
Totals:	132	10,649	10,781
Mean FL:	73.2	69.9	69.9
Total Grilse: c/	2	1,024	1,026
Total Adults:	130	9,625	9,755

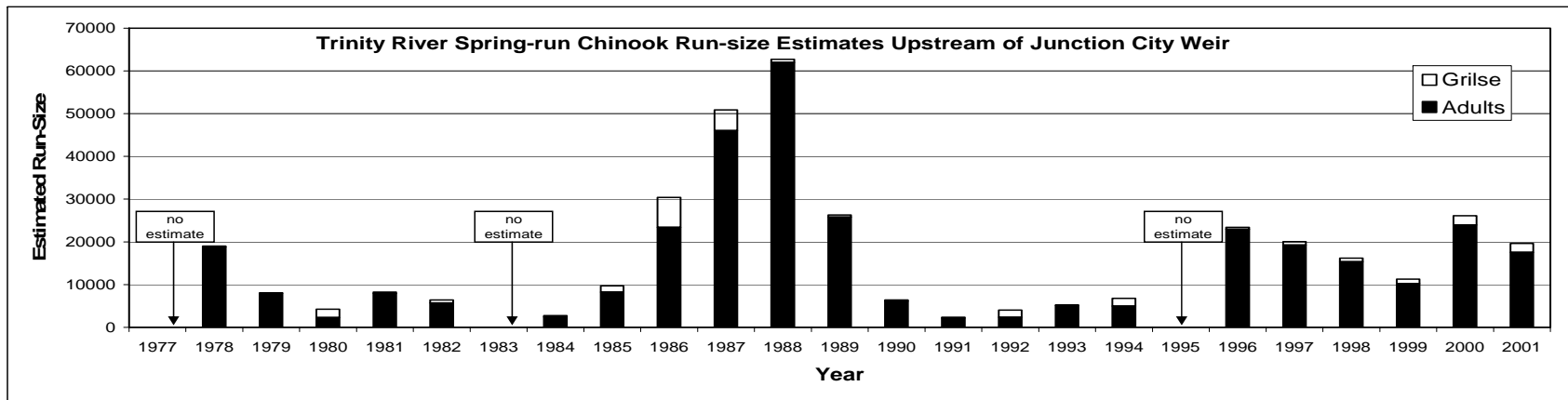
a/ The fish ladder was open from 10 September 2001 through 12 March 2002.

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

c/ Grilse were considered fish less than or equal to 58 cm, FL.

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 2001.

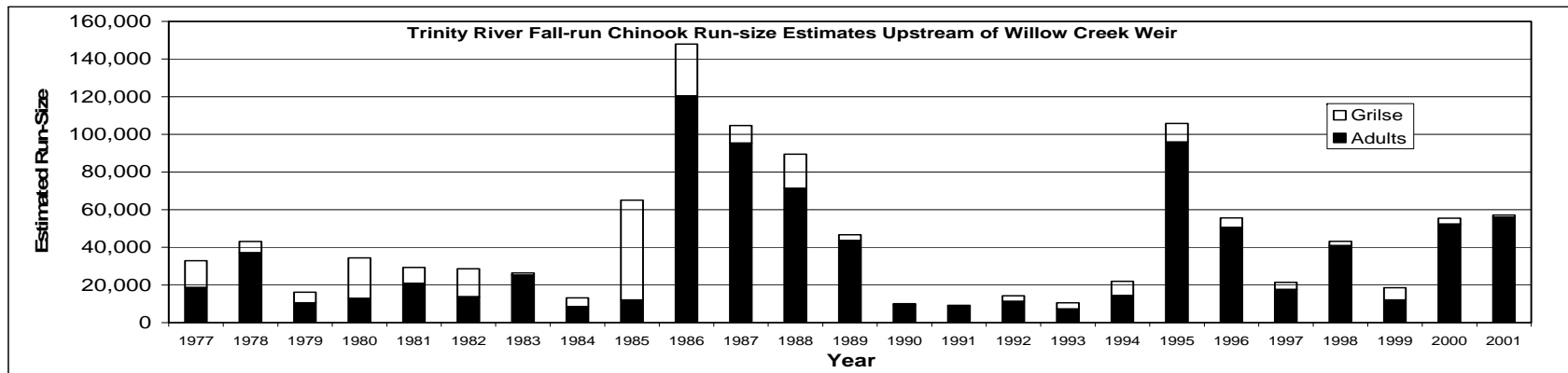
Year	Run-size estimate					Spawner escapements						Angler harvest		
	Grilse		Adults		Total	Natural			Trinity River Hatchery			Grilse	Adults	Total
	Number	Percent	Number	Percent		Grilse	Adults	Total	Grilse	Adults	Total			
1977			no estimates				no estimates		385	1,124	1,509	no estimates		
1978	190	1.0%	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%	19,622	1,178	10,284	11,462	629	6,366	6,995	258	906	1,164



a/ The 1978 sport harvest of spring-run chinook was limited by a salmon fishing closure beginning 25 August 1978.  
 b/ The sport harvest of adult spring-run chinook was limited by fishing closures to the taking chinook salmon greater than or equal to 56 cm total length during these years. The closures took effect 22 September in 1985, 5 November 1992, 9 October 1994,. The Trinity River was subject to seasonal closures during the 1995-00 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 2001.

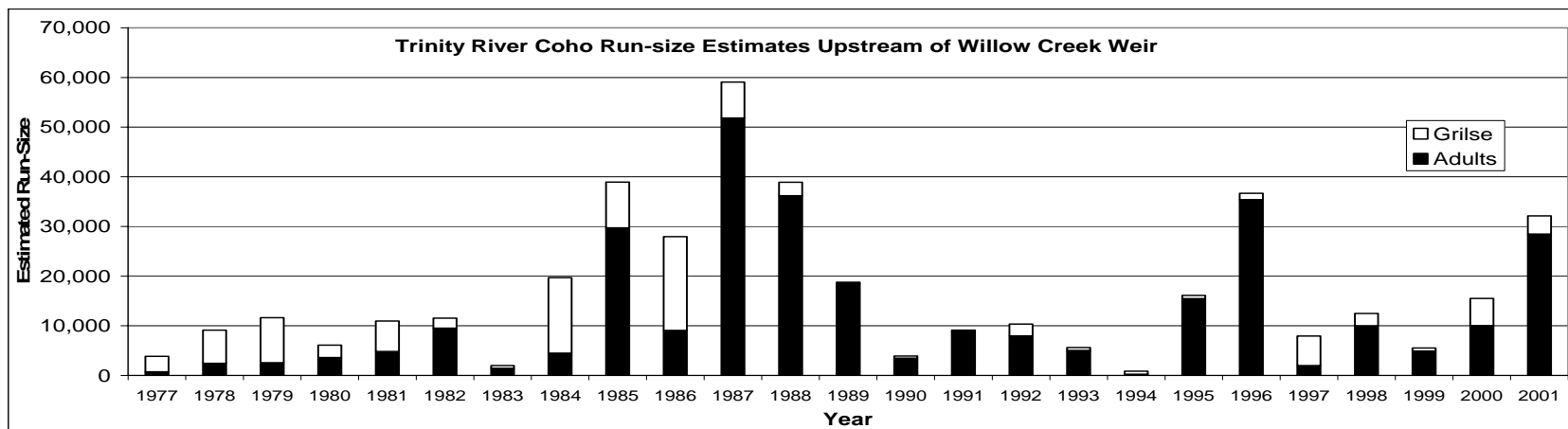
Year	Run-size estimate					Spawner escapements						Angler harvest			
	Grilse		Adults		Total	Grilse	Natural		Total	Trinity River Hatchery			Grilse	Adults	Total
	Number	Percent	Number	Percent			Adults	Grilse		Adults	Grilse	Adults			
1977	14,318	43.5%	18,596	56.5%	32,914	9,737	13,501	23,238	2,177	2,035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



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

Appendix 17. Coho salmon run-size, spawner escapement and angler harvest estimates for the Trinity River upstream of Willow Creek Weir from 1977 through 2001.

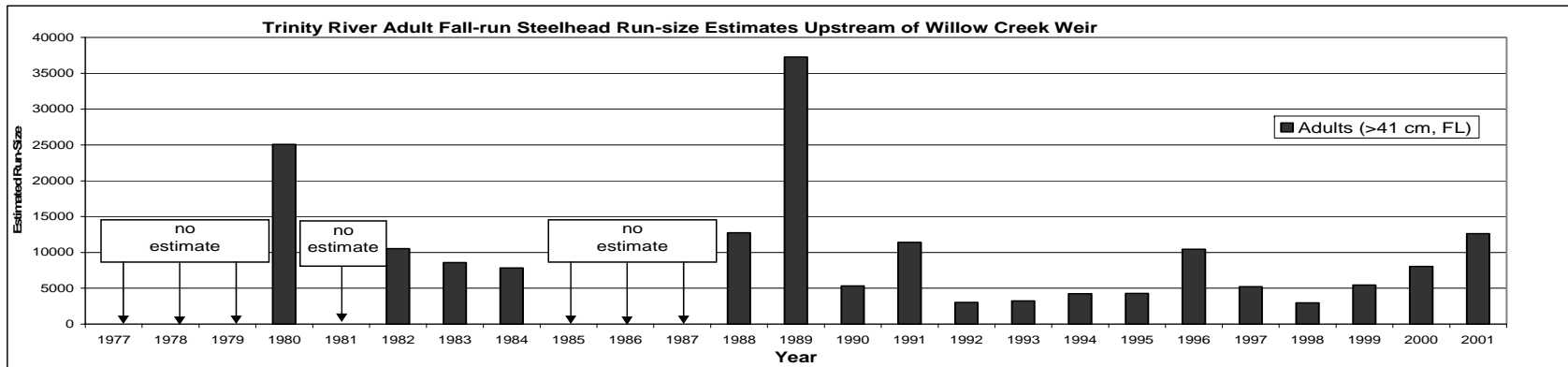
Year	Run-size estimate					Spawner escapements						Angler harvest		
	Grilse		Adults		Total	Grilse	Natural		Trinity River Hatchery			Grilse	Adults	Total
	Number	Percent	Number	Percent			Adults	Total	Grilse	Adults	Total			
1977	3,106	80.5%	752	19.5%	3,858	1,756	25	1,781	1,230	698	1,928	120	29	149
1978	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%	32,141	2,644	18,715	21,359	1,026	9,755	10,781	0	0	0 c/



a/ The 1978 sport harvest of coho was essentially eliminated by a salmon fishing closure beginning 25 August 1978.  
 b/ The 1985 sport harvest of adult coho was limited by a closure for the taking salmon greater than or equal to 56 cm total length beginning 22 September 1985.  
 c/ The 1996-01 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 2001. a/

Year	Run-size estimate					Spawner escapement						Angler harvest			
	Hatchery b/		Wild c/		Total	Natural			Trinity River Hatchery			Hatchery	Wild	Total	
	Number	Percent	Number	Percent		Hatchery	Wild	Total	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					"			6,661		599	"			
1984	"					"			6,430		142	"			
1985	No estimates					No estimates					461	No estimates			
1986	"					"					3,780	"			
1987	"					"					3,007	"			
1988	No estimates for hatchery/wild components					12,743	"					817	"		
1989	"					37,276	11,926 d/					4,765	"		
1990	"					5,348	28,933					930	"		
1991	"					11,417	3,188					446	"		
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			516	
1998	"					2,972	"			2,463	"			68 e/	
1999	"					5,470	"			3,817	"			82 e/	
2000	"					8,042	"			7,097	"			177 e/	
2001	"					12,638	"			9,938	"			367 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.

ANNUAL REPORT  
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT  
2001-02 SEASON

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

by

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ABSTRACT

Recovery of marked spring-run (spring) and fall-run (fall) Chinook salmon (*Oncorhynchus tshawytscha*) at Trinity River Hatchery (TRH) was conducted between 10 September, 2001 and 12 March, 2002. Of the 25,170 Chinook salmon that entered TRH, we recovered 7,215 adipose fin-clipped (AD) Chinook salmon, 28.7% of the total. Of these, coded-wire tags (CWT) were recovered from 1,679 spring Chinook and 5,115 fall Chinook salmon.

We estimated that 3,372 marked (AD+CWT) spring Chinook returned to the Trinity River upstream of the Junction City Weir and 10,600 marked fall Chinook returned to the Trinity River upstream of the Willow Creek weir during the 2001-02 season.

Run-size, in-river angler harvest, and spawner escapements of marked spring- and fall-run Chinook salmon of the 1996 through 1999 brood years are presented. Complete returns are only available for both runs of fish from the 1996 brood year, returning as two- through five-year-olds. TRH-produced spring Chinook from this brood year returned at estimated rates of 0.34% and 0.28% for fingerling and yearling releases respectively. Similarly, fall Chinook returned at rates of 0.20% and 0.36%. Spring Chinook released as yearlings returned at rates similar to fingerling released fish. Fall Chinook yearlings returned at approximately twice the rate of fingerlings.

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 were 65.2% and 61.5% respectively.

## 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 10 September, 2001 through 12 March, 2002, 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). 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. 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 2002, Sinnen 2000, Lau et al. 2000; Lau et al. 1998; Zuspan 1997; Zuspan 1996.

## 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:

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

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

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

where,  $F_{\text{CWT group}}$  = fraction of the salmon population with a specific CWT code; and  $NH_{\text{CWT group}}$  = 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:

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

where,  $N_{\text{CWT group}}$  = 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:

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

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

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



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

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:

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

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

As stated above, estimating the total return of individual CWT groups depends on a basin run-size estimate. In evaluating the return of CWTed 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 48.4), 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 7,215 AD-clipped Chinook at TRH this season, of which we recovered CWT's from 1,679 spring Chinook and 5,115 fall Chinook. The remaining 421 AD-clipped fish had either shed their CWT or the CWT was lost or unreadable. Chinook without CWT's were classified as either spring- or fall-run based on their date of entry into TRH. Fish which entered the hatchery prior to 14 October were considered spring Chinook, while Chinook entering after 28 October were considered fall fish. Recovered spring Chinook CWT's were composed of 12 release groups from the 1996 through 1999 BY's. Recovered fall Chinook with CWT's were from 18 groups representing the 1996 through 1999 BY's (Table 1).

Table 1. Release and recovery data for adipose fin-clipped chinook recovered at Trinity River Hatchery (TRH) during the 2001-02 season.

CWT a/ code	Egg source	Brood year	Release data				Recovery data				Total No.
			Date	Number	Size (No./lb)	Site	Males		Females		
							No.	FL b/	No.	FL b/	
<b>Spring-run chinook salmon</b>											
065231	TRH	1996	10/1-7/97	110,330	10.8	TRH	1	90.0	0	---	1
065237	TRH	1997	06/15/98	104,577	49	TRH	21	84.0	24	78.8	45
065238	TRH	1997	06/15/98	104,578	49	TRH	26	85.4	31	76.7	57
065240	TRH	1997	10/1-7/98	147,507	13	TRH	291	85.2	474	78.1	765
065247	TRH	1998	06/1-7/99	54,378	55	TRH	41	72.1	52	67.9	93
065248	TRH	1998	06/1-7/99	61,516	64	TRH	48	72.4	47	68.3	95
065249	TRH	1998	06/1-7/99	61,074	67	TRH	39	72.5	46	68.4	85
065250	TRH	1998	10/4-13/99	137,602	11.25	TRH	193	68.7	226	65.2	419
065251	TRH	1999	06/1-07/00	49,421	40.8	TRH	28	51.9	0	---	28
065252	TRH	1999	06/1-07/00	51,993	40.8	TRH	25	52.0	0	---	25
065253	TRH	1999	06/1-07/00	46,966	50.6	TRH	9	52.7	0	---	9
065258	TRH	1999	10/03-06/00	129,919	10.3	TRH	57	45.6	0	---	57
100000 c/ d/							55	71.7	77	72.9	132
Spring-run chinook salmon totals:							834		977		1,811
<b>Fall-run chinook salmon</b>											
065230	TRH	1996	06/5-12/97	217,981	88	TRH	0	---	1	83.0	1
065233	TRH	1997	06/15/98	50,947	110	TRH	12	85.1	20	79.8	32
065234	TRH	1997	06/15/98	49,353	108	TRH	13	83.8	27	80.1	40
065235	TRH	1997	06/15/98	49,786	100	TRH	15	86.1	14	80.2	29
065236	TRH	1997	06/15/98	48,382	88	TRH	4	79.0	13	76.8	17
065239	TRH	1997	06/15/98	18,304	160	TRH	8	81.4	17	79.8	25
065241	TRH	1997	10/1-7/98	313,080	23.2	TRH	735	84.8	1,079	79.2	1,814
062641	TRH	1998	10/4-13/99	334,726	19.05	TRH	1,550	73.4	1,356	69.7	2,906
065242	TRH	1998	06/1-7/99	46,399	106	TRH	20	76.0	15	71.9	35
065642	TRH	1998	10/4-13/99	16,673	19.05	TRH	65	72.9	54	69.8	119
065243	TRH	1998	06/1-7/99	42,659	118	TRH	11	74.9	13	70.9	24
065244	TRH	1998	06/1-7/99	49,332	135	TRH	7	76.0	13	70.3	20
065245	TRH	1998	06/1-7/99	46,391	141	TRH	10	74.4	14	70.9	24
065254	TRH	1999	06/1-07/00	44,654	79.4	TRH	8	52.4	0	---	8
065255	TRH	1999	06/1-07/00	42,549	79.4	TRH	2	52.5	0	---	2
065256	TRH	1999	06/1-07/00	43,565	90.5	TRH	1	51.0	0	---	1
065257	TRH	1999	06/1-07/00	50,533	90.5	TRH	5	50.6	0	---	5
065259	TRH	1999	10/03-06/00	296,892	14.7	TRH	13	48.7	0	---	13
100000 c/ e/							130	76.7	158	74.0	288
Fall-run chinook salmon totals:							2,609		2,794		5,403

a/ CWT = Coded-wire tag.

b/ FL = Average fork length in cm.

c/ 100000 = No CWT found or it was lost during recovery.

d/ Assigned as spring-run chinook based on their entry dates into Trinity River Hatchery.

e/ Assigned as fall-run chinook based on their entry dates into Trinity River Hatchery.

