State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2000 - 2001 SEASON

Northern California - North Coast Region
601 Locust Street
Redding, Ca. 96001

May 2002

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Foreword

This is the thirteenth annual report to the United States Bureau of Reclamation (USBR). This year's activities were conducted under terms of Cooperative Agreement Number 01FG200055, and cover the period October 1, 2000 through September 30, 2001 (FFY 2001). The field work was conducted by personnel of the California Department of Fish and Game's (CDFG) Klamath-Trinity Program, Hoopa Valley Tribe's (HVT) Fisheries Department, Yurok Tribal (YT) Fisheries Department and U.S Fish and Wildlife Service (USFWS). The HVT, YT and USFWS were contracted separately by the USBR for cooperative and singular work performed during FFY 2001. Please refer to the respective agencies fisheries departments or the USBR for information regarding these contracts.

This year's CDFG work was comprised of six different projects (**Tasks**) performed on the lower Klamath River, Trinity River, and South Fork Trinity River. Each task represents work that was prioritized by the Technical Advisory Committee (TAC), a sub-group of the Trinity River Task Force. This latter group is responsible for implementation and funding of work under the auspices of the Trinity River Restoration Program (TRRP).

The necessity for performing our Trinity River monitoring activities have been outlined in several Acts of Congress including Public Law 386 (69 Stat. 719), August 12, 1955, Public Law 98-541, October 24, 1984 and the "Trinity River Basin Fish and Wildlife Management Reauthorization Act" of 1995.

Acknowledgments

The following people made possible our field work for the season: Cliff Carrington, Ron Smith, Mike and Linda Allen, Del Rae Williams, Craig Imamoto, Erin McCarthy and Linda Battin, CDFG ; Clyde Matilton, Roy (Rocky) Jones, Timothy Melony, and Dan Ashe, HVT; Jay Glase USFWS; and Charlie Chamberlin, YT.

We appreciate the cooperation of the CDFG Trinity River Hatchery staff during processing of returning salmonids and the following private landowners for granting us access through/on their properties: Don and Letha Blythe, Marv Holden, and Dave Shuman.

We also appreciate the funding and administrative support supplied by the Bureau of Reclamation, most notably Mr. Jim Destaso and Mr. Russ Smith.

Trinity River Basin Salmon and Steelhead Project
2000 - 2001 Season

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ANNUAL REPORT
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2000-01 SEASON

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

by

Wade Sinnen and Carl Reese

ABSTRACT

The California Department of Fish and Game's Trinity River Project conducted tagging and recapture operations from June 2000 through March 2001 to obtain 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. We placed weirs in the Trinity River near the towns of Junction City and Willow Creek, and trapped 3,796 chinook salmon, 235 coho salmon, 416 fall-run steelhead and 43 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 26,083 spring-run chinook salmon migrated into the Trinity River basin upstream of Junction City Weir and that 1,807 (6.9%) of these were caught by anglers, leaving 24,275 fish as potential spawners. We estimated 55,473 fall-run chinook salmon migrated past Willow Creek Weir and that 1,583 (2.9%) of these were caught by anglers, leaving 53,890 as potential spawners.

The coho salmon run in the Trinity River basin upstream of Willow Creek Weir was estimated to be 15,532 fish. No coho were estimated to be harvested, thus all coho were potential spawners.

An estimated 8,042 adult fall-run steelhead entered the Trinity River basin upstream of Willow Creek Weir. Anglers harvested 177 (2.2%) of the adult fall-run steelhead that migrated past Willow Creek Weir, leaving 7,865 fish as potential spawners.

TASK 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-run adult steelhead in the mainstem Trinity River. This effort determines the composition (race and proportion of hatchery-marked[1/] or Project-tagged[2/] fish), distribution, and timing of chinook and coho salmon, and fall-run 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-run chinook salmon (fall chinook), coho salmon (coho), and fall-run 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.

The 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.

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,

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

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

1973a, 1973b, 1982; Smith 1975; Weber 1965). These earlier efforts did not include fish which used the mainstem and tributaries of the lower Trinity River, nor 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 2000 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. We trapped at the WCW from August 23 through November 14, 2000. We trapped at the JCW from June 30 through September 27, 2000.

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 afternoon during trapping days 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-

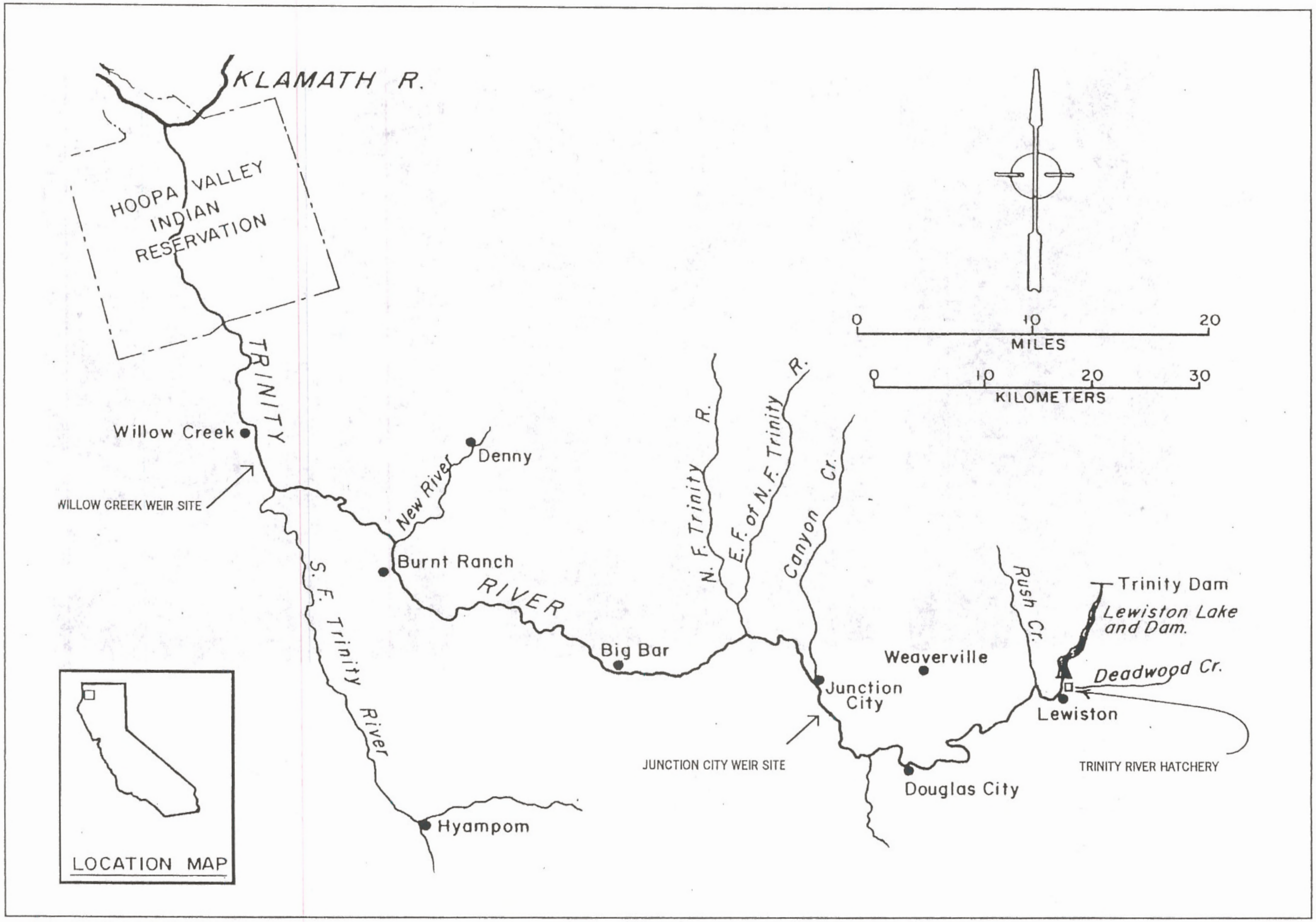


Figure 1. Location of trapping and tagging weirs for anadromous salmonids near Willow Creek and Junction City in the mainstem Trinity River during the 2000-01 season.

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

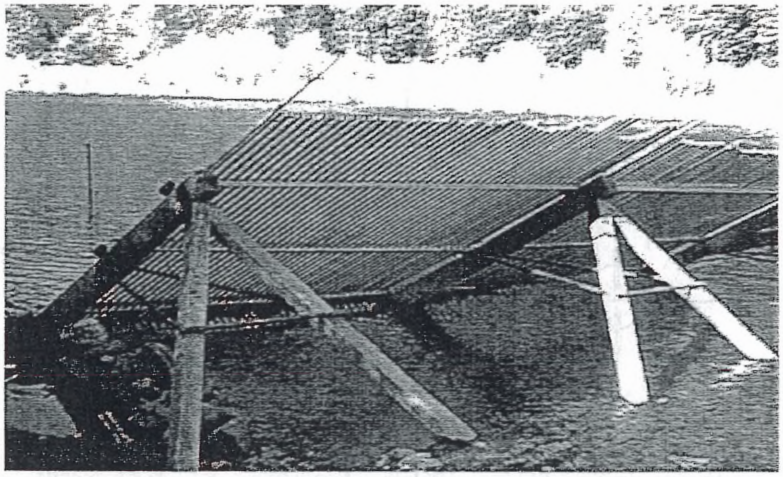


Figure 3. Photograph of upstream view of Alaskan weir. Note the panel boat gate (left center of picture).

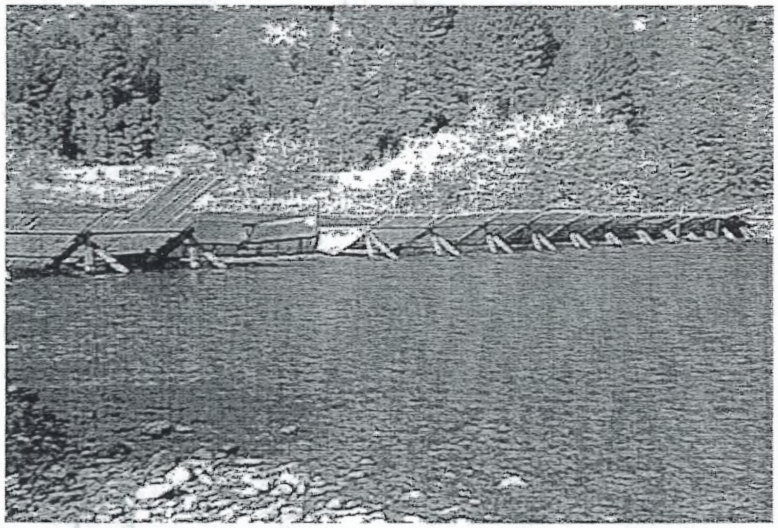
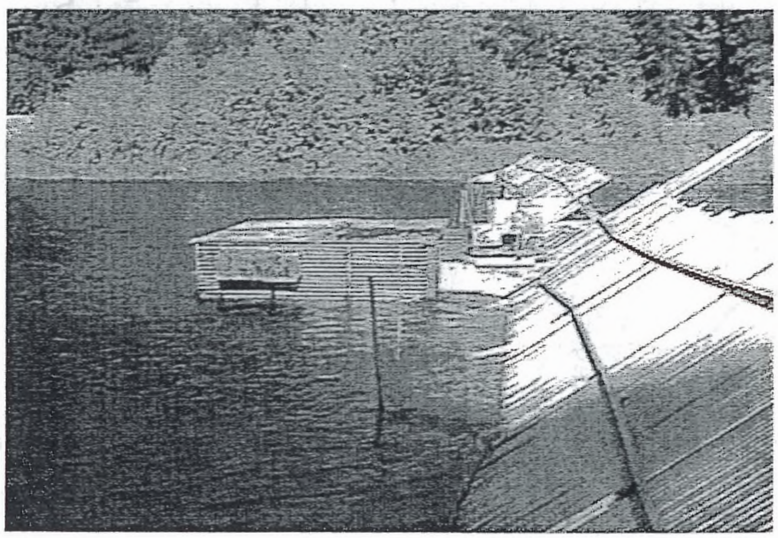


Figure 4. Photograph of Alaskan weir showing the trapping box on the upstream side of the weir.



cm (10-ft X ¾-in) electrical conduit spaced 5.1 cm apart on center, leaving a gap of 3.2 cm between conduits. Conduits were supported by three pieces of aluminum channel arranged 0.92 m apart, that connected to the supporting tripods. We anchored the tripods with cable attached to 1.8-m stakes driven into the stream bottom. The weir panels were angled, with the top of the weir standing 1.8 m above the river bottom.

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. Approximately 12 weir conduits were raised leaving a 1 meter entry way 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 Floy Tag FT-4[3/] spaghetti tag (Project-tagged). Tags were inserted using an applicator needle through the fishes back 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 tagged with non-reward tags only 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-run at that weir. If there are two consecutive weeks with nearly identical proportions, then the first week is designated as spring and the following as fall. A recovered tagged chinook was identified as

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

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. If these fish were recovered at the hatchery or during spawning surveys, the CWT code indicated whether they were spring or fall fish. Secondly, non-CWT 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 without CWT's entering TRH, we expanded the numbers of tags recovered from each returning CWT group by the ratio of tagged to untagged chinook salmon when they were originally released (same strain, brood year [BY], release site and date). For example, 109,869 fall chinook of CWT group 06-52-32 plus 805,333 unmarked fall chinook were released directly from TRH in October 1997. Since there were 7.33 unmarked chinook salmon released for every CWT chinook salmon released (805,333 unmarked/109,869 marked = 7.33), we multiplied the total number of CWT chinook salmon of code group 06-52-32 by 7.33 to estimate the number of unmarked chinook of that release group that returned to TRH. In doing so, we assumed that return rates to TRH of both CWT 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 of the CWT groups, we assumed the additional fish were naturally produced. We designated these fish as spring- or fall-run 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-run chinook run-sizes, we assigned a separation date at the hatchery between the two runs. The separation date was the week in which fall-run chinook out numbered spring-run 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 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. 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 Grilse Coho Salmon

Since coho salmon are not coded-wire tagged, 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 ≤41 cm FL captured at the weirs were assumed to be half-pounders (assumed to have migrated to the ocean). Steelhead ≤41 cm FL that entered TRH were classified as sub-adults, since we did not know whether they had migrated to the ocean or were residual fish. We chose the 41 cm cutoff based on fork length frequency data obtained from the lower Klamath River (Hopelain, 2001).