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

### Spring-run Chinook salmon

Based on estimated total Chinook run-size above JCW, the AD-clip rate of spring Chinook at JCW, the estimated angler harvest rate, and recovery of spring-run CWT fish at TRH, we estimated that 3,372 CWT'ed spring chinook salmon returned to the Trinity River above JCW during the 2001-02 season. An estimated 193 of these fish were harvested by anglers during the season. Escapement of CWT'ed spring Chinook was divided between 1,679 fish recovered at the TRH and 1,500 estimated to have spawned naturally (Table 2).

#### 1996 brood year

Two spring Chinook CWT groups from the 1996 BY completed their life cycle this season, having reached the age of five. CWT group 065229 (smolt release) had an overall return rate of 0.34%. The yearling-released group, 065231, returned at a rate of 0.28%, 0.8 times that of their smolt-released counterpart. The largest returns for smolt releases were at age three, and age four for yearling releases (Table 3).

#### 1997 brood year

Spring Chinook yearlings (CWT 065240) from the 1997 BY have returned at a rate approximately 3.7 times that of their smolt (CWT 065237 and 065238) released counterparts thus far. Tagged fish from this BY can be expected to return as five-year-olds in 2002 (Table 3).

#### 1998 brood year

Three smolt release groups, 065247, 065248 and 065249 (smolt releases) and 065250 (yearling release), have returned as age two and three-year-old fish thus far. Estimated return of yearling releases, through age three are approaching 0.7%, which is approximately 2 times that of the fingerling releases (Table 3). Spring Chinook from these groups will be returning as four- and five-year-olds during 2002 and 2003 respectively.

#### 1999 brood year

Four release groups from the 1999 BY returned as two-year-olds. The one yearling release group, 065258, has returned at approximately the same rate as that of the three smolt groups, 065251, 065252 and 065253 (Table 3). Spring Chinook from this BY are expected to return as three through five-year-olds during the next three years.

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 2001-02 season.

Run-size estimates a/		Angler harvest rates b/		% TRH	%	Ad+CWT
		Grilse	Adults	Ads With CWTs c/	Weir Ads d/	Run-size estimates e/
Spring Chinook (JCW)	19,622	12.5%	5.2%	92.90%	18.50%	3,372
Fall Chinook (WCW)	57,109	7.9%	3.2%	94.70%	19.60%	10,600

CWT code	BY	Age	TRH Total No.	% of Total	Run-size	Angler harvest	Spawning escapement		
							TRH	Natural	Total
<b>Spring-run chinook salmon</b>									
065231	96	5	1	0.1%	2	0	1	1	2
065237	97	4	45	2.7%	90	5	45	40	85
065238	97	4	57	3.4%	114	6	57	51	108
065240	97	4	765	45.6%	1,537	80	765	692	1,457
065247	98	3	93	5.5%	187	10	93	84	177
065248	98	3	95	5.7%	191	10	95	86	181
065249	98	3	85	5.1%	171	9	85	77	162
065250	98	3	419	25.0%	842	44	419	379	798
065251	99	2	28	1.7%	56	7	28	21	49
065252	99	2	25	1.5%	50	6	25	19	44
065253	99	2	9	0.5%	18	2	9	7	16
065258	99	2	57	3.4%	114	14	57	43	100
			1,679	100%	3,372	193	1,679	1,500	3,179

**Fall-run chinook salmon**

065230	96	5	1	0.0%	2	0	1	1	2
065233	97	4	32	0.6%	66	2	32	32	64
065234	97	4	40	0.8%	83	3	40	40	80
065235	97	4	29	0.6%	60	2	29	29	58
065236	97	4	17	0.3%	35	1	17	17	34
065239	97	4	25	0.5%	52	2	25	25	50
065241	97	4	1,814	35.5%	3,759	120	1,814	1,825	3,639
062641	98	3	2,906	56.8%	6,022	193	2,906	2,923	5,829
065242	98	3	35	0.7%	73	2	35	36	71
065243	98	3	24	0.5%	50	2	24	24	48
065244	98	3	20	0.4%	41	1	20	20	40
065245	98	3	24	0.5%	50	2	24	24	48
065642	98	3	119	2.3%	247	8	119	120	239
065254	99	2	8	0.2%	17	1	8	8	16
065255	99	2	2	0.0%	4	0	2	2	4
065256	99	2	1	0.0%	2	0	1	1	2
065257	99	2	5	0.1%	10	1	5	4	9
065259	99	2	13	0.3%	27	2	13	12	25
			5,115	1	10,600	342	5,115	5,143	10,258

a/ Run-size estimates are upstream of either Willow Creek weir (WCW) or Junction City weir (JCW) and are inclusive of the entire run (hatchery produced and naturally produced).

b/ In-river angler harvest rates are based on the return of reward tags.

c/ A portion of all chinook released from Trinity River Hatchery (TRH) are coded-wire tagged and identified with an adipose (Ad) fin-clip. The fraction shown are those fish with an adipose fin-clip that also contained a coded-wire tag (CWT).

d/ The observed percentage of Ad-clipped fish 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 1998 through 2001.

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/ TRH	Natural	Total
065229	1996	06/2-6/97	218,881	TRH	2	79	0.036	5	31	43	74
					3	460	0.210	28	235	196	431
					4	204	0.093	13	112	79	191
					5	0	0.000	0	0	0	0
					Totals: d/ Total Adults: e/			743	0.3395	46	378
			664	0.3034	41	347	275	622			
065231	1996	10/1-7/97	110,330	TRH	2	8	0.007	1	3	5	8
					3	143	0.130	9	73	60	133
					4	159	0.144	10	87	62	149
					5	2	0.002	0	1	1	2
					Totals:d/ Total Adults: e/			312	0.2828	20	164
			304	0.2755	19	161	123	284			
065237	1997	06/15/98	104,577	TRH	2	41	0.039	2	21	18	39
					3	805	0.770	50	441	314	755
					4	90	0.086	5	45	40	85
065238	1997	06/15/98	104,578	TRH	2	61	0.058	2	31	27	58
					3	718	0.687	44	393	281	674
					4	114	0.109	6	57	51	108
065240	1997	10/1-7/98	147,507	TRH	2	223	0.151	9	114	99	213
					3	2,708	1.836	167	1,483	1,058	2,541
					4	1,537	1.042	80	765	692	1,457
065247	1998	06/1-7/99	54,378	TRH	2	35	0.064	5	19	11	30
					3	187	0.344	10	93	84	177
065248	1998	06/1-7/99	61,516	TRH	2	27	0.0439	4	15	8	23
					3	191	0.3105	10	95	86	181
065249	1998	06/1-7/99	61,074	TRH	2	29	0.0475	4	16	9	25
					3	171	0.28	9	85	77	162
065250	1998	10/4-13/99	137,602	TRH	2	144	0.1046	22	79	43	122
					3	842	0.6119	44	419	379	798
065251	1999	06/1-7/00	49,421	TRH	2	56	0.1133	7	28	21	49
065252	1999	06/1-7/00	51,993	TRH	2	50	0.0962	6	25	19	44
065253	1999	06/1-7/00	46,966	TRH	2	18	0.0383	2	9	7	16
065258	1999	10/3-6/00	129,919	TRH	2	114	0.0877	14	57	43	100

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 1996. 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.

## 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 10,600 CWT'ed fall Chinook salmon returned to the Trinity River above WCW during the 2001-02 season. We estimated that anglers harvested 339 CWT'ed fall Chinook. Escapement of CWT'ed fall Chinook was divided between 5,086 fish recovered at TRH and 5,175 estimated to have spawned naturally (Table 2).

### 1996 brood year

Two fall Chinook CWT groups from the 1996 BY completed their life cycle this season, having reached the age of five. Estimated returns of five year old Chinook were minimal, only two fish from the smolt release group, 065230, returned this year. The total return rate of fish released as yearlings was estimated as 0.36%, 1.8 times that of their smolt released counterparts. Chinook released as yearlings experienced their highest return as four year old fish, while smolt releases returned as age three fish most frequently (Table 4).

### 1997 brood year

Both smolt and yearling groups from the 1997 BY have returned thus far at very good rates. Smolt returns from CWT groups 065233, 065234, 065235, 065236 and 065237 have returned at an average 0.80%, through age four. The one Chinook group (065241) released as yearlings have returned at a rate of 3.6%, approximately 4.5 times that of smolt releases. Returns of both release types were greatest in 2000 as age three fish. Fish released from this BY are expected to return as five-year-olds during the 2002 season.

### 1998 brood year

Returns of 1998 BY fall Chinook are complete through age 3 only. Six release groups have returned (4 smolt and 2 yearling) to date as two and three-year-old fish (Table 4). Return rates of age 2 fish were similar for both releases types, however, yearlings returning as age 3, have returned at a rate approaching 13 times that of smolts. Fish from both release groups should return as four and five-year-old fish in 2002 and 2003, respectively.

### 1999 brood year

Five CWT groups (4 smolt and 1 yearling) from the 1999 brood year returned as two-year-olds during the 2001 season (Table 4). Age 2 return rates were less than 0.1% for all release groups. Chinook from BY 1999 are expected to return as adults (age three through five) during the next three seasons.

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 1998 through 2001.

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
065230	1996	06/5-12/97	217,981	TRH	2	31	0.014	2	16	13	29
					3	248	0.114	3	128	117	245
					4	164	0.075	4	105	55	160
					5	2	0.001	0	1	1	2
					Totals: d/ Total Adults: e/	445	0.204	9	250	186	436
					414	0.190	7	234	173	407	
065232	1996	10/1-7/97	109,869	TRH	2	2	0.002	0	1	1	2
					3	178	0.162	2	92	84	176
					4	214	0.195	6	137	71	208
					5	0	0.000	0	0	0	0
					Totals: d/ Total Adults: e/	394	0.359	8	230	156	386
					392	0.357	8	229	155	384	
065233	1997	06/15/98	50,947	TRH	2	29	0.057	0	15	14	29
					3	277	0.544	7	177	93	270
					4	67	0.132	2	32	33	65
065234	1997	06/15/98	49,353	TRH	2	72	0.146	1	37	34	71
					3	322	0.652	9	206	107	313
					4	83	0.168	3	40	40	80
065235	1997	06/15/98	49,786	TRH	2	37	0.074	0	19	18	37
					3	233	0.468	6	149	78	227
					4	60	0.121	2	29	29	58
065236	1997	06/15/98	48,382	TRH	2	64	0.132	4	33	27	60
					3	263	0.544	7	168	88	256
					4	35	0.072	1	17	17	34
065239	1997	06/15/98	18,304	TRH	2	17	0.093	1	9	7	16
					3	95	0.519	3	61	31	92
					4	52	0.284	2	25	25	50
065241	1997	10/1-7/98	313,080	TRH	2	422	0.135	26	218	178	396
					3	7,182	2.294	194	4,591	2,397	6,988
					4	3,781	1.208	121	1,814	1,846	3,660
062641	1998	10/4-13/99	334,726	TRH	2	366	0.109	20	234	112	346
					3	6,057	1.810	194	2,906	2,957	5,863
065242	1998	06/1-7/99	46,399	TRH	2	22	0.047	1	14	7	21
					3	73	0.157	2	35	36	71
065243	1998	06/1-7/99	42,659	TRH	2	11	0.026	1	7	3	10
					3	50	0.117	2	24	24	48
065244	1998	06/1-7/99	49,332	TRH	2	0	0.000	0	0	0	0
					3	42	0.085	1	20	21	41
065245	1998	06/1-7/99	46,391	TRH	2	5	0.011	0	3	2	5
					3	50	0.108	2	24	24	48
065642	1998	10/4-13/99	16,673	TRH	2	5	0.030	0	3	2	5
					3	248	1.487	8	119	121	240
065254	1999	06/1-7/00	44,654	TRH	2	17	0.038	1	8	8	16
065255	1999	06/1-7/00	42,549	TRH	2	4	0.009	0	2	2	4
065256	1999	06/1-7/00	43,565	TRH	2	2	0.005	0	1	1	2
065257	1999	06/1-7/00	50,533	TRH	2	10	0.020	1	5	4	9
065259	1999	10/3-6/00	296,892	TRH	2	27	0.009	2	13	12	25

a/ CWT = coded-wire tag.

b/ Chinook salmon released during May or June were smolts, those released in October were yearlings.

c/ TRH = Trinity River Hatchery.

d/ Totals are presented only for brood year 1996. 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.

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 2001-02 run-size of spring Chinook was composed of the 12,051 Chinook of TRH origin. This represents 65.2% (12,802/19,622) of the total estimated run upstream of JCW. The fall run, upstream of WCW, was estimated to be composed of 35,129 TRH-produced Chinook, which represents 61.5% (35,129/57,109) of the total estimated run.

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 2001-02 season. a/

CWT code b/	BY c/	Age	TRH expansion factor d/	Run size	Expanded run-size e/	Expanded angler harvest		Spawning escapement					
						Angler harvest	angler harvest	Expanded TRH f/	TRH	Natural	Expanded natural	Total	Expanded total
<b>Spring-run chinook salmon</b>													
065231	96	5	3.69	2	7	0	0	1	4	1	4	2	7
065237	97	4	6.18	90	556	5	31	45	278	40	247	85	525
065238	97	4	6.18	114	705	6	37	57	352	51	315	108	667
065240	97	4	2.85	1,537	4,380	80	228	765	2,180	692	1,972	1,457	4,152
065247	98	3	6.93	187	1,296	10	69	93	644	84	582	177	1,227
065248	98	3	6.28	191	1,199	10	63	95	597	86	540	181	1,137
065249	98	3	6.30	171	1,077	9	57	85	536	77	485	162	1,021
065250	98	3	2.90	842	2,442	44	128	419	1,215	379	1,099	798	2,314
065251	99	2	6.67	56	374	7	47	28	187	21	140	49	327
065252	99	2	6.40	50	320	6	38	25	160	19	122	44	282
065253	99	2	6.18	18	111	2	12	9	56	7	43	16	99
065258	99	2	2.93	114	334	14	41	57	167	43	126	100	293
				3,372	12,802	193	751	1,679	6,375	1,500	5,676	3,179	12,051
<b>Fall-run chinook salmon</b>													
065230	96	5	9.63	2	19	0	0	1	10	1	10	2	19
065233	97	4	10.69	66	706	2	21	32	342	32	342	64	684
065234	97	4	11.18	83	928	3	34	40	447	40	447	80	894
065235	97	4	10.91	60	655	2	22	29	316	29	316	58	633
065236	97	4	11.5	35	403	1	12	17	196	17	196	34	391
065239	97	4	11.02	52	573	2	22	25	276	25	276	50	551
065241	97	4	2.9	3,759	10,901	120	348	1,814	5,261	1,825	5,293	3,639	10,553
062641	98	3	2.89	6,022	17,404	193	558	2,906	8,398	2,923	8,447	5,829	16,846
065242	98	3	11.18	73	816	2	22	35	391	36	402	71	794
065243	98	3	11.18	50	559	2	22	24	268	24	268	48	537
065244	98	3	10.7	41	439	1	11	20	214	20	214	40	428
065245	98	3	11.25	50	563	2	23	24	270	24	270	48	540
065642	98	3	2.95	247	729	8	24	119	351	120	354	239	705
065254	99	2	10.82	17	184	1	11	8	87	8	87	16	173
065255	99	2	10.8	4	43	0	0	2	22	2	22	4	43
065256	99	2	10.82	2	22	0	0	1	11	1	11	2	22
065257	99	2	10.96	10	110	1	11	5	55	4	44	9	99
065259	99	2	2.89	27	78	2	6	13	38	12	35	25	72
				10,600	35,129	342	1,145	5,115	16,951	5,143	17,033	10,258	33,984

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.



## DISCUSSION

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

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

Hatchery-produced spring Chinook returns to the Trinity River this season were composed of approximately equal percentages of aged three (47%) and four (44%) year old fish. Age two returns composed 9% of the hatchery run and five year old returns were less than 1%. Hatchery produced fall Chinook were dominated by age three fish which composed 58% of the run. Age four fish were the second most abundant comprising 40% of the run. Age two returns were very low (1%), which could indicate that either survival rates for BY 1999 fish are poor or that the maturation rate is atypical of average years, when age two returns comprise 5-10% of the total run. Similar to spring Chinook, age five fall Chinook returns were minimal, which is typical of most years.

Return rates for TRH-produced fingerling and yearling spring and fall Chinook from the completed 1996 cohort are relatively equal. This appears to be an anomaly since yearlings typically have a much higher return rate, that can be as much as 10 times greater than Chinook released as fingerlings. No apparent cause can be pin pointed, however, the two differences between the release strategies are size at release and the time of release. It is possible that yearlings released in the fall of 1997 may have experienced higher than normal in-river mortality resulting in fewer reaching the ocean environment.

The estimated hatchery contribution rates (~ 65%) to overall spring and fall Chinook run-size are relatively high. As mentioned previously, run-size estimates may have potential bias (see TASK I), which under most scenarios would tend to be positive. However, this bias should not affect hatchery contribution rates since total CWT run-size is based on AD clip rates observed at either JCW or WCW, times total estimated runs above these sites. Thus, even if total run-size was adjusted lower, the AD clip rate would remain the same, resulting in the same hatchery contribution rates. If, however, hatchery produced fish are more vulnerable to capture than wild fish at the weirs, the estimated contribution of hatchery fish would be positively biased.

Another rough method to validate hatchery-produced Chinook contribution rates is to examine AD clip rates at TRH and the weirs. If it is assumed that the AD clip rate at TRH is representative of the hatchery population, then the AD clip rates observed at the weirs would theoretically represent a fraction of the TRH population. Therefore, simple division of the AD clip rates observed at both weir sites by the AD rate at TRH would produce a hatchery contribution rate. The AD clip rates observed at the weirs and TRH are the following: spring Chinook (JCW) 18.6%; fall Chinook (WCW) 19.6%; TRH springs 25.9%; TRH falls 29.8%. Performing the calculations results in a contribution rate of 71.8% for spring Chinook and 65.8% for fall Chinook. These are slightly higher than our reported rates, but within 6%.