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

We defined all tagged salmonids recovered dead at the weir, in spawning surveys or reported dead by anglers as tagging mortalities, if there was no evidence they had spawned and they were recovered dead ≤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 (killed) or released their catch. The questionnaire informed them of the fish's tagging date and location.

Tags returned to us through 30 May 2001 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.

Trinity River Hatchery

The TRH fish ladder was open from 5 September 2000 through 29 March 2001. 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- 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

During the 2000-01 season project personnel, in cooperation with the U.S. Fish and Wildlife Service and Yurok Tribe, 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 in 2000-01 by using Chapman's version[4/] of the Petersen Single Census Method:

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

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

We attempted to tag and recover enough fish to obtain 95% confidence limits within ±10% of the run-size estimate. We used criteria established by Chapman (1948) to select the type of confidence interval estimator.

We examined the grilse and adult composition of the effectively tagged salmon, the sample of Project-tagged salmon recovered at TRH, and the untagged sample of salmon at TRH to determine if the run-size estimate should be stratified by grilse and adults. Run-size estimates were stratified by grilse and adult salmon when: 1) the proportions of grilse and adult salmon in each of the above samples were significantly different statistically; and 2) there were sufficient grilse and adult salmon recovered in the Project-tagged sample at TRH to obtain 95% confidence limits of ±10% of each of the stratified portions of the run-size estimate.

If we were not able to stratify the salmon run-size estimate by grilse and adults, 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. If the number of any particular species trapped at a weir was less than 100 fish and were composed of a majority of TRH-produced fish, we stratified the run into grilse and adults based on the pooled proportions observed at the weir and TRH.

All steelhead run-size estimates were for adults only. This year, 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 5 or older returning during this season would not bare an adipose fin-clip.

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.

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

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

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

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

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

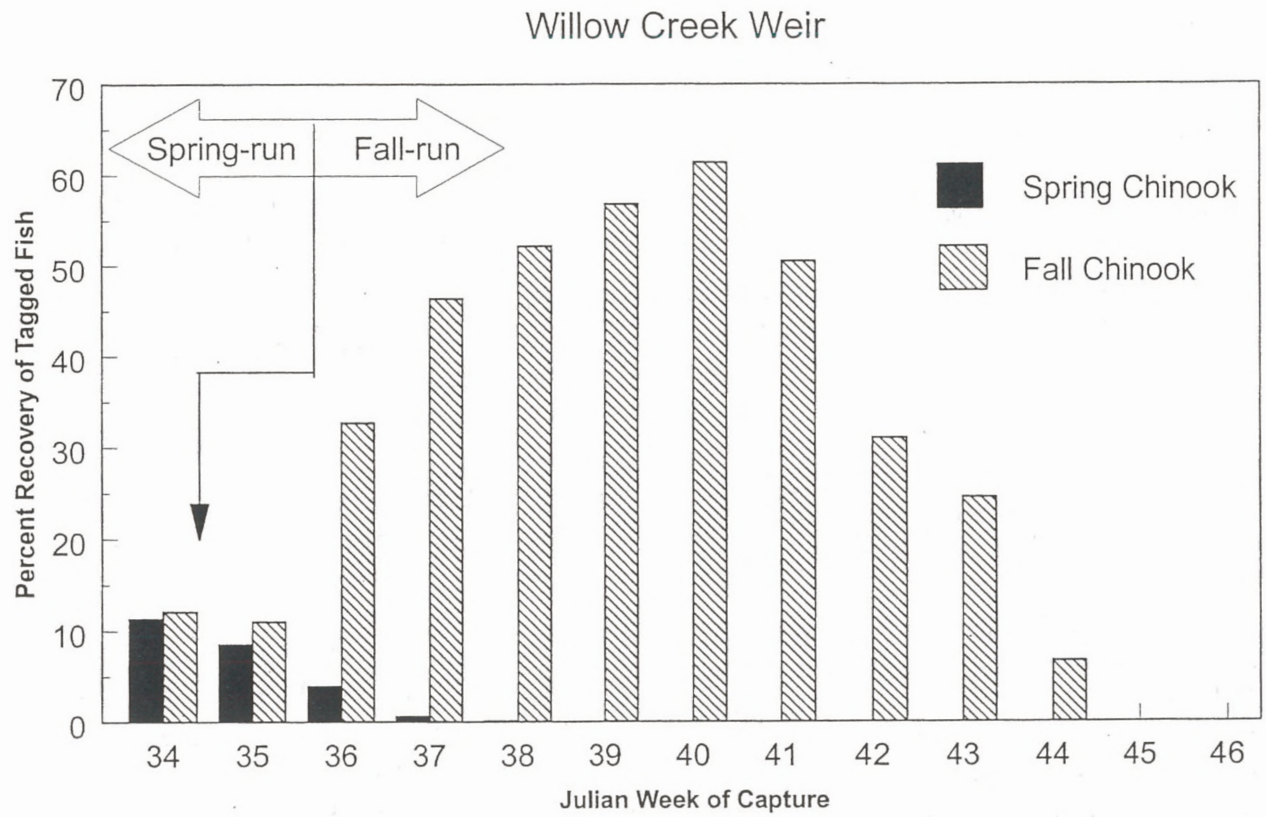
Weekly sampling data collected by Project personnel at the weirs are presented in Julian week (JW) format. Each JW is defined as one of a consecutive set of 52 weekly periods, beginning 1 January, regardless of the day of the week on which 1 January falls. The extra day in leap years is included in the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

RESULTS

Trapping and Tagging

Chinook Salmon

Spring-Fall Chinook Separation. Analysis of known and estimated race, WCW-tagged chinook, showed that beginning JW 34 (20-26 Aug. 2000) and continuing thereafter, the proportion of fall chinook exceeded that of spring chinook. However, the proportions during the first two Julian weeks of trapping (JW 34-35) were similar (Figure 5). Therefore, for the purposes of this report, the 133 chinook trapped during JW 34 at WCW were considered spring-run while the 3,192 chinook trapped thereafter were considered fall chinook.