### 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 2002-03.
2. Monitor the annual TRH-produced Chinook salmon contribution rates to the overall runs to determine the relative status of naturally produced Chinook salmon in the Trinity basin.
3. Continue spawner carcass surveys (Task IV) in the upper Trinity River to evaluate straying of TRH produced fish.

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ANNUAL REPORT  
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT  
2001-2002 SEASON

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

by

Wade Sinnen

ABSTRACT

Project personnel marked 524,238 coho salmon (*Oncorhynchus kisutch*) from the 2000 brood year with a right maxillary clip prior to their release from Trinity River Hatchery (TRH) in March of 2002. These fish are expected to return as two and three-year-old fish during the 2002-03 and 2003-04 seasons respectively.

An estimated 32,141 coho returned to the Trinity River, upstream of the Willow Creek weir (RK 48), during the 2001-02 season. We estimated the TRH-produced component of this run to be 28,768 fish (89.5%). There was no angler harvest reported this season. Spawning escapement of TRH-produced coho was divided between 10,649 fish which entered TRH and 18,119 fish estimated to have spawned outside of the hatchery facility.

TRH-produced coho from the 1998 brood year are considered to have completed their life cycle this year. An estimated 30,684 coho from the 1998 brood year returned to the Trinity River basin, upstream of Willow Creek weir, the past two seasons. This represents 6.22% of the 493,233 coho yearlings released from TRH. Estimated TRH-produced coho returns from the 1999 brood year are complete for age two returns only. An estimated 3,373 coho have returned thus far, representing 0.66% 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 the marking of coho prior to their release from the hatchery facility and the 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 2001-02 coho run above WCW. Data compilation and analysis is reliant upon previously reported data in Sinnen and Null, 2002, Sinnen and Moore, 2000, and Lau et al., 2000.

### Marking at Trinity River Hatchery

All fish to be marked are anaesthetized with carbon dioxide; and their right maxillaries removed with a pair of sharp scissors. Marked fish are tallied with a manual counter and returned to hatchery ponds.

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 marked.

#### TRH-produced coho escapement and in-river harvest

To estimate the contribution of TRH-produced coho to escapement and in-river angler harvest, the following information is required:

1. Marking and enumeration of the coho production released from TRH.
2. Recovery totals of marked and unmarked coho returning to TRH.
3. Total coho run-size above Willow Creek Weir (WCW).
4. The percentage of marked coho salmon observed at WCW.
5. Coho in-river angler harvest rates.
6. Specific age class determinations.

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

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

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

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

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

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

The size separating grilse and adult coho is determined using length frequency analysis. The total number of grilse and adults in the coho run is determined by multiplying the proportion of each observed at Willow Creek weir times the total estimated run-size. The number of right maxillary-clipped coho for each age strata is estimated by multiplying the ratio of marked to unmarked coho observed at Willow Creek weir times the total age stratified run-size estimate. The remaining coho are considered naturally produced. Coho harvest rate estimates are developed using angler tag return data presented in Task 1. Harvest rates are multiplied times the age stratified coho run to produce a harvest estimate. The estimate is apportioned to both

maxillary clipped and naturally produced fish. Coho escapement is determined by the following equation:

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

where,  $H_{\text{coho}}$  = 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 marked 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 marked and unmarked coho salmon.

## RESULTS

### Marking

Staff personnel marked (right maxillary-clip) approximately 531,436 BY 2000 coho, representing the entire brood year at Trinity River Hatchery. We began marking on January 1, 2002 and finished on March 13, 2002.

We performed a quality control check of each raceway on March 13-14, 2002. We measured and examined approximately 1% of the coho in each raceway. The percentage of coho with proper clips ranged from 99.1% to 94.5% and averaged 98.7% for the 5,425 fish examined. We therefore estimate that 524,238 coho were effectively clipped and released (Table 1). These fish ranged in size from 90 to 332 mm fork length (FL), with a range of mean lengths from 150 to 209 mm, FL. All BY 2000 coho were volitionally released from TRH beginning on March 15, 2002.

Table 1. Quality control analysis of right maxillary clip and fork length (FL) measurements of BY 2000 yearling coho salmon, prior to release from Trinity River Hatchery, March 2002.

Pond	Number counted/ clipped	Number examined post clip	Number without clip	Percent unclipped	Post clip morts	Number effectively clipped	FL range (mm)	FL mean (mm)
F1&2	32,063	332	3	0.9	21	31,775	133 – 307	199
F3&4	36,147	362	8	2.2	18	35,352	131 – 286	188
G1&2	29,514	297	7	2.4	12	28,806	131 – 285	195
G3	41,910	345	19	5.5	5	39,605	90 – 229	152
G4	28,595	369	13	3.5	10	27,595	119 – 290	185
H1&2	29,286	296	2	0.7	18	29,081	119 – 277	197
H3&4	24,988	269	1	0.4	10	24,888	132 – 332	209
I1&2	36,545	384	1	0.3	12	36,435	121 – 300	203
I3&4	45,305	462	3	0.7	21	44,988	100 – 271	185
J1&2	108,862	1,092	6	0.5	230	108,319	92 – 243	151
J3&4	118,221	1,217	8	0.7	56	117,394	109 – 265	150
Totals:	531,436	5,425	71		413	524,238		

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

Total (natural and TRH-produced) coho run-size for the 2001-02 season, above WCW, was estimated at 32,141 fish (TASK 1), of which 3,670 were grilse (age 2) and 28,470 were adults (age 3). Age classes were determined using length frequency analysis. The size separating grilse and adults was 58 cm, FL (TASK 1). Therefore all coho  $\leq$  58 cm, FL were considered grilse and larger fish adults.

The percentage of right maxillary-clipped (RM) coho observed at WCW was 91.9% (34/37) for grilse salmon and 89.2% (256/287) for adults. The overall marked coho total observed at WCW for the 2001-02 season was 89.5% (290/324). Therefore, we estimate that the 2001-02 coho run was composed of 3,373 naturally-produced fish and 28,768 TRH-produced fish (Table 2.).

Since none of the project tags applied to coho salmon at WCW were returned by anglers, we estimated that anglers did not harvest any coho during the 2001-02 season. The sport take of coho, a federally threatened species, has been prohibited since 1995; however, some fish are occasionally harvested by unknowledgeable anglers due to mistaken identity or a lack of knowledge concerning the closure.



Table 2. Run-size, in-river sport catch, and spawner escapement estimates for naturally- and TRH-produced coho salmon upstream of Willow Creek Weir for the 2001-02 return year.

Strata	BY a/	Age b/	Run-size	Angler harvest	Spawning escapement	
					TRH c/	Natural
Naturally	99	2	298	0	2	296
Produced	98	3	3,075	0	130	2,945
		Totals:	3,373	0	132	3,241
TRH	99	2	3,373	0	1,024	2,349
Produced	98	3	25,395	0	9,625	15,770
		Totals:	28,768	0	10,649	18,119
		Grand totals:	32,141	0	10,781	21,360

a/ BY=Brood year

b/ Age classes are determined using fork length frequency analysis.

c/ TRH=Trinity River Hatchery

Based on coho run-size estimates presented in Table 2, the percent return of 1998 brood year, TRH-produced coho salmon, was approximately 6% (Table 3). These fish have reached three years of age and are considered to have completed their life cycle. The estimated return of two-year-old 1999 brood year coho is approximately 0.7%. These fish will return during the 2002-03 season as three-year-olds.

Spawning escapement of 1998 brood year, TRH-produced coho, consisted of 10,541 (34.4%) fish that entered TRH and 20,143 (65.6%) fish estimated to have spawned in natural areas (Table 3).

Estimated escapement of TRH-produced, two-year-old coho, from the 1999 brood year was composed of 1,024 (30.4%) hatchery spawners and 2,349 (69.6%) natural spawners (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 2000 through 2001.

Release Data					Estimated Returns						
Clip a/	Brood Year	Date	Number	Site	Age b/	Run-size	% of release	River harvest	Spawning Escapement		
									TRH c/	Natural	Total
RM	98	3/15-22/00	493,233	TRH	2	5,289	1.07	0	916	4,373	5,289
					3	25,395	5.15	0	9,625	15,770	25,395
					Totals:	30,684	6.22	0	10,541	20,143	30,684
RM	99	3/15-20/01	512,986	TRH	2	3,373	0.66	0	1,024	2,349	3,373

a/ Identifying clip. Beginning with the 1994 brood year, all coho salmon released from Trinity River Hatchery received right maxillary (RM) clips.

b/ Age classes are determined using length frequency analysis.

c/ 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 not rigorous, statistically speaking. The total coho run-size estimate of 32,141 fish, produced under task 1 of this report, was based on only 312 effectively tagged fish. Confidence intervals (1-p=0.95) for this estimate are in the 17- 22% range. Additionally, the Willow Creek weir was only operational through 12, November, 2001. If run timing of coho salmon to the upper Trinity River occurs after this time, or naturally produced coho return later than their hatchery produced cohorts, we may be missing a portion of the run at the weir, which could bias our estimates. However, since our efforts represent the only work to quantify the hatchery vs. wild runs and survival and contribution rates of returning coho, we feel it is important to present the best information we have available.

Return rates of 98 BY coho, estimated at ~ 6%, is relatively high, although not extraordinarily so. Estimated returns of yearling Chinook released from TRH have approached or exceeded 2% (See Task 2). Given the fact that 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). Return rates of TRH-produced coho have ranged from 1.30% to 6.22% for brood years 1994 through 1998 (appendix 1).

The reported number of hatchery-produced coho estimated to have spawned in natural areas surpassed those that were counted at TRH, indicating that TRH-produced coho stray at a very high rate, the run-size estimate was positively biased this year, or a combination of the two. Results of a mainstem Trinity River carcass survey (TASK 4 of this report) indicate that straying may have been substantial this year. Of the 692 coho salmon carcasses recovered, 525 (75.9%) were RM-clipped. It must be noted that the surveys were only performed in the mainstem and were discontinued after December 13<sup>th</sup>, which would preclude full recovery of coho carcasses.

Despite the potential bias, coho trends, based on trapping data at Willow Creek weir, indicate that coho runs returning to the upper Trinity basin are heavily supported by TRH production. The past five 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 remained fairly constant, near 90% of the total observed (appendix 2).

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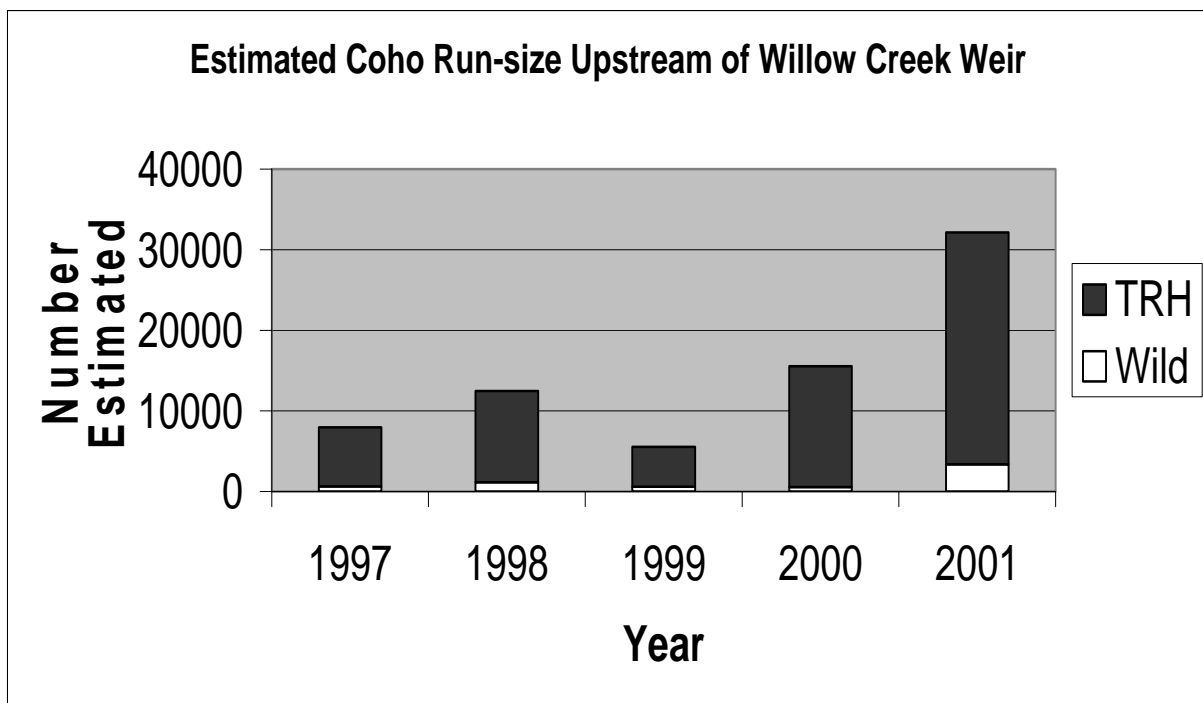
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Appendix 1. Run-size, harvest and spawner escapement estimates for right maxillary clipped, Trinity River Hatchery-produced coho salmon returning to the Trinity River, upstream of Willow Creek weir, brood years 1994-1998.

Brood year	Release data			Return data						
	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	865	867	1,732
			Totals:		2,702	3.74%	0	970	1,732	2,702
1995	3/17-21/97	580,880	TRH	2	3,594	0.62%	39	868	2,687	3,555
			TRH	3	9,008	1.55%	0	3,899	5,109	9,008
			Totals:		12,602	2.17%	39	4,767	7,796	12,563
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

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 1997-2001.

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



ANNUAL REPORT  
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT  
2001-02 SEASON

TASK 4  
SALMON SPAWNER SURVEYS IN THE UPPER TRINITY RIVER

by

Wade Sinnen

ABSTRACT

Staff of the California Department of Fish and Game's (CDFG) Trinity River Project (TRP), in cooperation with the Yurok Tribe and the U.S. Fish and Wildlife Service (USFWS) and U.S. Forest Service, conducted a salmon spawner survey of the Trinity River from 1 October through 18 December, 2001. We surveyed the mainstem Trinity River from the upstream limit of anadromous fish migration at Lewiston Dam to Cedar Flat Recreational Area. Major tributaries, which were accessible to anadromous fish, were not surveyed. We examined 5,515 Chinook salmon (*Oncorhynchus tshawytscha*) and 692 coho salmon (*O. kisutch*) carcasses during the survey. Carcass density (fish/km) was highest in the uppermost reach near Lewiston Dam and generally decreased in a downstream fashion.

We recovered both spring-run (spring) and fall-run (fall) Chinook salmon carcasses during the survey. Recovery was dominated by spring Chinook until late October, thereafter, fall Chinook became the dominant race. Coho salmon carcasses were recovered starting in mid-October and peaked in mid-December during the final week of the survey. Chinook and coho salmon carcasses were recovered throughout the survey area.

Fork lengths of spring and fall Chinook salmon averaged 75.5 cm (range: 36 - 109 cm) and 77.0 cm (range: 40-116 cm), respectively. Coho salmon fork lengths averaged 72.7 cm (range: 35-93 cm). Adult Chinook salmon composed 95.6% of the spring Chinook, 96.6% of the fall Chinook, and 98.4% of the coho recovered.

We observed spring Chinook adult salmon male:female sex ratio of 0.68:1. The sex ratio for adult fall Chinook was 0.55:1. The coho sex ratio was 0.98:1.

We estimated female pre-spawning mortality of spring and fall Chinook at 6.3% and 9.2% respectively. Coho female pre-spawn mortality was estimated at 8.9%.

Based on the recovery of adipose-fin-clipped Chinook salmon carcasses, we estimated that 23.9% of the spring-run and 30.3% of the fall-run salmon spawners observed in the mainstem survey were of hatchery origin. Based on recovery of right-maxillary clipped coho, we estimate that 75.9% of mainstem spawners were of hatchery origin.

## OBJECTIVES

1. To determine the size, sex composition, and hatchery component among the naturally spawning populations in the mainstem Trinity River.
2. To determine the incidence of pre-spawning mortality among naturally spawning Chinook and coho salmon within the mainstem Trinity River.
3. To determine the distribution of naturally spawning Chinook and coho salmon within the mainstem Trinity River.

## INTRODUCTION

The California Department of Fish and 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. Redd survey information will be summarized by the YT and USFWS.

Spawner surveys have been conducted intermittently on the Trinity River since 1955. Spawning surveys prior to 1964 included areas now impassable to salmonids due to the construction of Trinity and Lewiston Dams.

This survey will help to evaluate the pre- and post- treatment effectiveness of increasing adult spawning habitat within the basin through habitat improvement efforts that are part of the ongoing Trinity River Restoration Program.

## METHODS

The study area included the mainstem Trinity River from its upstream limit to anadromous fish migration at Lewiston Dam (River km 180.1) to Cedar Flat Recreational Area, 101.6 km. The study area was divided into 10 sections (Table 1). Sections were surveyed between October 1 and December 18, 2001. Crews from the YT and CDFG surveyed sections 1-6, the USFWS surveyed sections 7-10. We attempted to survey sections 1-6 on a consecutive basis with each section surveyed at least once a week, however logistical and manpower constraints caused some sections to be excluded on several occasions. Sections 7-10 were surveyed on a bi-weekly basis.



Table 1. Description and Lengths of river zones used in the 2001 mainstem Trinity River spawner survey.

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

The survey was conducted using inflatable rafts equipped with rowing frames. Raft crews consisted of a rower and a person to recover carcasses. Two rafts were used simultaneously, with one covering each side of the river. Carcasses were recovered on foot along the shore or, in deep water, with long handled gigs.

In the Trinity River, there is a temporal overlap in the spring and fall Chinook runs. Since there is variation in run timing each year, a date separating the two runs was determined based on two criteria. First, some recovered Chinook carcasses contained CWT's placed in their snouts as juveniles at the Trinity River Hatchery. The code on each tag indicated whether that fish was of spring or fall origin. Expansions were made based on the ratio of tagged to untagged Chinook salmon at the time of release. Second, some Chinook were marked with spaghetti tags at either the Junction City or Willow Creek weirs. A run designation was assigned to these fish based on the date of capture at the weirs. We separated the two runs of Chinook when the percent recovery of fall Chinook was greater than that of spring Chinook during the survey week.

Carcasses were systematically graded as to their degree of decomposition. During the survey, carcasses were split into four categories as follows: two clear eyes, one clear eye, both eyes cloudy, and skeletons. For the purpose of this report, and to be consistent with previous reports, carcasses will be categorized as either condition-one or condition-two. Condition-one carcasses were those which had at least one clear eye, a relatively firm body, and were assumed to have

died within one week prior to recovery. Condition-two carcasses were in various advanced stages of decomposition and assumed to have died more than one week prior to recovery. Complete intact skeletons were counted. Condition-two carcasses were not used for some of our length and Ad-clip rate analysis because the deterioration of these fish may compromise interpretation of length and/or the presence of an Ad-clip.

All observed carcasses were identified to species, examined for hatchery and/or program marks and sexed. Most fish were measured if they were sexed and identified to species. We measured to the nearest cm fork length (FL). Hatchery marks included adipose-fin clips (Ad-clips), indicating the presence of a coded-wire tag (CWT) for Chinook salmon (Chinook) and right-maxillary clips (RM) for coho salmon (coho). Coho did not receive a CWT. Program marks were external tags (spaghetti tags) applied at two mainstem weirs to complete Task 1 of this report. Heads of Ad-clipped fish were removed and retained for later CWT recovery and decoding. Spaghetti tags were removed and the unique number associated with each tag was recorded.

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

## RESULTS

### Spring/fall Chinook separation

Overlap of spring and fall Chinook occurred throughout most of the survey. Spring Chinook carcass recoveries were predominant through Julian week 43 (Oct. 22 - 28), after which, fall Chinook recoveries were most numerous. For the purposes of this report, all Chinook recoveries prior to Julian week 44 were classified as spring Chinook and all subsequent recoveries were classified as fall Chinook (Figure 1).

### Spawner distribution

We recovered 5,515 Chinook carcasses throughout a 12 week period in our 10 survey sections (Table 2) of the upper mainstem Trinity River. Sections 1-3 were surveyed the most frequently due to the large number of Chinook encountered there. We recovered 692 coho salmon, 676 of which were found in sections 1 and 2.

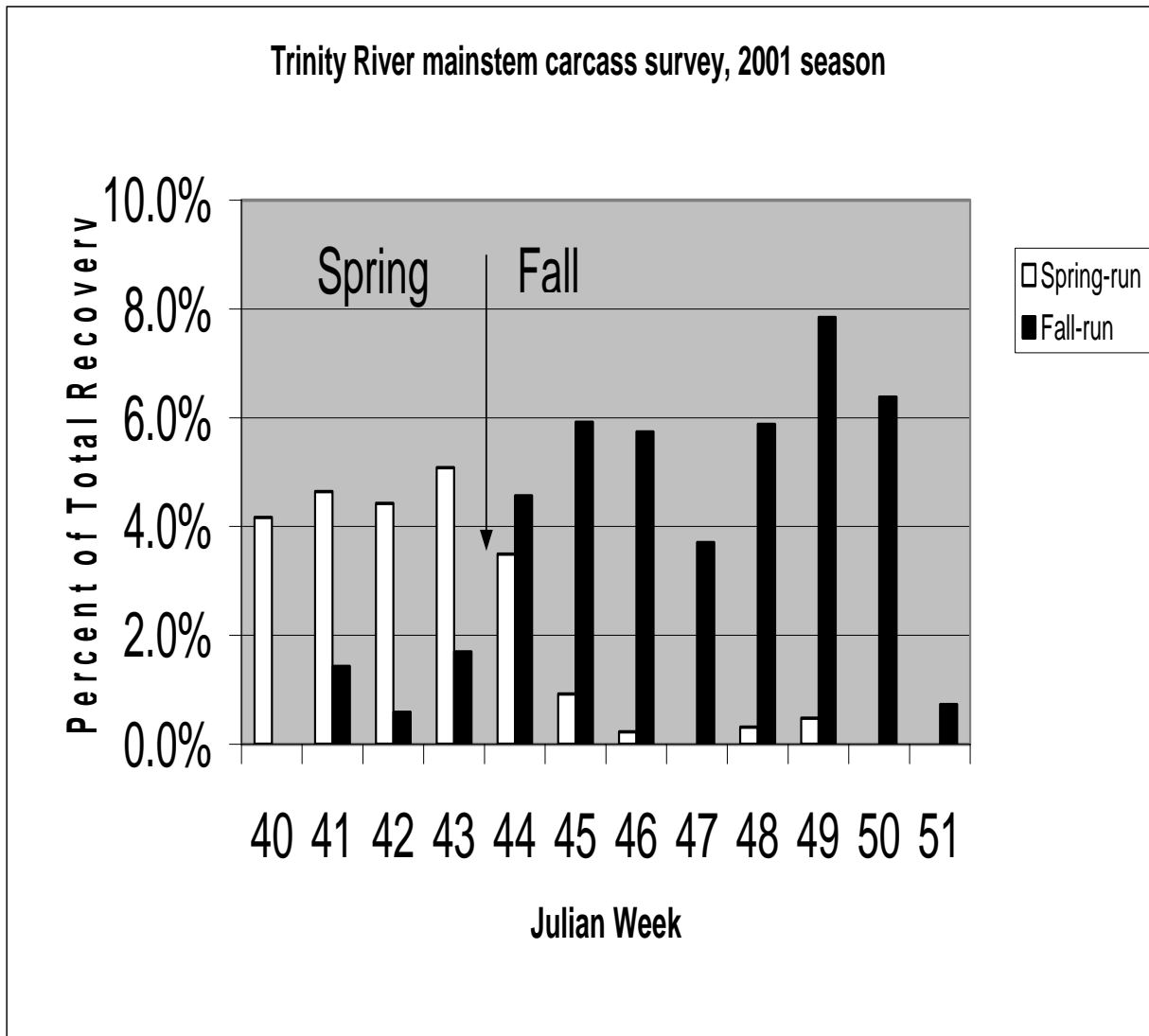


Figure 1. Weekly proportions of coded-wire tagged and Program-marked spring- and fall-run chinook salmon observed in the 2001 mainstem Trinity River spawner survey. The arrow denotes the designated separation between the spring and fall runs.

Table 2. Recovery of all Chinook salmon by Julian week and section in the mainstem Trinity River spawner survey during the 2001-02 season.

		Julian week of recovery												
		40	41	42	43	44	45	46	47	48	49	50	51	
Week ending		Oct. 7	Oct. 14	Oct. 21	Oct. 28	Nov. 4	Nov. 11	Nov. 18	Nov. 25	Dec. 2	Dec. 9	Dec. 16	Dec. 23	
Section	No. of surveys	Number of Chinook recovered												Section totals
1	11	19	80	141	143	176	297	575		1,116	663	289	101	3,600
2	11	25	104	117	85	99	128	174		159	164	112	36	1,203
3	9	21	49	40	27	28	31	51			15	11		273
4	8	17	42	30	24	36	50	29				3		231
5	5	5			3	7	9		7					31
6	6	2	4		6	5	5		4					26
7	9	3	1	8	7	8	21	23	16	7				94
8	6	2		1		4		1		3		4		15
9	6	1		1		9		15		5		3		34
10	6	1		1		0		3		2		1		8
Weekly Totals:		96	280	339	295	372	541	871	27	1,292	842	423	137	5,515

### Spring Chinook

There were 1,010 Chinook classified as spring-run examined during the survey (Table 3), of which, 546 (54.1%) Chinook were classified as condition-one. The greatest number (383) and density (119.7 fish/km) of spring Chinook carcasses were recovered in section 1, followed by section 2, where recovery densities dropped to about 35% of section 1. Less than 14 fish/km were recovered in the remaining 8 sections surveyed. The lowest density (0.14 fish/km) of spring Chinook recoveries were observed in section 9, located between the Big Flat and Del Loma.

### Fall Chinook

There were 4,505 fall Chinook examined during the survey (Table 4), of which, 1,083 (24.0%) were classified as condition-one. Similar to spring Chinook, the largest number (3,217) and greatest density (1,005.3 fish/km) of fall Chinook carcasses were recovered in section 1, followed by section 2, where recovery densities dropped to about 11% of section 1. Less than 14 fish/km were recovered in the remaining 8 sections surveyed. The lowest density (0.4 fish/km) of fall Chinook recoveries were observed in section 10, located between Del Loma and Cedar Flat, the lower most section.

Table 3. Number, density, incidence of Ad-clips and project tags, and condition of spring Chinook salmon recovered during the 2001-02 mainstem Trinity River spawner survey.

Section	length (km)	Number observed	Density (fish/km)	Ad-clips a/		Project tags b/		Cond.-1 c/	Cond.-2 d/
				Total	C-1	Total	C-1		
1	3.2	383	119.7	26	(20)	5	(2)	196	187
2	7.9	331	41.9	13	(7)	7	(4)	164	167
3	10.2	137	13.4	4	(3)	5	(2)	85	52
4	10.4	113	10.9	4	(3)	4	(3)	78	35
5	15.7	8	0.51	0		0		4	4
6	7.2	12	1.7	0		1	(1)	6	6
7	8.8	19	2.2	2	2	0		12	7
8	9.7	3	0.31	0		0		1	2
9	14.8	2	0.14	0		0		0	2
10	13.7	2	0.15	0		0		0	2
Totals:	101.6	1,010	9.94	49	35	22	12	546	464

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

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

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

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

Table 4. Number, density, incidence of Ad-clips and project tags, and condition of fall Chinook salmon recovered during the 2001-02 mainstem Trinity River spawner survey.

Section	length (km)	Number observed	Density (fish/km)	Ad-clips a/		Project tags b/		Cond.-1c/	Cond.-2 d/
				Total	C-1	Total	C-1		
1	3.2	3,217	1,005.3	231	(119)	120	(57)	1,083	2,134
2	7.9	872	110.4	38	(20)	25	(8)	305	567
3	10.2	136	13.3	1	(1)	3	(3)	77	59
4	10.4	118	11.3	3	(3)	9	(6)	64	54
5	15.7	23	1.5	0		0		10	13
6	7.2	14	1.9	0		0		9	5
7	8.8	75	8.5	4	(2)	0		38	37
8	9.7	12	1.2	0		0		5	7
9	14.8	32	2.2	1	(0)	1	(0)	16	16
10	13.7	6	0.4	0		1	(0)	1	5
Totals:	101.6	4,505	44.3	278	145	159	74	1,608	2,897

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

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

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

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

#### Coho salmon

Coho salmon carcasses were recovered starting in mid-October and peaked in mid-December during the final week of the survey. A total of 692 coho were recovered during the survey, of which 526 were classified as condition-1 and 166 as condition-2 (Table 5). The highest density (145.3 fish/km) of coho salmon carcasses were recovered in section 1. Recovery density of coho in section 2 dropped to slightly more than 26 fish/km, downstream of which very few coho were recovered.

Table 5. Number, density, incidence of RM-clips and project tags, and condition of coho salmon recovered during the 2000 mainstem Trinity River spawner survey.

Section	length (km)	Number observed	Density (fish/km)	RM-clips a/	Project Tags b/	Cond.-1 c/	Cond.-2 d/
1	3.2	465	145.3	364	14	350	115
2	7.9	211	26.7	151	3	162	49
3	10.2	11	1.1	7	3	9	2
4	10.4	1	0.1	1	0	1	0
5	15.7	2	0.1	2	0	2	0
6	7.2	1	0.1	0	0	1	0
7	8.8	1	0.1	0	0	1	0
8	9.7	0	0	0	0	0	0
9	14.8	0	0	0	0	0	0
10	13.7	0	0	0	0	0	0
Totals:	101.6	692	6.8	525	20	526	166

a/ Right maxillary-clipped, condition-1 and condition-2 coho.

b/ Spaghetti tags applied at Willow creek and Junction City weirs.

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

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

#### Size composition

Only condition-1 fish that were measured are included in our analysis. Condition-2 fish were not included due to potential inaccuracies in measuring fish in various decomposed states.

#### Spring Chinook

Fork lengths of 545 condition-1 spring Chinook salmon averaged 75.5 cm and ranged between 36 - 109 cm (Figure 2). Grilse accounted for 6.4% (35/545) of condition-1 spring Chinook. Grilse were considered fish  $\leq 57$  cm, FL, based on analysis performed under Task 1 of this report.

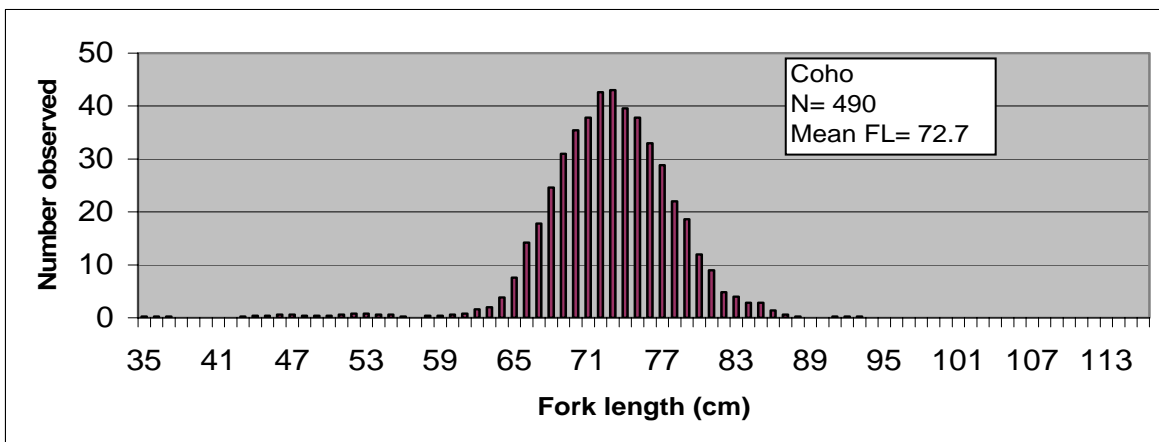
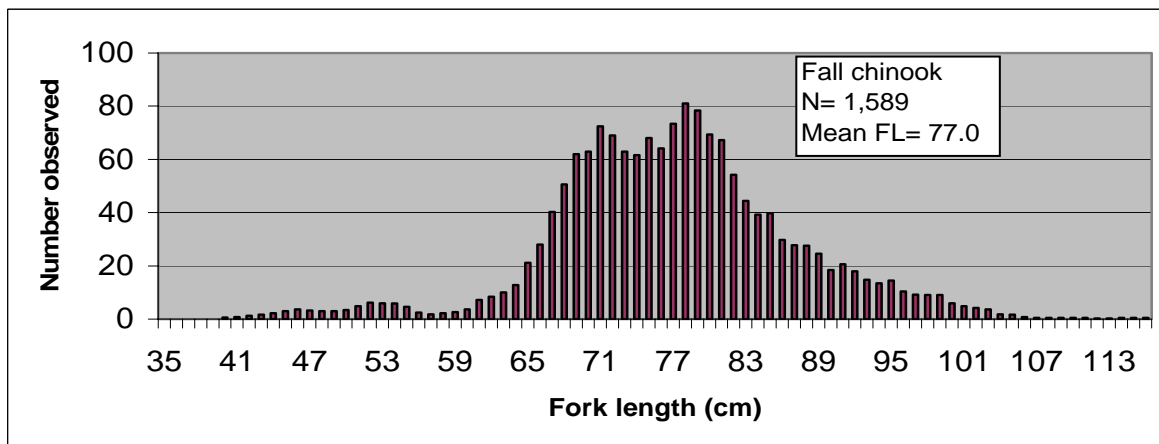
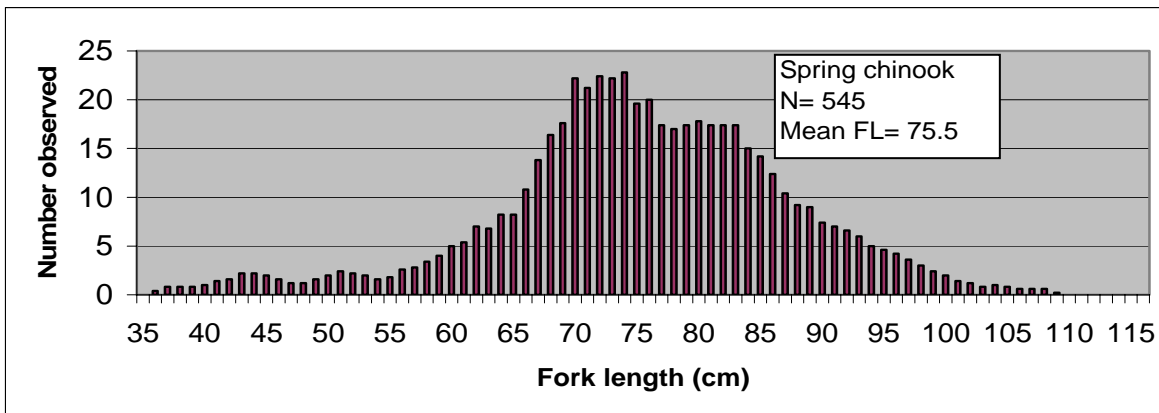


Figure 2. Length frequency histograms for condition-1 chinook and coho salmon recovered during the 2001-02 mainstem Trinity River spawner survey. The number of fish at each fork length is shown as a moving average of five, 1-cm increments.



### Fall Chinook

Fork lengths of 1,589 condition-1 fall Chinook salmon averaged 77.0 cm and ranged between 40 - 116 cm (Figure 2). Nineteen condition-1 fish were not measured and were excluded from length analysis. Grilse accounted for 3.4% (54/1589) of condition-1 fall Chinook. Grilse were considered fish  $\leq 55$  cm, FL, based on analysis performed under Task 1 of this report.

### Coho

Fork Lengths of 490 coho salmon were examined (Figure 2). The average size of coho examined was 72.7 cm and the range of sizes was 35 to 93 cm. Thirty-six condition-1 coho were not measured. Eight (1.6%) coho were considered grilse. Grilse were considered fish  $\leq 58$  cm, FL. The nadir separating grilse and adults was determined using analysis from Task 1 of this report.