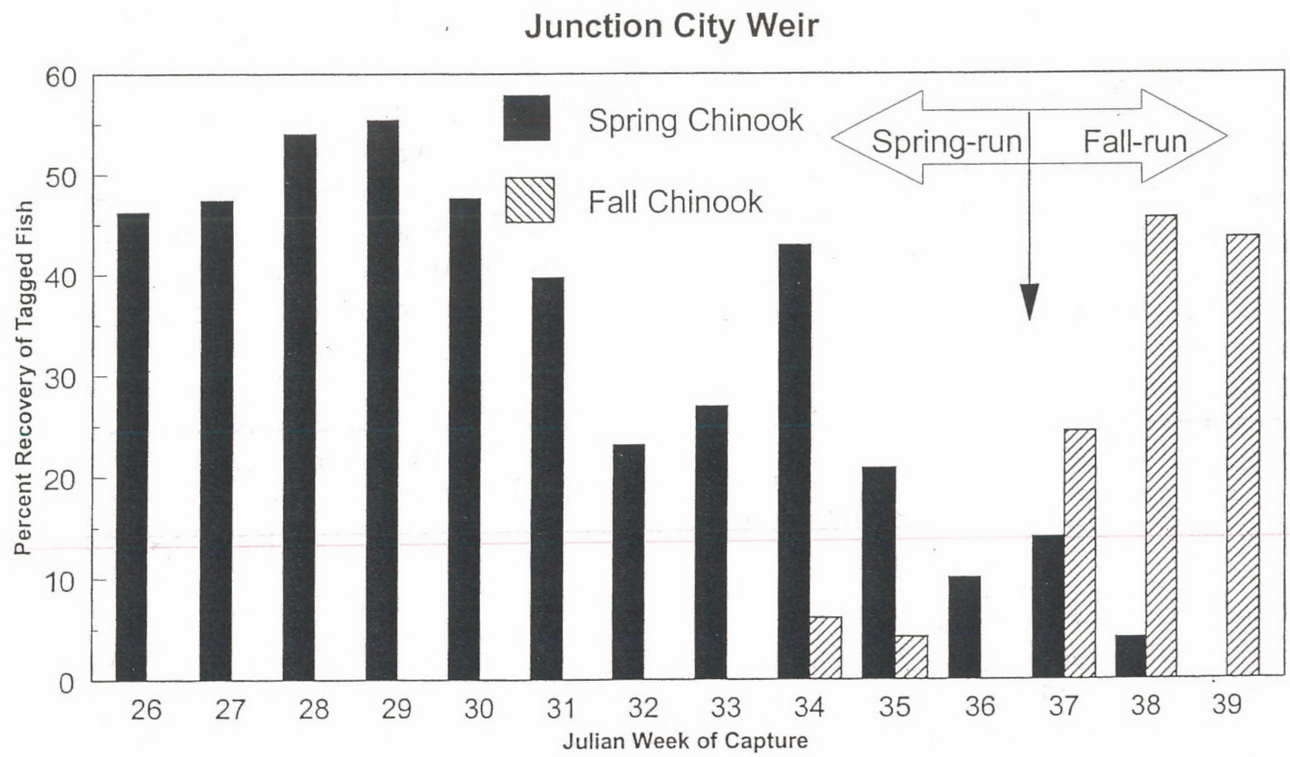


Figure 5. Weekly proportions of spring and fall chinook salmon at the Willow Creek and Junction City weirs during the 2000-2001 season. The arrow denotes separation of the runs for analysis. Chinook salmon were designated as either spring- or fall-run based on recoveries of coded-wire tags and entry timing into Trinity River Hatchery.

Spring chinook were the predominant race at JCW through JW 36, therefore the 604 chinook trapped at JCW prior to and including JW 36 were considered spring chinook (Figure 5). The remaining 316 chinook trapped from JW 37 through JW 39 were considered fall-run.

Run Timing. The spring chinook run at WCW was limited to the first week of trapping. Fall chinook average weekly catch at WCW peaked (251.3 fish/night) during JW 37 (10-16 Sep., 2000). The fall run remained strong the next two weeks at which time the run began to taper off (Table 1, Figure 6).

At JCW, spring chinook average weekly catch peaked (30.6 fish/night) during JW 28 (9 July - 15 Jul 2000). Catch declined thereafter, through JW 36, the last week of the spring run (Table 2, Figure 7).

Sizes of Trapped Fish. The average lengths of spring chinook trapped at JCW and that entered TRH ranged between 65.1 and 68.2 cm FL. Based on the analysis of combined FL distribution at JCW and TRH, the length separating grilse from adult spring chinook was 53 cm (Figure 8). Limited information from known-age, hatchery-marked spring chinook that entered TRH generally supported the 53 cm FL separation of adults and grilse (Appendix 2). Therefore, this season, we considered spring chinook in the Trinity River basin ≤53 cm FL to be grilse, while adults were >53 cm FL. Grilse comprised 8.3 % and 4.7 % of the spring chinook observed at JCW and TRH, respectively.

The average lengths of fall chinook trapped at WCW and that entered TRH ranged between 67.1 and 69.3 cm FL. Analysis of the combined FL distribution for the two sites placed the nadir separating grilse from adult fall chinook at 56 cm (Figure 9). Size data of known-age, hatchery-marked fall chinook entering TRH also supported the 56 cm FL size separation (Appendix 3). Therefore, this season, we considered fall chinook in the Trinity River basin ≤56 cm FL to be grilse, while adults were >56 cm FL. Fall chinook grilse comprised 5.7 % and 3.8 % of the run observed at WCW and TRH, respectively.

Effectively Tagged Fish. We trapped 604 spring chinook at JCW, of which 595 (49 grilse and 546 adults) were effectively tagged (Appendix 4). The number effectively tagged accounted for tagging mortalities (5), poor-condition untagged fish (1) and fish from which anglers reported removing tags (3). The effectively tagged number included 198 (33.3%) reward-tagged fish (20 grilse and 178 adults).

We trapped 3,192 fall chinook at WCW, 137 of which were released untagged, 31 from which anglers had removed the tags and four which were tagging mortalities. We effectively tagged 3,016 fall chinook (173 grilse and 2,843 adults) at WCW this season (Appendix 5). We placed reward tags on 996 (56 grilse and 940 adults), or 33.0%, of the effectively tagged fall chinook at WCW.

Incidence of Tags and Fin Clips. None of the chinook tagged at WCW were subsequently recaptured at JCW this year.

Table 1. Weekly summary of spring-run and fall-run chinook trapped in the Trinity River at Willow Creek Weir during the 2000-01 season. a/

Julian week	Inclusive dates			Nights trapped	Number trapped			Average catch (fish/night)
					Grilse b/	Adults	Total	
Spring-Run Chinook c/								
34	08/20		08/26	3	7	126	133	44.3
Fall-Run Chinook c/								
35	08/27	-	09/02	5	15	70	85	17.0
36	09/03	-	09/09	5	3	156	159	31.8
37	09/10	-	09/16	3	30	724	754	251.3
38	09/17	-	09/23	5	24	818	842	168.4
39	09/24	-	09/30	5	43	603	646	129.2
40	10/01	-	10/07	6	27	259	286	47.7
41	10/08	-	10/14	5	13	206	219	43.8
42	10/15	-	10/21	5	15	91	106	21.2
43	10/22	-	10/28	4	7	52	59	14.8
44	10/29	-	11/04	4	4	27	31	7.8
45	11/05	-	11/11	4	0	2	2	0.5
46	11/12	-	11/18	2	1	2	3	1.5
	Sub-total:			53	182	3,010	3,192	
	Sub-mean:							60.2
	Grand Total:			56	189	3,136	3,325	
	Combined Mean:							59.4

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 14 November (Julian week 46) of 2000.
b/ Spring-run chinook less than or equal to 53 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 34 through 38. For the purpose of analysis, all chinook caught through Julian week 34 were considered spring-run chinook; those caught after that were considered fall-run chinook.