## Adult sex composition and female pre-spawn mortality

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

### Spring Chinook

Of the 589 adult spring Chinook recovered that were measured and sexed, 239 were sexed as males and 349 as females, a male:female ratio of 0.68:1. One adult fish could not be reliably sexed.

We examined 349 female spring Chinook salmon, of which 22 were classified as pre-spawn mortalities, a rate of 6.3%.

### Fall Chinook

Of the 1,661 adult fall Chinook that were measured and sexed, 586 were sexed as males and 1,061 as females, a male:female ratio of 0.55:1. The gender of 14 adult Chinook could not be reliably determined.

Of the 1,061 female fall Chinook carcasses examined, 98 were classified as un-spawned, a rate of 9.2%.

### Coho salmon

We measured 492 adult coho during the survey, of which 243 were males, 248 were females and 1 was of unknown sex. The male:female ratio was 0.98:1.

A total of 248 female coho carcasses were examined for spawning success, of which 22 (8.9%) were classified as un-spawned.

## Incidence of Program marked salmon

### Spring Chinook

A total of 22 project spaghetti tags were recovered from spring Chinook (Table 3), of which 12 were recovered from condition-1 fish. Seven of the tags were applied at Willow Creek weir and 15 at Junction City weir. The majority (21/22) of the tags were recovered in sections 1-4.

### Fall Chinook

A total of 159 project spaghetti tags were recovered from fall Chinook (Table 4), of which 74 were found on condition-1 fish. Chinook tagged at Willow Creek weir accounted for 150, while Chinook tagged at Junction City weir accounted for 9. Approximately 75% of all tags were recovered in section 1.

### Coho salmon

Twenty project tags were found attached to coho, all of which were applied at Willow Creek weir. Coho were not tagged at Junction City weir this year (Table 5). The majority of recoveries were in section 1.

## Incidence of hatchery produced Chinook and coho salmon

### Spring Chinook

Thirty-five (6.4%) of the condition-one and 49 (4.9%) of all spring Chinook bore Ad-clips. The majority (39/49) of Ad-clipped Chinook were recovered in sections 1 and 2 (Table 3). Coded-wire tags (CWT's) were recovered from 36 and 29 of the total and condition-1 fish respectively (Table 6). Twenty (55.6%) of the 36 total CWT's were from Trinity River Hatchery (TRH) produced, four-year-old spring Chinook and 12 (33.3%) were from three-year-old spring Chinook. One age two spring Chinook CWT was recovered as well as three CWT's from fall Chinook.

### Fall Chinook

One hundred forty-five (9.0%) of the condition-one and 278 (6.2%) of all fall Chinook bore Ad-clips. The vast majority (231/278) of the Ad-clipped fish were found in section 1 (Table 4). CWT's were recovered from 145 and 91 of all and condition-1 fish respectively (Table 6). Four-year-old fall Chinook of TRH origin accounted for 44.8% (65/145) of all CWT's. Three-year-old Chinook accounted for 68 (46.9%) of the total. No recoveries of two-year-old fall Chinook and twelve spring Chinook were recovered during fall carcass sampling. Two CWT code groups, 065241 (age four) and 062641 (age 3) comprised 119 of the total 145 CWT's. Both groups were released as yearlings from TRH in 1998 and 1999, respectively.

### Coho

The incidence of right maxillary clips (RM) was found on 525 of 692 (75.9%) coho examined (Table 5). We combined both condition-1 and -2 fish in this analysis because RM clips, unlike

Table 6. Release and recovery data for adipose fin-clipped Chinook salmon recovered during the 2001 Trinity River mainstem spawner survey.

				Recovery Period a/			
Release Data				Spring		Fall	
Tag Code	Brood Year	Age	Race	Total	C-1	Total	C-1
065233	1997	4	Fall	0	0	4	2
065236	1997	4	Fall	0	0	2	2
065237	1997	4	Spring	2	2	0	0
065238	1997	4	Spring	3	3	0	0
065239	1997	4	Fall	0	0	2	1
065240	1997	4	Spring	15	11	5	2
065241	1997	4	Fall	1	1	57	36
065247	1998	3	Spring	3	1	0	0
065248	1998	3	Spring	3	2	1	1
065249	1998	3	Spring	2	2	2	0
065250	1998	3	Spring	4	4	4	4
065242	1998	3	Fall	0	0	1	1
065243	1998	3	Fall	0	0	1	0
062641	1998	3	Fall	2	2	62	39
065642	1998	3	Fall	0	0	2	2
065244	1998	3	Fall	0	0	2	1
065251	1999	2	Spring	1	1	0	0
Shed/Lost Tag b/				13	6	133	54
			Totals:	49	35	278	145

a/ The recovery period for spring Chinook was October 2- October 28; fall Chinook recovery period was October 29- December 13, 2001. Total and condition-1 (C-1) recoveries shown.

b/ The CWT was not present or the salmon head and/or CWT was lost during recovery. Tags were apportioned to either spring or fall Chinook based on the date of recovery.

adipose fin clips, remain recognizable well after the fish has died and are therefore subject to less observer error.

## DISCUSSION

The spawner survey conducted this year included both carcass recovery and redd enumeration and mapping. In prior years, CDFG conducted carcass recovery operations which entailed flagging carcasses for subsequent recapture to estimate recovery efficiency. This allowed us to estimate the total number of spawners in each surveyed section. With the addition of the redd mapping, crews did not have enough time to perform mark-recapture efficiency estimates. Therefore, sectional carcass density estimates of prior year's data for the mainstem Trinity River may not be directly comparable. Redd mapping will be the best method for identifying spawner redd distribution for this season. This phase of the project will be presented by the YT and USFWS.

### Spawner distribution

As noted previously, efficiency estimates used to estimate the number of fish which died in each section was not performed this year. The large number of Chinook and coho carcasses recovered in sections 1 and 2 this year are consistent with surveys performed in recent years (Aguilar 1996, Lau et al 1998, and Zuspan 1996, 1997), however, the number of Chinook carcasses found in downstream sections (4-7) was considerably less than previous years. It is unclear if our survey protocol for this year (sections not surveyed every week and no estimated recovery efficiencies) or the high relative abundance of hatchery produced Chinook in this year's run caused this to occur. Roughly one third of the estimated runs of spring and fall Chinook estimated to have returned to the basin upstream of Junction City weir (spring Chinook) and Willow Creek weir (fall Chinook), entered Trinity River Hatchery (Task 1). Additionally, 65.2% and 61.5% of the spring and fall runs respectively were estimated to be of hatchery origin (Task 2). Thus, straying of hatchery produced fish would most likely be highest near the hatchery, which may account for the high number of fish encountered there.

A similar protocol was in effect during the 2000 season (Sinnen and Null, 2002). The spawner distribution observed this year was very similar to the 2000 season. Chinook recovery (spring and fall combined) totals for both years were approximately 70% and 22% for sections 1 and 2 respectively.

### Size composition

The proportion of grilse in this year's run of Chinook and coho observed in the carcass survey and at two fixed locations (either Willow Creek or Junction City weir and Trinity River Hatchery) in the mainstem Trinity River are presented in appendix 1. The proportion of spring Chinook grilse observed in the spawner survey was 6.4%, less than the observed proportion at Trinity River Hatchery (TRH) and Junction City weir (JCW), which were 9.0% and 10.5% respectively.

For fall Chinook, the grilse proportion (3.4%) observed in the spawner survey was greater than proportions observed at Willow Creek Weir (WCW) and TRH, which were 2.1% and 1.1%, respectively (appendix 1).

The proportion of grilse coho (1.6%) observed in the spawner survey was significantly different than the other two fixed sites (appendix 1), however, this may be a manifestation of the truncated recovery period for coho salmon this season. Had surveys continued into January when a majority of coho would have died, the grilse proportion may have changed. Additionally, turbid river conditions may have affected recovery of smaller coho.

#### Adult sex composition and female pre-spawn mortality

For both races of Chinook and coho salmon, female adults outnumbered male adults. Previous studies on the Trinity presented in Aguilar (1996), suggest this is common for Chinook salmon. Intermittent carcass surveys performed during 1942-1994 found the highest percentage of adult males to be 49% and the average much closer to 40%. It is generally assumed that adult females would compose a higher percentage of adults than their male counterparts due to the fact that a percentage of males return as grilse.

Reported Trinity River Chinook salmon pre-spawn mortalities have ranged from 0 to 71% for spring Chinook and 0.7 to 43.7% for fall Chinook for the 1987-2001 period (Appendix 2). This year's pre-spawn mortality rates of 6.3% and 9.2% for spring and fall Chinook respectively are the highest we have observed since 1995. It has been noted, most recently by Zuspan (1998), that pre-spawn mortality may be density dependent in the Trinity system. In years of high Chinook abundance, pre-spawn mortality increases. It is not known if this is related to potential disease vectors or a lack of suitable spawning habitat in the Trinity, or both.

Our spring Chinook pre-spawn mortality estimate may be biased low this year since a large die off (>150 adult Chinook) were observed dead prior to our surveys. Spring Chinook have been observed to die prematurely most years in the Trinity, however this year mortalities appeared to be much higher than most by biologists monitoring the basin. The annual spring Chinook die off appears to be linked primarily to warm river temperatures (>21 Celsius) found in the Klamath and lower Trinity River. This condition appears to lead to disease susceptibility, particularly columnaris.

#### Incidence of Program marked salmon

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

During the 2001 season, the percentage of tags found on spring Chinook during carcass surveys was lower than observed at the hatchery. The percentage of program marked fall Chinook observed in the spawner survey was approximately the same as the TRH sample, while program marked coho proportions were greater than the recovered percentage at TRH (appendix 3). Factors that may account for differences in program marked percentages between the hatchery and natural areas include: 1) Sample size. Our sample sizes are much greater at TRH versus natural areas. 2) Weir trapping schedules. If a portion of the run is not trapped as efficiently as other segments of the run we would expect that the recovery percentages of marked fish may vary. This may explain the difference between spring Chinook marked recovery percentages at TRH versus spawner surveys. Since the JCW was not operational until mid June we may have missed a portion of the run. If this portion of the run had a higher percentage of wild fish than latter segments, we would expect lower tag recovery percentages in natural areas, which was observed this year.

#### Incidence of hatchery produced Chinook

Another important aspect of our surveys is document the magnitude and distribution of hatchery strays. Ad-clip and RM-clip rates observed at 3 fixed sites and in the carcass survey are presented in appendix 4. Only condition-1 fish were used for carcass survey Chinook Ad-clip analysis, while all coho found during carcass surveys were used. This was done because of the subjectivity of determining the presence or absence of Ad-clips on deteriorating Chinook and the more easily identified RM-clip on coho.

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

The Ad-clip rate (6.2%) of spring Chinook found in the mainstem Trinity River were lower than at either JCW (18.6%) and TRH (25.9%). Using the above estimation method and assumption, we estimate that hatchery-produced spring Chinook, upstream of Junction City weir composed 71.8% ( $18.6/25.9$ ) of the total run and 23.9% ( $6.2/25.9$ ) of the spring Chinook observed in the mainstem carcass survey. This is slightly higher than the estimate produced under task 2 of this report, in which we estimated that 65.2% of the spring run upstream of Junction City was composed of hatchery produced spring Chinook.

The Ad-clip rate (9.0%) of fall Chinook found in the mainstem spawner survey was also lower than that observed at WCW (19.6%) and TRH (29.7%). Using the previous estimation methods, we estimate that 66.0% ( $19.6/29.7$ ) of the fall Chinook, upstream of Willow Creek weir, were of hatchery origin and that 30.3% ( $9.0/29.7$ ) of mainstem spawners were of hatchery origin. Using task 2 results, we estimated that 61.5% of Chinook above Willow Creek weir were of hatchery

origin.

Estimates made under task 2 do not rely on the assumption that all fish which enter the hatchery are of hatchery origin, thus it is likely that some naturally produced Chinook do enter the hatchery.

The incidence of coho RM-clips varied from a rate of 75.9% in the mainstem spawner survey to 98.8% at TRH. The observed rate at WCW was intermediate at 89.5%. These high rates of hatchery produced coho in all sample sites indicate that the Trinity River coho population, upstream of Willow Creek weir, is heavily supported by hatchery produced fish. However, sampling at the weir (through mid November) and in the mainstem Trinity spawner survey (through mid December) did not include the complete temporal scale of coho migration and their ultimate death. The potential exists that naturally produced coho have a later run-timing, spawn and die later, or spawn primarily in tributary streams which were not surveyed.

## RECOMMENDATIONS

- 1.) Annual spawner survey activities should be continued, with current 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).
- 3.) We should attempt to measure all identifiable fish.

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Appendix 1. Size composition of Chinook and coho salmon observed in the mainstem spawner survey and at three fixed locations in the Trinity River basin during the 2001-02 season.



### Spring Chinook

	Junction City weir	Trinity River Hatchery	Spawner survey b/
Grilse a/	78	629	35
Adults	663	6,366	510
% Grilse	10.5%	9.0%	6.4%

a/ Spring Chinook grilse were  $\leq 57$  cm, FL; larger fish were adults.

b/ Condition 1 fish only.

### Fall Chinook

	Willow Creek weir	Trinity River Hatchery	Spawner survey b/
Grilse a/	58	204	54
Adults	2,671	17,971	1535
% Grilse	2.1%	1.1%	3.4%

a/ Fall Chinook grilse were  $\leq 55$  cm, FL; larger fish were adults.

b/ Condition 1 fish only.

### Coho

	Willow Creek weir	Trinity River Hatchery	Spawner survey
Grilse a/	37	1,026	8
Adults	287	9,755	482
% Grilse	11.4%	9.5%	1.6%

a/ Coho grilse were  $\leq 58$  cm, FL; larger fish were adults

Appendix 2. Female chinook salmon pre-spawning mortality rates observed during the mainstem Trinity River spawner surveys from 1955 through 2001.

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

- a/ Spring-run and fall-run chinook salmon were not separated during these years.
- b/ Pre-spawning mortality rate was not reported during these years.
- c/ Overall pre-spawning mortality rates were reported but not numbers of carcasses observed.

Appendix 3. Proportions of recovered Program-marked (spaghetti tagged), condition-1, salmon carcasses in the mainstem Trinity River spawner survey and at Trinity River Hatchery during the 2001-02 season.

	Spring Chinook			Fall Chinook			Coho		
Mainstem spawner survey									
Tag site a/	Program marks	Total observed	% Program marks	Program marks	Total observed	% Program marks	Program marks	Total observed	% Program marks
JCW	6	546	1.1%	6	1,608	0.4%	-----	-----	-----
WCW	6	546	1.1%	68	1,608	4.2%	17	526	3.2%
Totals:	12	546	2.2%	74	1,608	4.6%	17	526	3.2%
Trinity River Hatchery									
JCW	256	6,995	3.7%	5	18,175	0.03%	-----	-----	-----
WCW	51	6,995	0.7%	817	18,175	4.5%	104	10,781	1.0%
Totals:	307	6,995	4.4%	822	18,175	4.5%	104	10,781	1.0%

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

Appendix 4. Comparison of the proportion of adipose fin-clipped (Ad-clip) Chinook salmon and right maxillary-clipped (RM-clip) coho salmon in the mainstem Trinity River spawner survey to proportions observed at three fixed locations in the Trinity River basin during the 2001-02 season.

	Spring Chinook			Fall Chinook			Coho		
Site a/	Ad-clips	Total	% Ad-clips	Ad-clips	Total	% Ad-clips	RM-clips	Total	% RM-clips
JCW	137	738	18.6%	-----	-----	-----	-----	-----	-----
WCW	-----	-----	-----	536	2,729	19.6%	290	324	89.5%
TRH	1,809	6,995	25.9%	5,406	18,175	29.7%	10,649	10,781	98.8%
TR b/	34	546	6.2%	145	1,608	9.0%	525	692	75.9%

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

b/ Only condition-1 Chinook were used for the mainstem spawner survey analysis.

ANNUAL REPORT  
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT  
2001-02 SEASON

TASK 5  
ANGLER CREEL SURVEYS IN THE LOWER KLAMATH RIVER

By  
Sara Borok

ABSTRACT

During August 6th through November 4th, 2001, a creel census was conducted in the lower (Mouth to the falls at Coon Creek) Klamath River to determine numbers of upstream migrating chinook salmon, coho salmon and steelhead trout harvested by sport anglers. The chinook quota of 29,800 adult fall-run chinook salmon was not met. A total of 8,463 (7,285 adults and 1,178 grilse) chinook salmon and 300 (237 adults and 63 half-pounders) steelhead harvested. We did not start counting fish toward the quota until August 20th. During the first two weeks of the creel 753 (698 adult and 55 grilse) spring-run chinook salmon were harvested. The total of fall-run chinook harvested was 7,710 (6,587 adults and 1,123 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 the fall chinook resource and harvest allocation in northern California and southern Oregon.

The numbers of fall chinook salmon entering the Klamath River (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 estimate. Annual reports

summarizing these activities have been written through the 1998 season (Boydston 1979, 1980; Lee 1984a, 1984b, 1985, Lau 1992, 1993, 1994, 1995, 1996, 1997; Pisano 1998; Borok 1999, 2000).

This report covers the period July 1, 2001 through June 30, 2002. It provides data and a description of the CDFG fall chinook angler harvest monitoring program in the Mainstem Klamath River from the mouth to the falls at Coon Creek excluding the Trinity River. Trinity River fall chinook angler harvest data during the corresponding time is contained in a separate CDFG report.

The Klamath River Project (KRP) divides the Klamath River 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 Klamath river (Area 3) and Trinity River. We monitor each of the areas for the fall-run chinook harvest and determine when the quota of each section 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 purposes, a special fishery for adult chinook is permitted from Iron Gate Dam to where Interstate 5 crosses the Klamath River. Once the river is closed to adult chinook harvest in any area, fishing for grilse chinook and other legal species is still permitted.

The Fish and Game Commission establishes all angling regulations and quotas for the Klamath River. These regulations are enforced by the CDFG. The Commission adopts the quota recommendations made by the Pacific Fishery Management Council. Typically, the in-river sport chinook quota was 7.5% of the overall allowable harvest, or 15% of the non-tribal fisheries harvest. This year was different, a large run was forecast and it was believed the ocean commercial and recreational fishermen would not be able to catch their portion of the allocation due to fishing constraints due to ESA stocks being listed as threatened. The portion that the commercial and recreational fishermen would not be able to catch was given to the in-river sport anglers. Instead of the in-river sport getting 7.5% of the non-tribal, they received 20% of the non-tribal harvest allocation or 29,800 fish.

Starting in 1999 an "impact quota" was implemented for the Klamath and Trinity Rivers. From this impact quota a ten percent hooking mortality factor was accounted for within the quota and this number was used as the trigger quota. This trigger closure was to account for increased hook and release mortalities when 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 2001 season these percentages worked out to 14,900 fish for the Lower Klamath River, 5,066 for the upper Klamath River and 4,917 for each section on the Trinity River (9,834 total for Trinity River).

During the 2001 season, fishing regulations allowed anglers to harvest three chinook (up to two adult chinook salmon) 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 divide into three areas for estimating angler catch and effort. Areas 1 and 2 are included in this report. Area 3 methods and results are included in another report.

AREA 1 : This area consisted of 4.5 rkm (2.8 mi) of river from the mouth of the Klamath to the Highway 101 bridge and is referred to as the estuary. Virtually all shore angling effort took place at the mouth of the river. River mouth configuration which changed between years, determined which side (north or south) afforded better angling. A creel sample of shore anglers was conducted at the mouth location. During the 2001 season fishing at the mouth was closed when 15% of the basin quota was met, which occurred on August 25th, 2001. The majority of fish were caught at the mouth 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 (Townsite Boat Ramp) were sampled this season for angler effort and catch.

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

Shore angling access above Blakes Riffle to Johnsons was limited to about three areas: the mouth of Blue Creek ( rkm 26.3, 16.4 rm), Ah Pah Creek ( rkm 27.5, 17.2 rm) and Bear Riffle ( rkm 29.8, 18.6 rm) were accessible by vehicle but accounted for an estimated less than one percent of angling effort in the entire sample area.

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

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

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

#### Creel Census Methods

Study methods and procedures used in the Lower Klamath Creel (Area 1 and 2) during the 2001 seasons were essentially the same as those described for the 1984-1987 seasons (Hopelain 1989). 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 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 either juveniles, grilse or adults).



## Harvest and Effort Estimating Procedures

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

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

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

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

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

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

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. Both are valid assumptions.

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

## Daily Real Time Harvest Estimates and Projections

As in previous seasons, the Klamath River Project thought it necessary to compute harvest and effort estimates daily (real time) as we neared the fall-run chinook 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.

## RESULTS

The creel census for the lower Klamath River began on August 6 and ran through November 4 (JW 32 through 44) of 2001. Chinook salmon harvested in the creel fishery ranged in size from 34 to 111 cm in fork length (FL) and averaged 75.1 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 62 cm FL (Figure 1A) instead of the 56cm separation used during the creel season. All numbers cited in this report are based on the adjusted adult -grilse separation.

This adult-grilse separation was larger than the 58 cm FL break off observed in the 2000 season. The grilse component of the angler harvest ranged in size from 34 to 61 cm FL and averaged 51.5 cm FL. The adult chinook salmon component of the harvest ranged in size from 62 to 111 cm FL and averaged 79.1 cm FL (Figure 1A). This separation is slightly larger than that used by Trinity River Hatchery and the Willow Creek Weir. They made the separation at 58 cm FL (personnel communication Wade Sinnen). This separation in the sport fishery is the same as Iron Gate Hatchery (Figure 1B). From recovery operations at Iron Gate Hatchery we determined the grilse-adult break off at 62 cm FL.

Harvested steelhead ranged in size from 28 to 76 cm FL and averaged 46.9 cm FL (Figure 1C). I considered any fish less than 42 cm FL to be half-pounders, any steelhead larger to be an adult. Any steelhead less than 23 cm FL I considered a resident trout and not anadromous. The half-pounder steelhead ranged in size from 28 to 41 cm FL and averaged 37.9 cm FL. The adult steelhead ranged in size from 42 to 76 cm FL and averaged 52.8 cm FL.

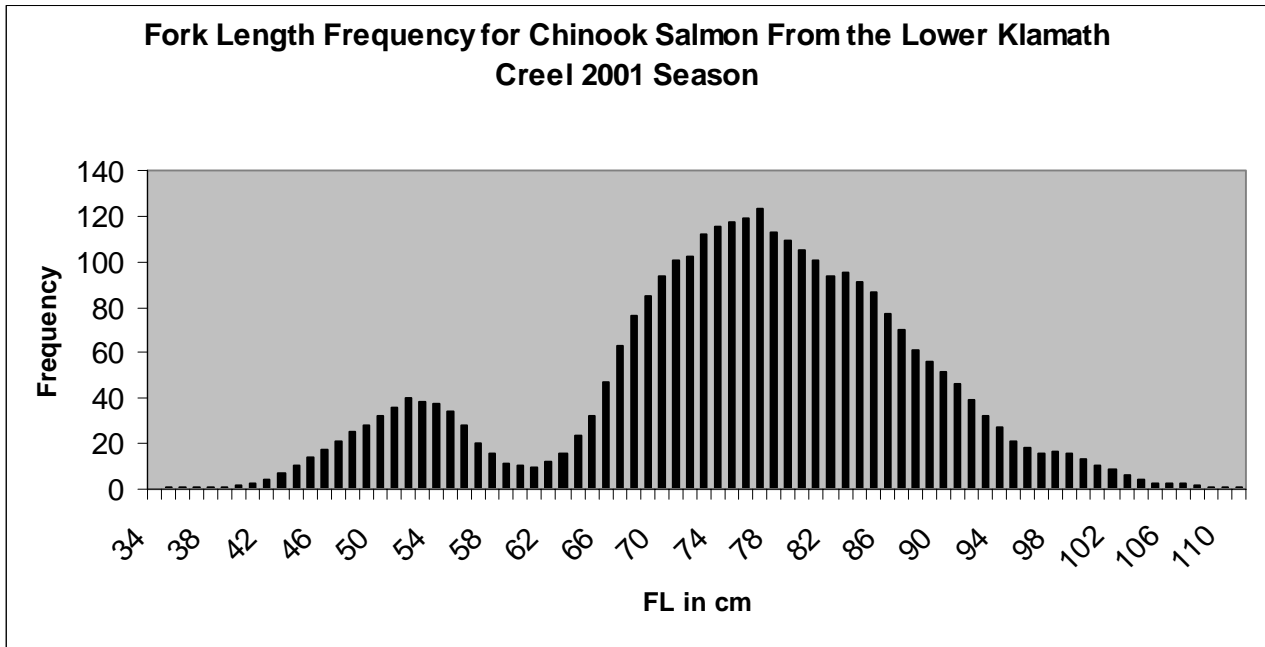


Figure 1A. Fork Length Frequency of Chinook Salmon Harvested in the Lower Klamath River Creel During the 2001 Season.

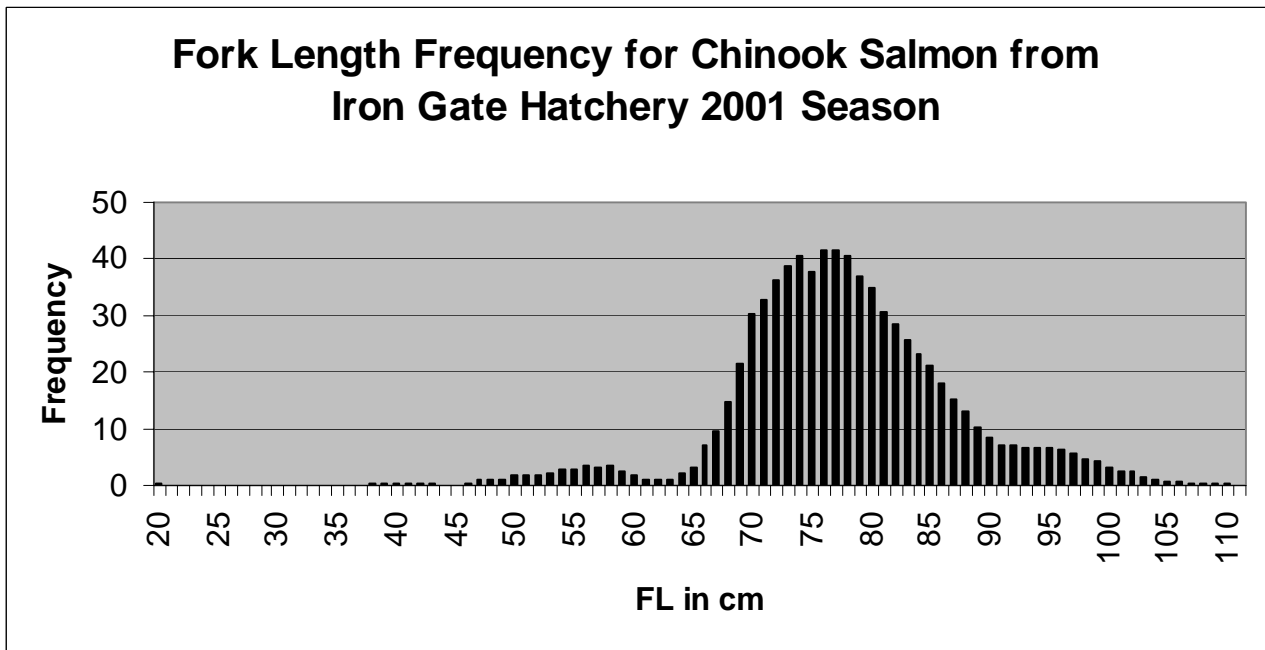


Figure 1B. Fork Length Frequency of Chinook Salmon Sampled at Iron Gate Hatchery During the 2001 Season.

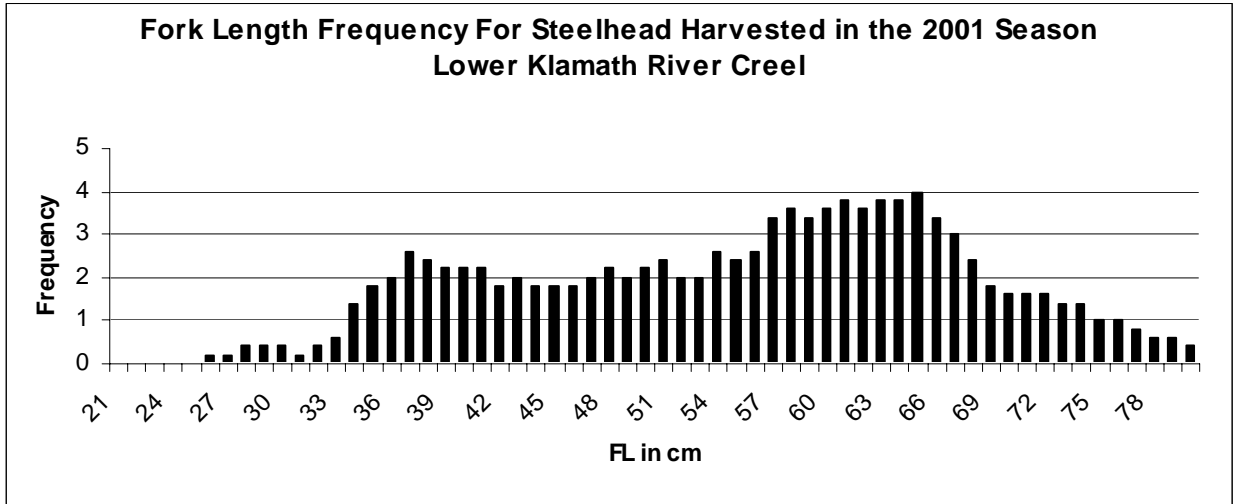


Figure 1C. Length Frequency of Steelhead Caught in the Lower Klamath River Creel during the 2001 Season.

Estimated Angler Effort and Harvest

During the 2001 season, I estimate that anglers made a total of 20,119 trips in both Areas combined. Of the 20,119 trips 11,089 were in Area 1, 9,026 were in Area 2 (Table 1). These trips resulted in a total of 88,053 fishing hours. As in previous seasons, boat anglers outnumbered shore anglers in both Areas (Table 1). But shore anglers out fished the boat anglers. We estimate a total of 8,463 (7,285 adults and 1,178 grilse) chinook salmon and 300 (237 adults and 63 half-pounders) steelhead were harvested. We did not start counting fish toward the quota until August 20th. During the first two weeks of the creel, 753 (698 adult and 55 grilse) spring-run chinook salmon were harvested. The total of fall-run chinook harvested was 7,710 (6,587 adults and 1,123 grilse) fish. Adults composed 85.4 % (6,587/7,710) of the estimated fall-run chinook harvest. Adult steelhead trout composed 79.2 % (237/299; Table 1) of the steelhead harvest.

Table 1. Summary of Estimated Angler Effort and Harvest During the 2001 Lower Klamath River Creel Census.

Site	Angler		Steelhead		Chinook Salmon	
	Trips	Hours	<42cm	>41cm	<62cm	>61cm
Area 1 -Mouth to Highway 101 Bridge						
Shore	7,021	22,581	5	69	101	4,220
Boats	4,069	19,909	14	21	221	1,078
Total	11,089	42,489	19	90	323	5,298
Area 2 - Highway 101 to Coon Creek Falls						
Shore	2,372	7,554	9	26	9	168
Boats	6,654	38,009	35	121	846	1,820
Total	9,026	45,563	44	147	855	1,987
Grand Total	20,119	88,053	63	237	1,178	7,285
2000 Season	14,150	57,184	58	72	1,080	2,196

### 2001 Harvest and Effort Patterns

Compared to previous years, angler effort increased for the 2001 season. The number of angler trips was the second highest in the last ten years. The average length of each trip expanded to 4.3 hours per trip. It is our hypothesis that the larger quota this year brought the anglers back (Table 2). The 2001 season had the highest catch per hour for adult salmon in the last 21 years (Figure 2).

During the 2001 season, Area 2 anglers harvested less fish than Area 1 (Table 1). Anglers (boat and shore) in Area 1 accounted for 66.4% (5,621 / 8,463) of the total chinook salmon and 36.5%

(109 /299) of the steelhead harvested. Anglers in Area 2 harvested the remainder. Area 1 anglers accounted for 55.1% (11,089/ 20,116) of angler trips and only 48.3% of the angler hours (42,489/ 88,053). Most of the fish harvested in Area 1 were by shore anglers at the mouth.

In past seasons, boat anglers interviewed at the Roy Rook Boat Ramp accounted for the largest percentage of the total harvest and effort. The anglers fishing at the mouth had the most success this season. Anglers at the mouth accounted for 27.1 % of the total chinook harvest. Roy Rook Boat Ramp followed with 20.2 % and Townsite Boat Ramp with for 19.9% of the total chinook harvest.

In Area 1, boat anglers were less successful in catching chinook than shore anglers. The opposite was true in Area 2, shore anglers caught less fish than boat anglers. Boat anglers in Area 2 harvested the majority (71.8%) of the grilse chinook.

The majority of harvest of chinook occurred in Area1 at the mouth this season. Storms during Julian week 36 kept anglers from fishing at the mouth of the river, otherwise harvest may have been greater. The mouth of the river backed up water a certain tides starting in Julian week 39. Harvest in the estuary dropped of markedly when this happened.

More adult steelhead (237) were harvested than half-pounders (63). The peak of the adult steelhead harvested was Julian week 33 in Area 1 and Julian week 34 for Area 2 (Figure 7). The peak weeks for half-pounders harvested was Julian weeks 34 and 35 for Area 1 and week 33 for Area 2 (Figure 8) Anglers start fishing for steelhead usually in July, and creel counts during Julian Week 32 at the beginning of August, therefore we miss the early portion of the steelhead run.

Table 2. The Number of Angler Trips, Hours, and Average Length of Trip in the Lower Klamath River Sport Fishery for the Last Ten Seasons, 1992-2001.

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

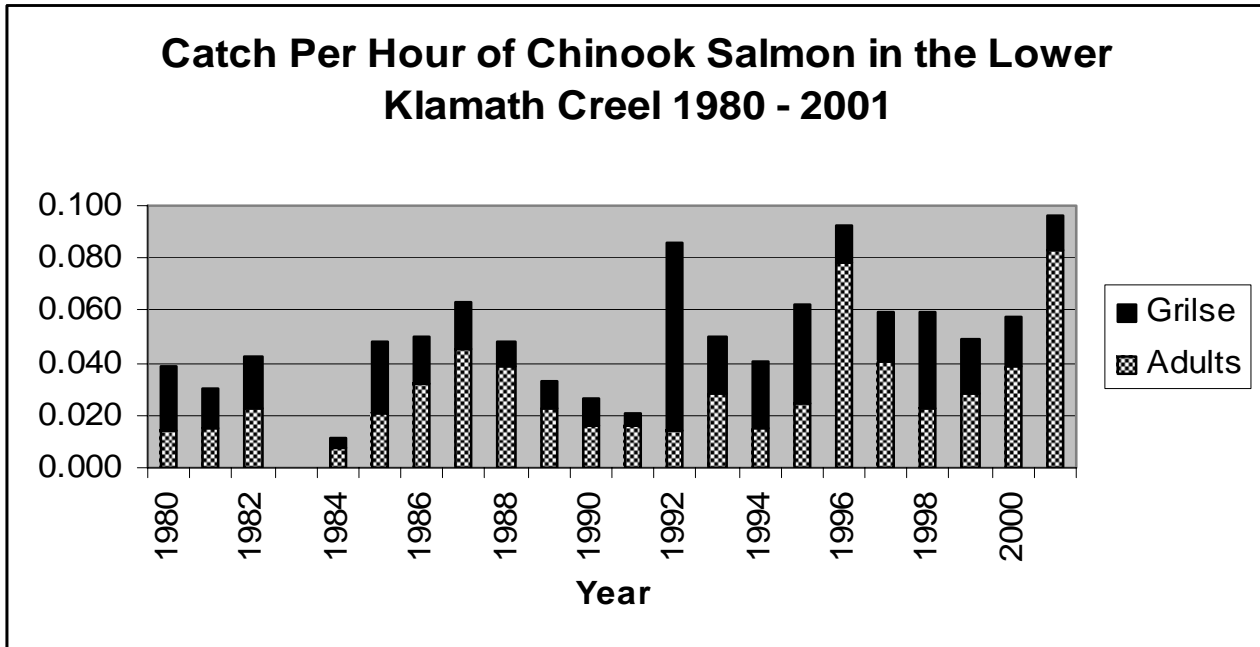


Figure 2. Catch Per Hour for Chinook Salmon from the Sport Harvest on the Lower Klamath River 1980 – 2001.