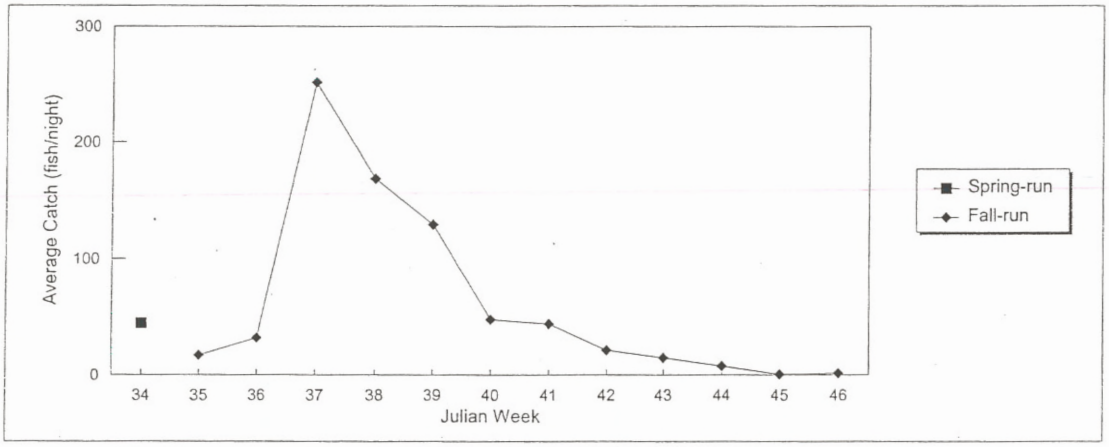


Figure 6. Average catch of spring- and fall-run chinook salmon in the Trinity River at Willow Creek Weir during the 2000-01 season.

Table 2. Weekly summary of spring-run and fall-run chinook trapped in the Trinity River at Junction City Weir during the 2000-01 season. a/

Julian week	Inclusive dates			Nights trapped	Number trapped: Grilse b/	Adults	Total	Average catch (fish/night)
Spring-Run Chinook c/								
26	06/25	-	07/01	1	0	27	27	27.0
27	07/02	-	07/08	3	0	20	20	6.7
28	07/09	-	07/15	5	5	148	153	30.6
29	07/16	-	07/22	5	8	104	112	22.4
30	07/23	-	07/29	5	14	91	105	21.0
31	07/30	-	08/05	5	1	63	64	12.8
32	08/06	-	08/12	5	3	10	13	2.6
33	08/13	-	08/19	5	7	19	26	5.2
34	08/20	-	08/26	5	6	43	49	9.8
35	08/27	-	09/02	5	4	20	24	4.8
36	09/03	-	09/09	5	2	9	11	2.2
	Sub Total:			49	50	554	604	
	Sub Mean:							12.3
Fall-Run Chinook c/								
37	09/10	-	09/16	5	1	88	89	17.8
38	09/17	-	09/23	5	4	168	172	34.4
39	09/24	-	09/30	5	0	55	55	11.0
	Sub Total:			15	5	311	316	
	Sub Mean:							21.1
	Grand Total:			64	55	865	920	
	Combined Mean:							14.4

a/ Trapping at Junction City Weir took place from 30 June (Julian week 26) through 27 September (Julian week 39) of 2000.
b/ Spring-run chinook <= 53 cm FL and fall-run chinook <= 55 cm were considered grilse.
c/ There was actually a temporal overlap of spring- and fall-run chinook during Julian weeks 34 through 38. For the purpose of analysis , all chinook trapped through Julian week 36 were considered spring-run; those caught after that were considered fall-run.

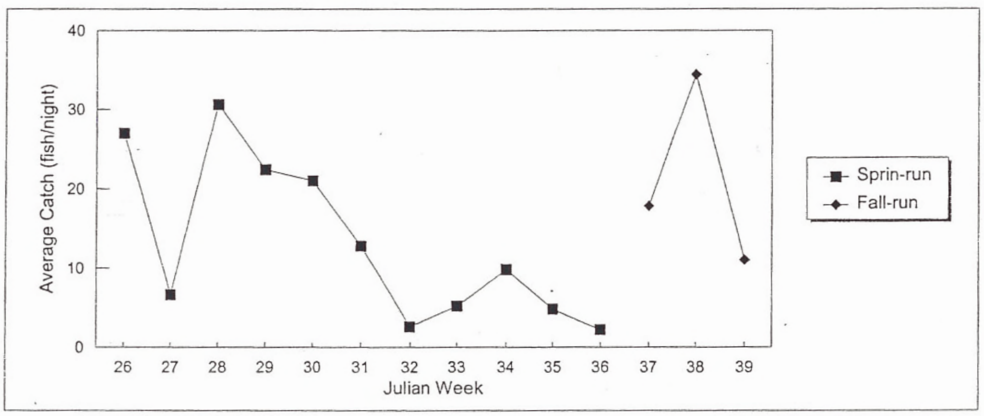


Figure 7. Average catch of spring- and fall-run chinook salmon in the Trinity River at Junction City Weir during the 2000-01 season.