### 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 11,892 half-pounders, 2,997 adult steelhead, 464 grilse, and 1,720 adult chinook salmon. In addition, 12 grilse and 242 adult coho salmon were released this season (Tables 3 and 4).

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. A total of 254 coho (12 grilse and 242 adults) were released.

Table 3 Number of Chinook Salmon and Steelhead Caught and Released from the Lower Klamath River Creel For the Last Five Seasons 1997-2001.

Year	Chinook		Steelhead	
	Grilse	Adults	<42	>41
97	34	1,015	1,479	2
98	330	1,317	1,738	460
99	1,897	1,164	1,189	346
00	757	6,253	8,103	1,129
01	464	1,720	11,892	2,997

Table 4. Summary of Estimated Catch and Releases During the 2001 Lower Klamath River Creel Census.

Site	Angler		Steelhead		Chinook Salmon	
	Trips	Hours	<42cm	>41cm	<62cm	>61cm
Area 1 –Mouth to Highway 101 Bridge						
Shore	7,021	22,581	40	50	66	918
Boats	4,069	19,909	592	132	69	289
Total	11,089	42,489	632	182	135	1,208
Area 2 - Highway 101 to Coon Creek Falls						
Shore	2,372	7,554	5,303	1,214	37	42
Boats	6,654	38,009	5,958	1,601	291	471
Total	9,026	45,563	11,261	2,815	328	513
Grand Total	20,119	88,053	11,892	2,997	464	1,720
2000 Season	14,150	57,184	8,103	1,129	757	6,253

Run Timing

Adult fall-run chinook harvest below Hwy 101(Area 1) peaked during Julian Week 35 with a



second peak occurring during Julian week 37. Above the Hwy 101 bridge (Area 2), the peak weeks for harvest of adult fall-run chinook occurred during Julian weeks 38 and 39 (Figure 3). For grilse chinook the peak of harvest occurred in Julian week 37 for Area 2 and during Julian week 39 for Area 1 (Figure 4). Grilse harvest only made up 13.4% of total chinook harvest.

Nearly as many chinook were released below the Hwy 101 bridge in Area 1 as were harvested in Area 2 (Tables 1 and 4). Anglers are not known to release many fish in Area 1. The peak weeks of adult chinook released in Area 1 were Julian Weeks 37 and 38. While the peak week of adult chinook released in Area 2 was Julian Week 40 (Figure 5). For grilse chinook the peak releases occurred during Julian Week 42 for Area 1 and Julian Week 41 for Area 2 (Figure 6).

Regulations allow anglers to keep only hatchery origin steelhead. Large numbers of steelhead were caught and released this year. Anglers released 2,997 adult and 11,892 half-pounders this season (Table 4). In Area 1 the peak week for all steelhead released was Julian week 33, with another smaller peak around Julian week 41 (Figures 9 and 10). Area 2 is where the majority of steelhead are harvested and released. Julian Week 33 was the peak week for half-pounders released in Area 2 (Figure 9). A week later, Julian week 34 was the peak week for adult steelhead released in Area 2 (Figure 10).

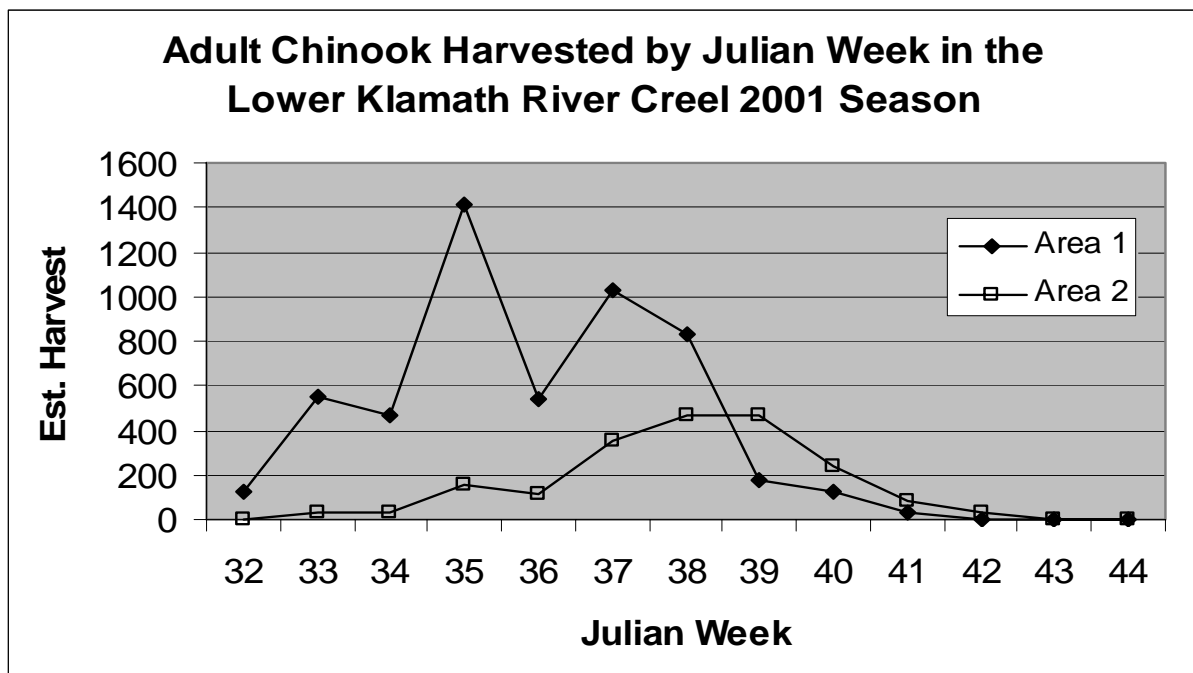


Figure 3. Adult Chinook Salmon Harvest By Julian Week in Lower Klamath River for the 2001 Creel Season.

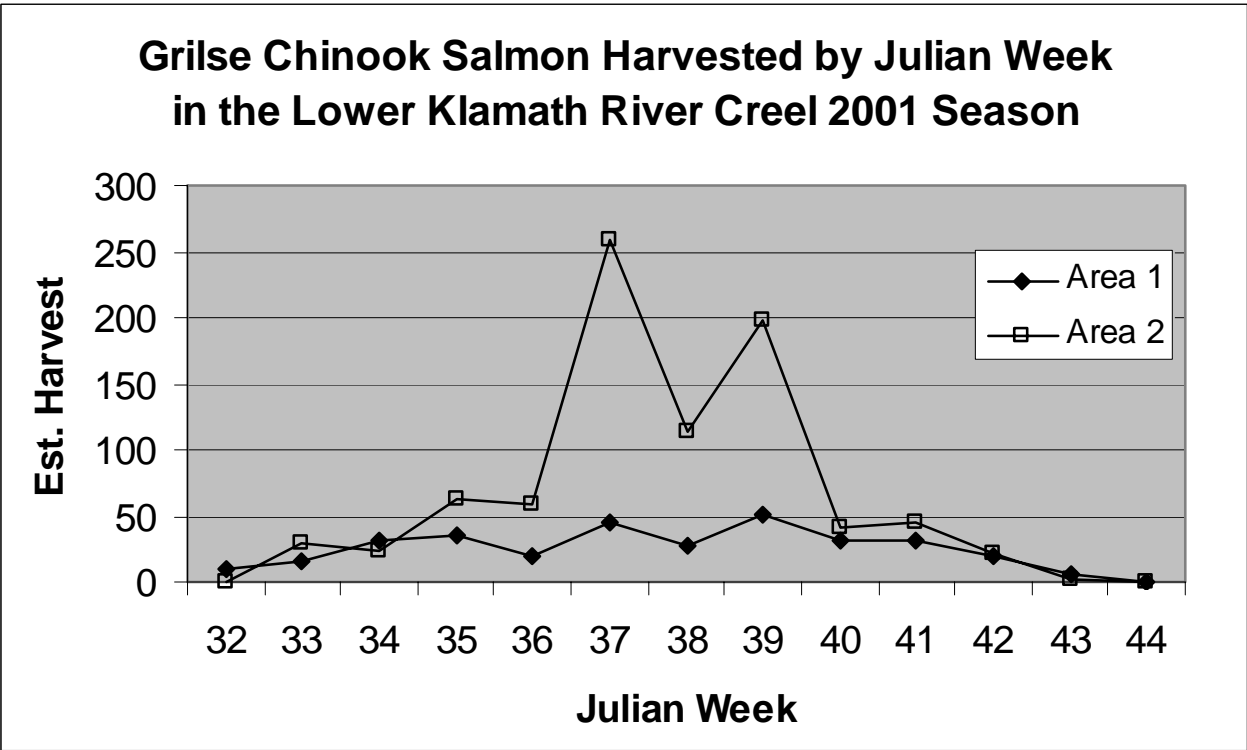


Figure 4. Grilse Chinook Harvested By Julian Week During the Lower Klamath River 2001 Creel Season.

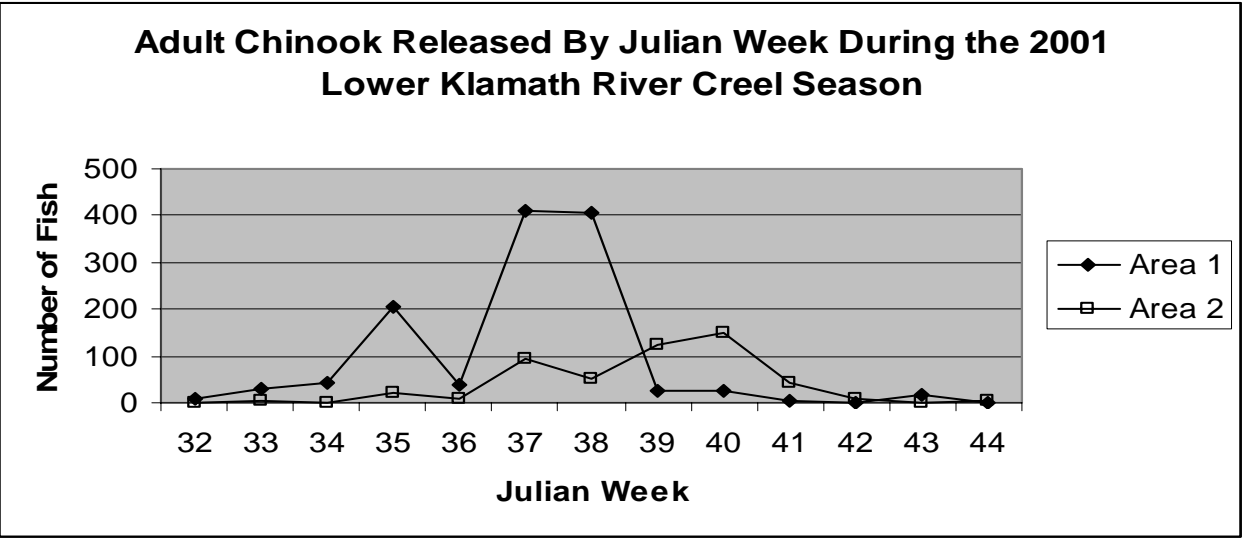


Figure 5. Adult Chinook Salmon Released By Julian Week in the Lower Klamath River for the 2001 Creel Season.

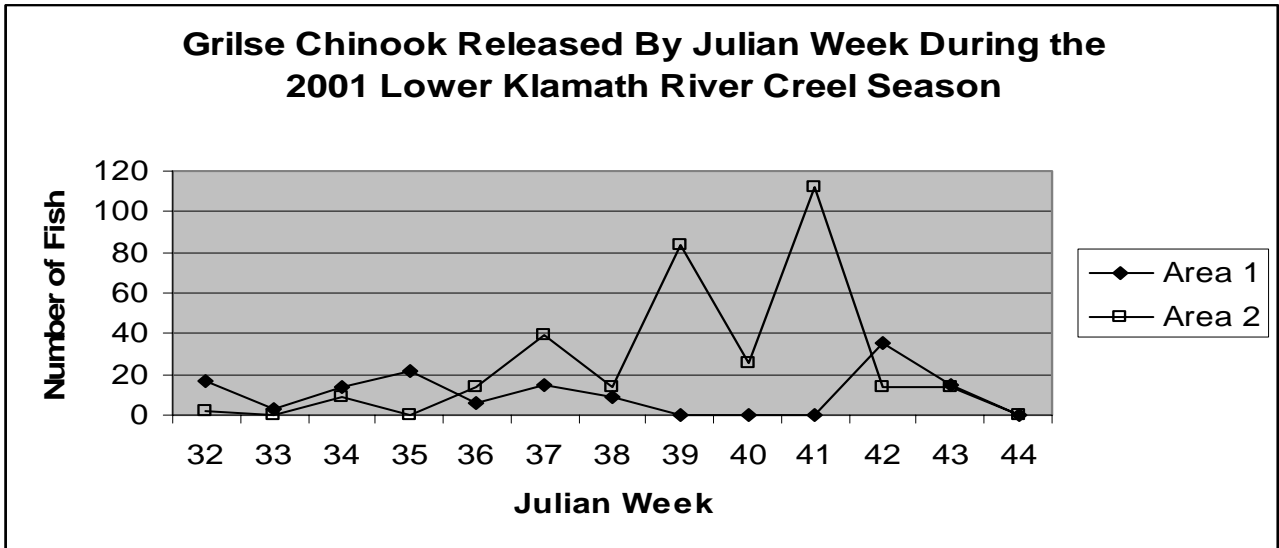


Figure 6. Grilse Chinook Released By Julian Week During the 2001 Lower Klamath River Creel Season.

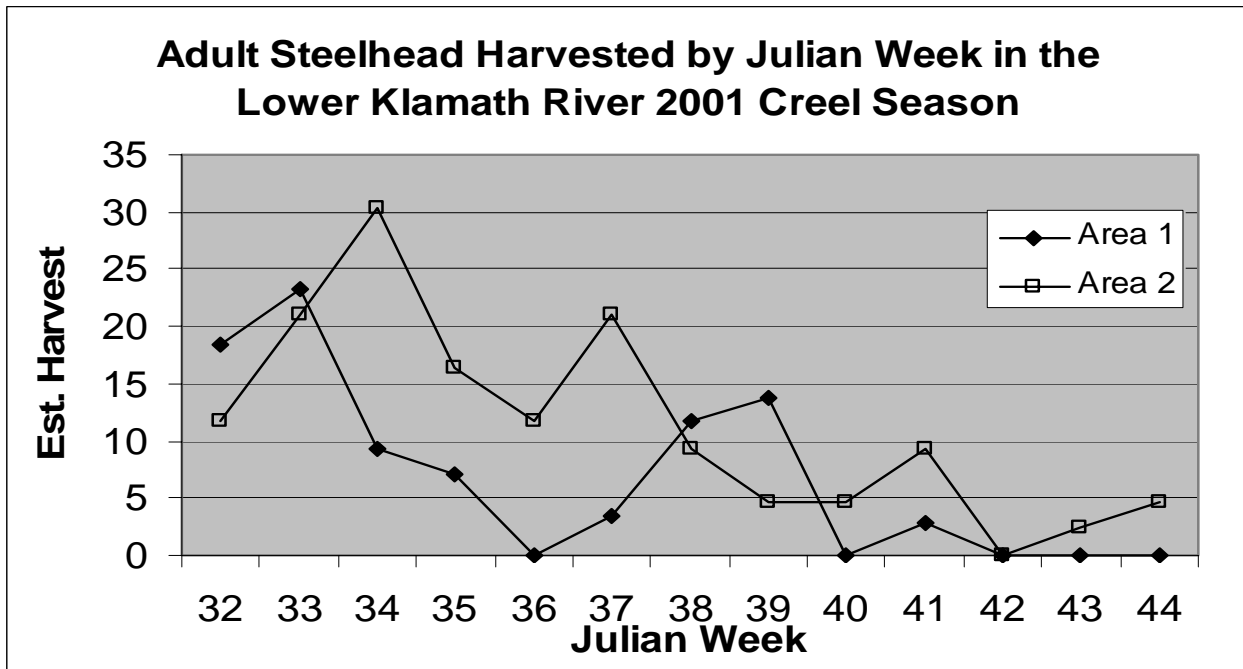


Figure 7. Adult Steelhead Harvested During the 2001 Lower Klamath River Creel Season.