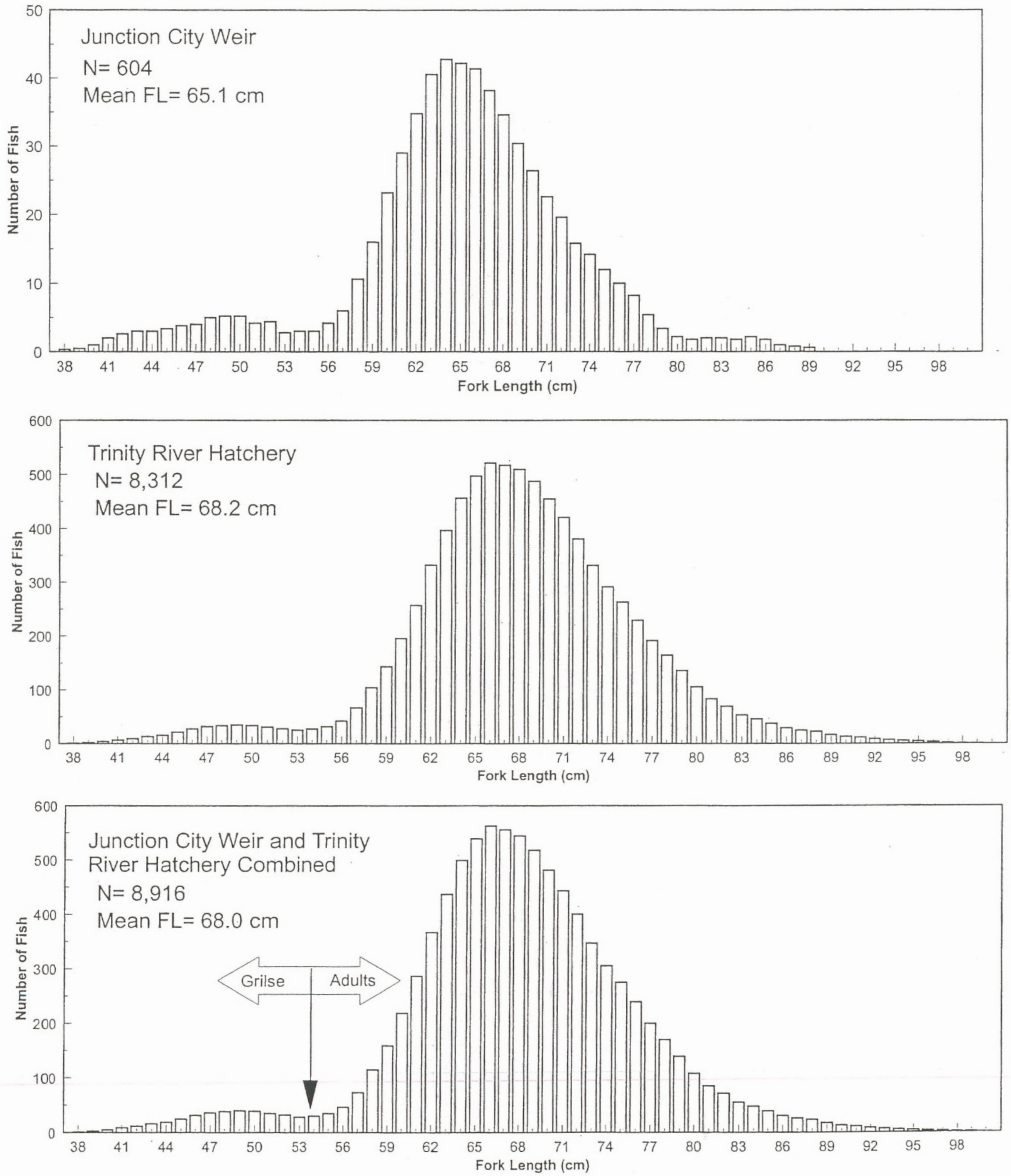


Figure 8. Analysis of spring-run chinook salmon fork lengths observed at the Junction City Weir and Trinity River Hatchery during the 2000-2001 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

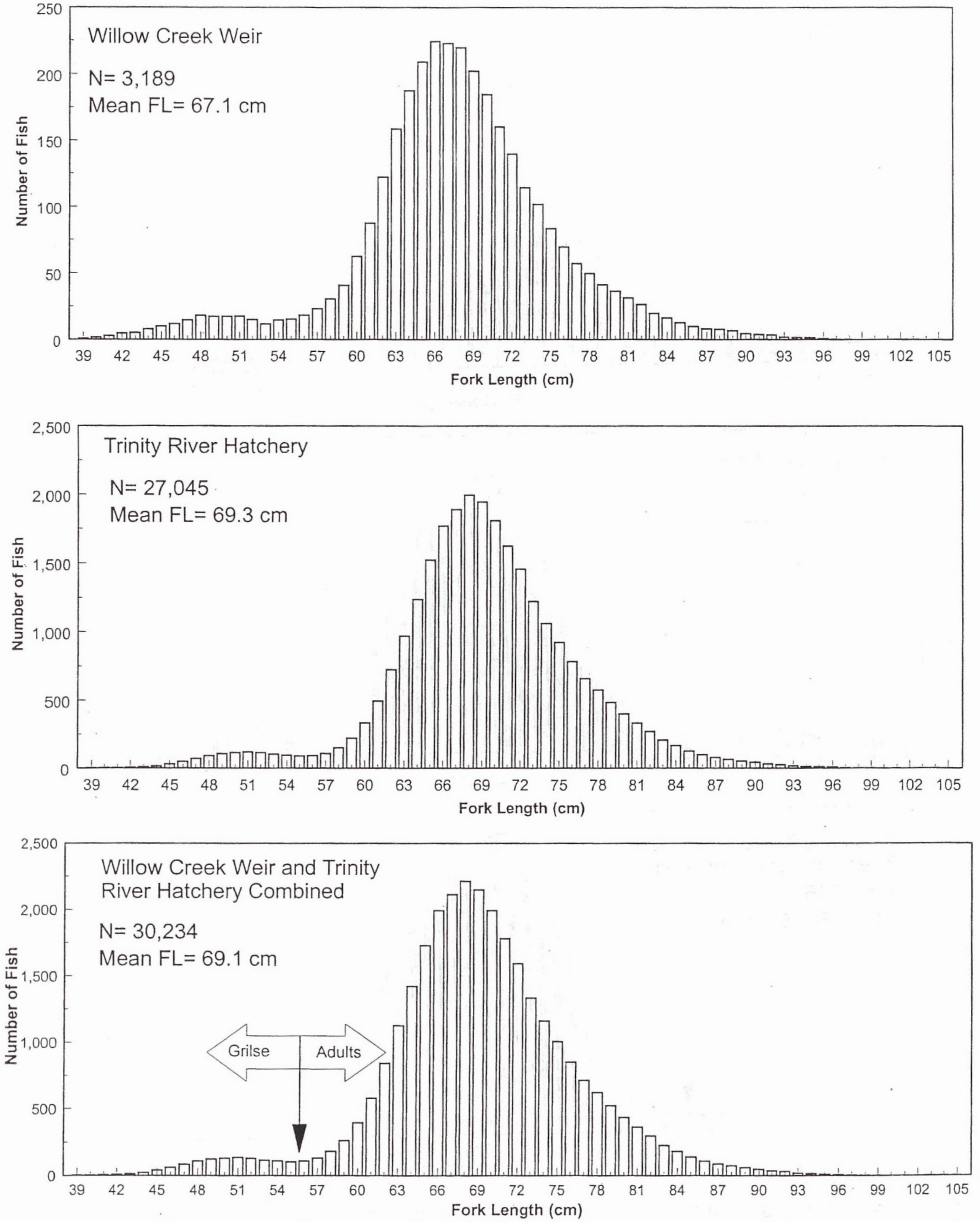


Figure 9. Analysis of fall-run chinook salmon fork lengths observed at the Willow Creek Weir and Trinity River Hatchery during the 2000-2001 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Ad-clipped fish comprised 11.3% (15/133) of the spring chinook seen at WCW and 19.5% (604/1,118) at JCW (Appendix 4).

Eight of the 15 (53.3%) Ad-clipped spring chinook tagged at WCW were recovered at TRH. All were from the same release group, CWT code 062540, spring-run chinook released as yearlings in October of 1997 (Table 3). Sixty-seven of the 118 (56.8%) Ad-clipped JCW-tagged spring chinook were recovered at TRH. These included spring chinook from 3 TRH release groups, however the majority of fish were represented by one CWT group, 065240, which were brood year 1997, released as yearlings (Table 3).

Ad-clipped fish comprised 17.6% (562/3,192) of the fall chinook observed at WCW (Appendix 5). Three hundred fifty (62.3%) of the Ad-clipped fall chinook tagged at WCW were recovered at TRH. Of these, the vast majority were fall chinook released as yearlings (CWT code 065241) from TRH in October of 1998 (Brood year 1997). Brood year 1997 releases, returning as three-year-olds this season, were the dominant age class, based on return of Ad-clipped fish tagged at WCW and that entered the hatchery. Of the 350 WCW tagged, Ad-clipped fish, which entered the hatchery, 303 (86.6%) were from brood year 97 releases (Table 3).

Incidence of Gill-net Wounds, Hook Scars, and Predator Wounds. Ninety one (15.1%) of the 604 spring chinook trapped at JCW had gill-net wounds. The average size of gill-net-wounded vs. non-wounded spring chinook was 65.1 and 65.2 cm FL, respectively. Fresh hooking scars were observed on six spring chinook at JCW during the season. No ocean hooking scars were observed. Predator scars were evident on seven spring chinook, while 25 fish had wounds of unknown origin.

For fall chinook, 8.4% (267/3,192) of the fish trapped at WCW were gill-net-wounded. The average size of gill-net-wounded fish was 68.2 cm, FL. Non-gill-net-wounded fall chinook averaged 67.6 cm, FL. Hooking scars, 19 ocean and 116 fresh, were observed on fall chinook at WCW. Predator wounds were observed on 122 (3.8%) of the chinook. Forty fish had wounds of unknown origin.

Coho Salmon

Run timing. We trapped the first coho at WCW on 13 September, 2000 (JW 37). We observed two peaks in coho trapping during Julian weeks 40 and 43 when average catch exceeded 10 fish/night (Table 4, Figure 10). We trapped 235 coho salmon (83 grilse and 152 adults) at WCW during the 2000-01 season. Three coho were trapped at JCW this year.

Size of Fish Trapped. Coho trapped at WCW ranged from 35 to 81 cm, FL and averaged 58.2 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). The combined data indicated the separation between grilse and adults was 53 cm. This year all coho $\leq$53 cm FL were considered grilse, while larger coho were adults. Grilse coho comprised 35.3% and 21.1% of the coho trapped at WCW and TRH respectively.

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 the 2000-01 season.

	Release data						Numbers recovered from tagging site: b/	
CWT a/ number	Species	Race	Brood year	Date	Number of fish	Site c/	WCW	JCW
065223	chinook	spring	1995	06/03-13/96	196,211	TRH	0	0
065225	chinook	spring	1995	10/01-07/96	101,934	TRH	0	0
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	10
065238	chinook	spring	1997	06/15/98	104,578	TRH	0	7
065240	chinook	spring	1997	10/01-07/98	147,507	TRH	8	43
065247	chinook	spring	1998	06/01-07/99	54,378	TRH	0	0
065248	chinook	spring	1998	06/01-07/99	61,516	TRH	0	0
065249	chinook	spring	1998	06/01-07/99	61,074	TRH	0	0
065250	chinook	spring	1998	10/4-13/99	137,602	TRH	0	0
shed tag d/	chinook	spring					0	6
Total spring-run chinook:							8	66
065224	chinook	fall	1995	06/03-13/96	216,051	TRH	0	0
065226	chinook	fall	1995	10/01-07/96	110,327	TRH	0	0
065230	chinook	fall	1996	06/05-12/97	217,981	TRH	4	1
065232	chinook	fall	1996	10/01-07/97	112,746	TRH	4	1
065233	chinook	fall	1997	06/15/98	50,947	TRH	10	0
065234	chinook	fall	1997	06/15/98	49,353	TRH	17	1
065235	chinook	fall	1997	06/15/98	49,786	TRH	12	0
065236	chinook	fall	1997	06/15/98	48,382	TRH	18	0
065239	chinook	fall	1997	06/15/98	18,304	TRH	4	0
065241	chinook	fall	1997	10/01-07/98	313,080	TRH	252	15
062641	chinook	fall	1998	10/4-13/99	334,726	TRH	4	0
065242	chinook	fall	1998	06/01-07/99	46,399	TRH	0	0
065642	chinook	fall	1998	10/4-13/99	16,673	TRH	0	0
065243	chinook	fall	1998	06/01-07/99	42,659	TRH	1	0
065245	chinook	fall	1998	06/01-07/99	46,391	TRH	0	0
shed tag d/	chinook	fall					24	4
Total fall-run chinook:							350	22
RM e/	coho		1997	03/15-22/99	519,273	TRH	45	0
RM e/	coho		1998	03/15-20/00	493,727	TRH	17	0
Total coho:							62	0

a/ CWT=coded-wire tag.
b/ Tagging site: WCW=Willow Creek Weir; JCW=Junction City Weir.
c/ Release site: TRH=Trinity River Hatchery
d/ Fish with shed CWTs were designated as spring- or fall-race based on the date they were trapped at the weirs.
e/ Since brood year 1994, all coho produced at TRH have received a right maxillary clip (RM).
Coho <54 cm were classified as brood year 1998 and coho>53 cm were classified as brood year 1997. Age cutoff was based upon fork length distribution.

Table 4. Weekly summary of coho salmon trapped in the Trinity River at Willow Creek Weir during the 2000 season. a/

Julian week	Inclusive dates			Nights trapped	Number trapped Grilse b/	Adults	Total	Average catch (fish/night)
34	08/20	-	08/26	3			0	0.0
35	08/27	-	09/02	5			0	0.0
36	09/03	-	09/09	5			0	0.0
37	09/10	-	09/16	3	3	3	6	2.0
38	09/17	-	09/23	5	0	9	9	1.8
39	09/24	-	09/30	5	9	26	35	7.0
40	10/01	-	10/07	6	6	72	78	13.0
41	10/08	-	10/14	5	2	9	11	2.2
42	10/15	-	10/21	5	30	6	36	7.2
43	10/22	-	10/28	4	27	14	41	10.3
44	10/29	-	11/04	4	6	12	18	4.5
45	11/05	-	11/11	4		1	1	0.3
46	11/12	-	11/18	2			0	0.0
	Totals:			56	83	152	235	
	Mean: c/							5.5

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 14 November (Julian week 46) of 2000.

b/ Coho less than or equal to were 54 cm FL were considered grilse; larger fish were considered adults.

c/ Based on trapping data from Julian weeks 37 through 46.