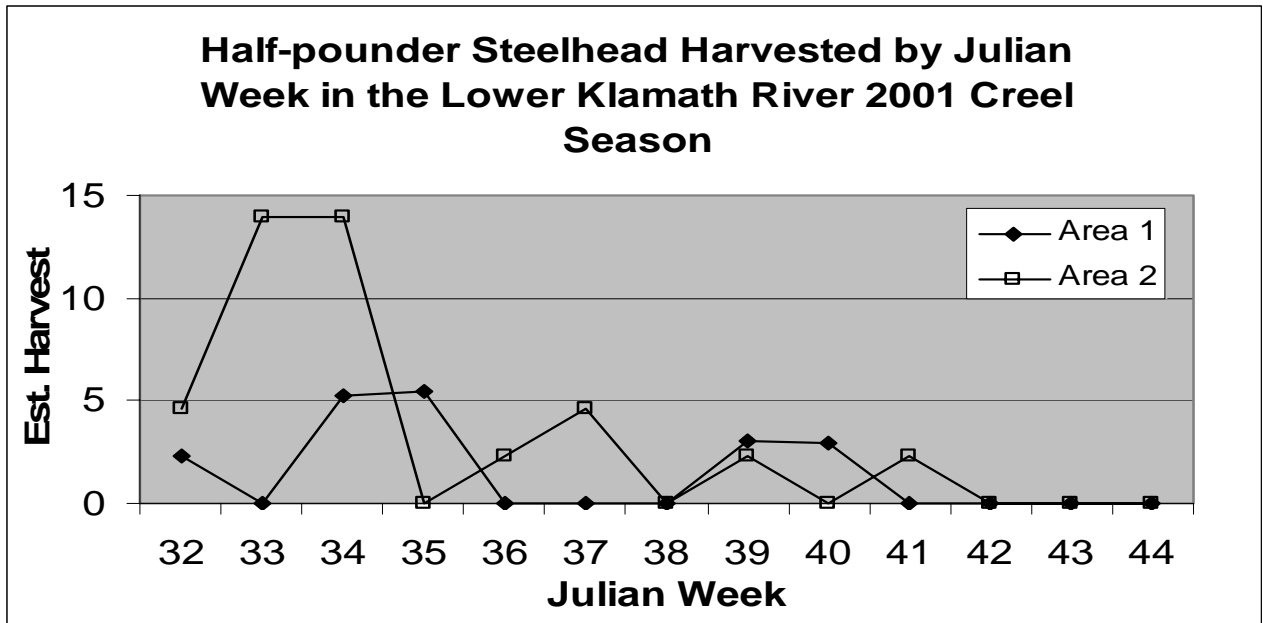


Figure 8. Half-pounder Steelhead Harvested by Julian Week During the 2001 Lower Klamath River Creel Season.

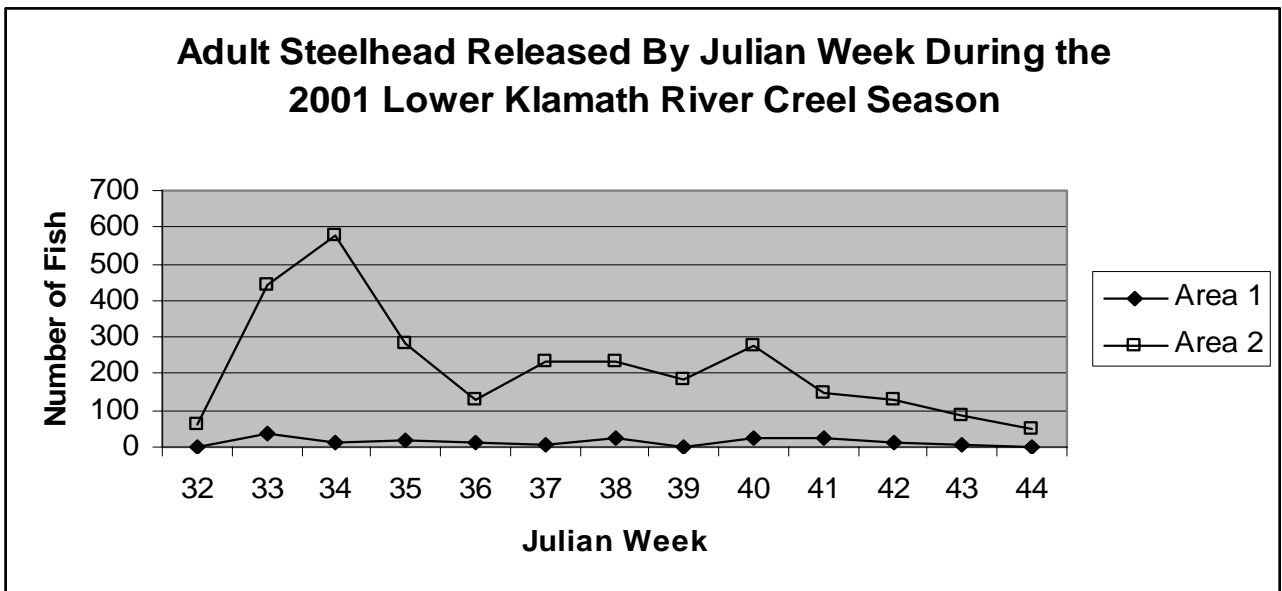


Figure 9. Adult Steelhead Released By Julian Week During the Lower Klamath River 2001 Creel Season.

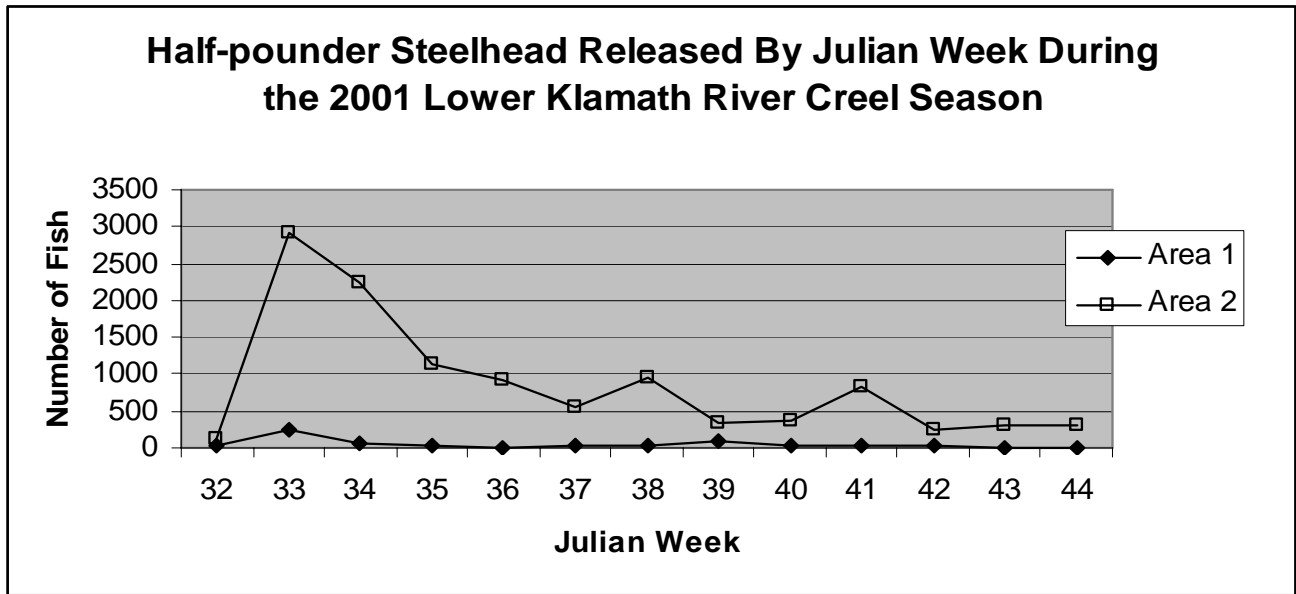


Figure 10. Half-pounder Steelhead Released By Julian Week During the Lower Klamath River 2001 Creel Season.

### Coded-Wire Tag Recovery

Klamath River Project personnel recovered 244 heads of adipose fin-clipped (Ad+CWT) chinook salmon during Julian Weeks 28 through 42 of the 2001 season. Thirty-Nine were from non-random recoveries (NRR) wherein anglers and 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 5). However, were used to calculate run timing (Figure 11).

Of these 244 tags, 216 were adult salmon while 28 were grilse salmon. One tag not included in Table 5 was from an adult (based on observed size) chinook tagged on the Columbia River. Fin-clipped fall run grilse ranged in size from 48 to 59 cm and averaged 52 cm. Spring-run grilse ranged in size from 67 to 83 cm and averaged 75 cm. Fin-clipped fall-run adults ranged in size from 53 to 107 cm and averaged 79 cm. Fin-clipped spring-run adults ranged in size from 75 to 102 cm and averaged 88 cm. All fin-clipped fish observed in the angler survey were assigned a head tag which allowed tracking of each adipose clipped fish through the extraction and decoding process.

There are standard codes for tags not recovered; 100000- no tag found, 200000- tag lost, 300000-no head recovered and; 400000-tag unreadable. For the heads recovered this season, thirty salmon heads had no tags in them (100000), one was lost during extraction (200000), no tags were unreadable (400000), while the 213 remaining were all decoded.

Hatchery Contribution

Randomly recovered, marked chinook composed 6.0 % (205/3,377) of the actual chinook harvested. With expansions made for sampling and tag code expansions, I estimate 2,228 hatchery fish were harvested (Table 6). Hatchery fish represented an estimated 26.3 % (2,228/8,463) of the entire sport harvest. We recovered 204 random recovered tags from Klamath and Trinity Basin origin chinook. And one tag recovered was from an adult fish originating at the Wells Hatchery on the Columbia River from the 1997 brood year.

In addition to the random recovered tags, we had 39 non-random recovered (NRR) tags. These are heads brought to us from fish with adipose clips that were recovered on days we were not sampling a particular area. These are used for run timing purposes. All of these NRR tags were from adult chinook based on the estimated size of head at the time of recovery.

Another 31 tags were recovered from which we were not able to retrieve a tag. These tags were either shed prior to recovery or lost during recovery. We give them the codes 100000 for not found and 200000 for lost tags. Of these, 27 were from adults (15 random and 12 NRR) and 4 from grilse based on fork length at the time of recovery. This left 185 known Klamath and Trinity River origin tags.

#### Klamath River Origin Chinook Salmon

We decoded 14 random recovered tags from Klamath River origin chinook (1 five-year-olds, 4 four-year-olds, 9 three-year-olds and 0 two-year-olds). These chinook represent eight marked groups from Iron Gate Hatchery (Table 5). When expanded by sampling and by tag code Iron Gate Hatchery origin fish account for 41.9% of the sport harvest (Table 6).

The peak for Klamath River origin chinook harvest was Julian Week 37, slightly later than the last two seasons. Personnel recovered Klamath River coded-wire-tagged fish between Julian week 33 and Julian week 41. Harvest of marked chinook dropped off completely by the end of Julian week 42 (Figure 11).

#### Trinity River Origin Chinook Salmon

We decoded 145 random recovered tags from Trinity River fall-run origin chinook (0 five-year-olds, 43 four-year-olds, 100 three-year-olds and 2 two-year-olds). We also recovered 26 spring-run Trinity River Hatchery origin chinook (0 five-year-olds, 10 four-year-olds, 0 three-year-olds and 16 two-year-olds, Table 5). Of these tags, 9 fall-run and 5 spring-run Trinity River Hatchery mark groups were represented. Trinity River origin fish represented 57.9% (8.9% spring-run and 49.0% fall-run) of all the marked chinook in the angler survey (Table 6).

Trinity River spring-run chinook tag recovery began during Julian Week 28 and extended through Julian Week 37. Fall-run fish began to appear in tag recoveries during Julian week 34

and continued through Julian Week 42. Trinity River fall-run tags peaked during Julian week 40 (Figure 11).

Table 5. Coded-Wire-Tag Information from Iron Gate Hatchery (IGH) and Trinity River Hatchery (TRH) for Chinook Salmon Obtained from the Lower Klamath River Creel 2001 season.

CWT Codes	Release Data			Recovery Data			
	Strain	BY	Site	Creel	NRR	FL	Dates
Adult Chinook							
06 -38-31	Fall	96	IGH	1	0	84	08/18
0601020213	Fall	97	IGH	1	1	83 - 85	08/26-31
0601020214	Fall	97	IGH	1	0	107	09/13
0601020215	Fall	97	IGH	2	0	79 - 96	8/28, 9/13
06-52-33	Fall	97	TRH	1	0	87	9/23
06-52-34	Fall	97	TRH	1	0	86	9/09
06-52-35	Fall	97	TRH	0	1	77	9/29
06-52-37	Fall	97	TRH	0	1	--	7/19
06-52-41	Fall	97	TRH	41	4	53 - 100	8/27-10/7
06-52-40	SPR	97	TRH	10	11	75 - 102	7/12-9/14
06-52-43	Fall	98	TRH	1		72	10/7
06-52-48	SPR	98	TRH	2	1	73-77	7/22,8/30
06-52-49	SPR	98	TRH	0	1	-	7/13
0601020301	Fall	98	IGH	1	0	76	9/16
0601020302	Fall	98	IGH	5	0	70 - 86	9/1-30
0601020303	Fall	98	IGH	1	0	79	9/22
0601020304	Fall	98	IGH	2	0	67, 72	8/16,10/5
06-56-42	Fall	98	TRH	2	0	65, 68	9/24-29
06-26-41	Fall	98	TRH	98	4	64 - 80	9/1-10/20
100000	no tag found			14	12	62 -101	7/17/-10/20
Total				181	34		
Grilse Chinook							
06-52-59	Fall	99	TRH	2	0	48,49	9/16,24
06-52-50	SPR	99	TRH	15	5	67-83	8/2-9/18
06-52-52	SPR	99	TRH	1	0	59	8/17
100000	No tag found			4	0		
200000	Tag Lost			1	0		
Totals				23	5		
Grand Total				204	39		

During the 2001 season, sport in-river harvest by stock can be described as follows: Julian weeks 28 through 34 were dominated by Trinity River spring-run chinook. Klamath River fall-run

chinook were present and peaked at Julian week 37. The bulk of the Trinity River fall-run tags were collected during Julian week 40. All coded-wire tagged chinook were gone by Julian week 42 (Figure 11).

Table 6. Estimated 2001 Lower Klamath River Hatchery Proportion of Sport Harvest.

Hatchery Run	Brood Year				Total	% by Hatchery Run	% Of Total Harvest
	96	97	98	99			
TRH SPR	0	76	109	15	200	8.9	2.4
TRH Fall	0	354	726	13	1,093	49.0	12.9
IGH Fall	26	308	601	0	935	41.9	11.0
Total	26	738	1436	28	2,228		26.3
% by year	1.1	33.1	64.4	1.2			

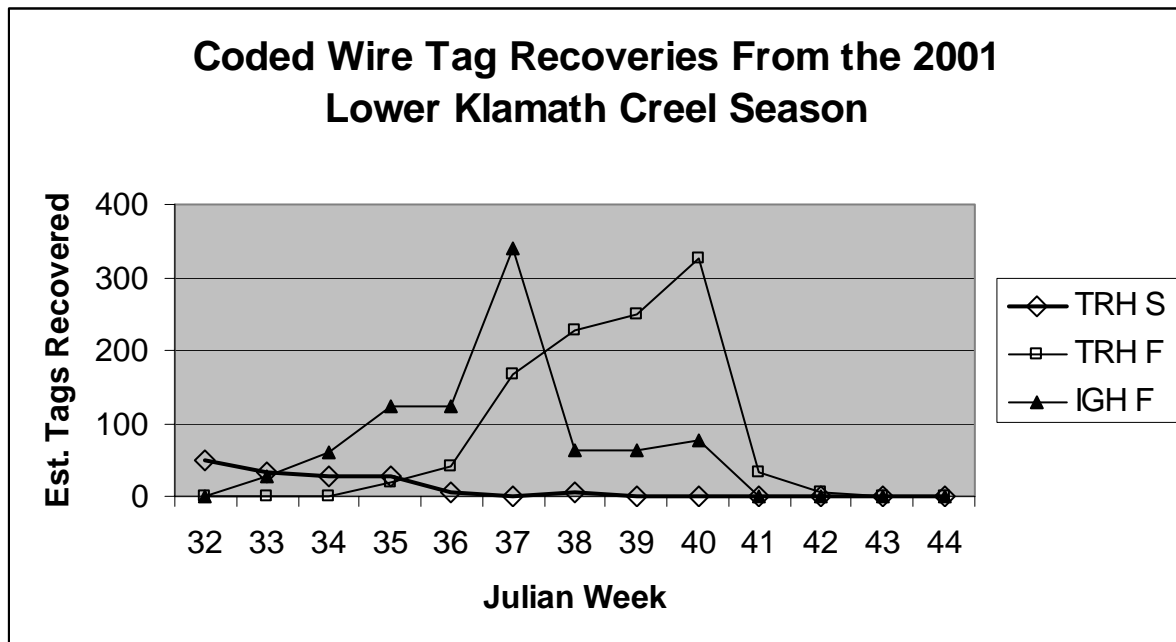


Figure 11. Timing by Julian Week of Coded Wire Tags, Expanded for Sampling and by Individual Tag Code, Recovered from Chinook Salmon in the Lower Klamath River 2001 Creel Season.



## DISCUSSION

During the 2000 creel season, a gear restriction at the mouth was in place to reduce the chance of fish being snagged. The mouth was the prime area of harvest during the 2001 season. The gear restriction seems to have done little to restrict harvest. The weather had more impact on limiting harvest than gear restrictions this season.

Changes in regulations over the last three years seem to have an effect on grilse salmon released. In 1997, two jacks and one adult chinook could be harvested per day, where as in 1998 one jack and one adult and in 1999 only one fish could be harvested. Adult chinook releases were constant over those three years (Table 3). During the 2000 season, anglers met their quota before the main part of the run arrived (September 2, 2000). The peak of the run did not occur for another two weeks, thus a high number of adults were released while anglers fished for grilse salmon (Table 3). In the 2001, two adults and one jack could be harvested. The number of adult chinook released during the 2001 season dropped from the previous year. Anglers did not meet their quota in 2001.

During the 2001 season the majority of chinook releases occurred in Area 1. This makes sense as most of the chinook were harvested in Area 1 too. For steelhead releases Area 2 always has a greater number. Most steelhead fishing guides who promote catch and release fishing, take their clients up the river from the Roy Rook Boat Ramp and Blakes Riffle has been written up in Western Outdoor News as a great place to Steelhead fish.

The large quota made for happy anglers and data was easy to gather. With such a large quota, I believe anglers were taking advantage and making multiple trips and taking more fish than what was legally allowed. For anglers below the Hwy 101 bridge to actually release fish, means there had to be plenty of full freezers. When possible, creel technicians will report flagrant disregard of regulations to Law Enforcement.

## CONCLUSION

The 2001 season resulted in the sixth largest run size (for fall-run chinook salmon) in the Klamath Basin over the last 26 years and the catch per hour for all chinook salmon (grilse and adults combined) for this season was the highest on record.

Post season adjustment for the actual adult-grilse cut-off did not effect the estimate of fish harvested significantly. The 22 inch adult-grilse cut off stated in the regulations was smaller than the actual size observed. The change in size resulted in 221 fish being reclassified from adults to grilse.

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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.