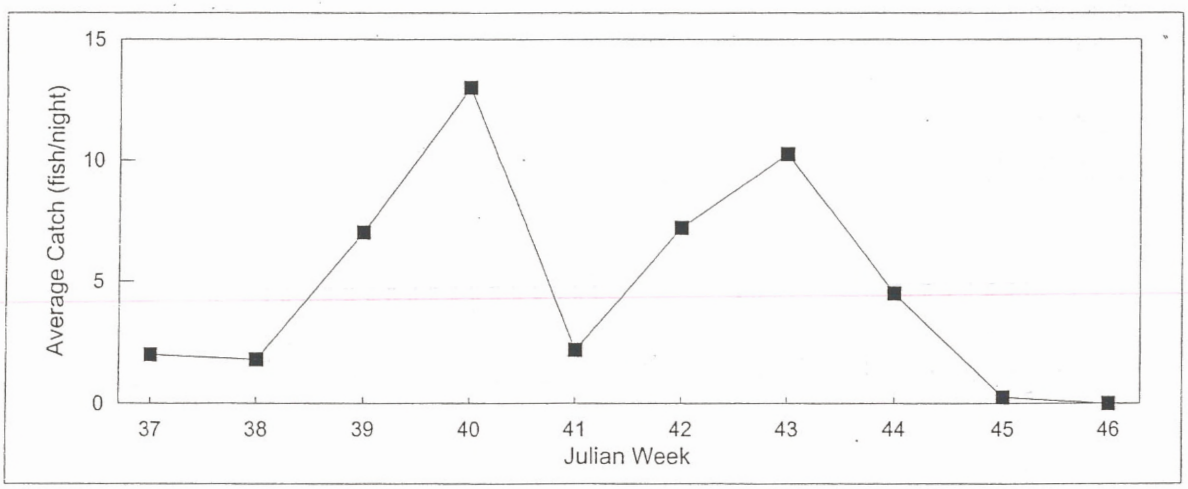


Figure 10. Average catch of coho salmon in the Trinity River at Willow Creek Weir during the 2000-01 season.

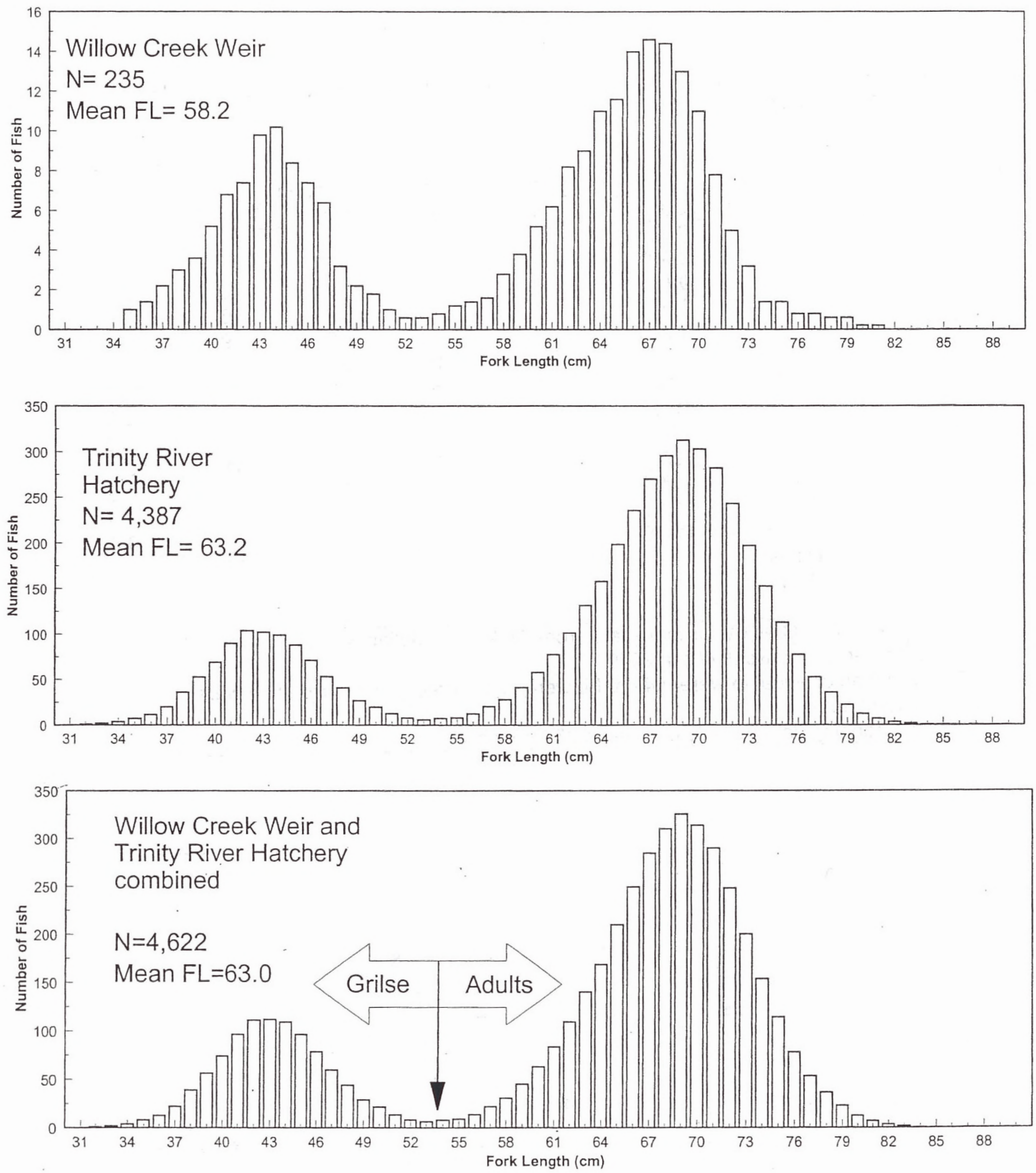


Figure 11. Analysis of coho salmon fork lengths observed at the Willow Creek Weir and Trinity River Hatchery during the 2000-01 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate grilse and adults for analysis.

Effectively Tagged Fish. Of the 235 coho salmon trapped at WCW, 222 were effectively tagged (Appendix 6). Thirteen coho were not tagged because they were judged to be in poor condition. To discourage anglers from harvesting coho, all fish received non-reward tags.

Incidence of Tags and Fin Clips. We trapped 227 coho (80 grilse and 147 adults) at WCW that bore right maxillary (RM) clips, which comprised 96.6% of the total WCW coho catch (Appendix 6). Sixty two of the project tagged, RM-clipped coho, were recovered at TRH (Table 3).

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. Five (2.1%) of the coho observed at WCW were gill-net-wounded, one had a fresh hook wound, and 22 (9.2%) were observed to have predator scarring.

Fall-run Steelhead

Run Timing. We trapped steelhead every week of trapping at WCW (Table 5, Figure 12). The highest trapping rate (43.3 fish/night) occurred during JW 44 (29 October - 4 November). This peak coincided with a storm event which appeared to stimulate upstream migration. We trapped a total of 456 steelhead (40 half-pounders and 416 adults) during the course of the season.

At JCW, steelhead were trapped every week except Julian weeks 32 and 39, however, the average nightly catch was low throughout the season. Average catch rates never exceeded 2 fish/night (Table 6, Figure 13). We trapped 1 half-pounder and 44 adult steelhead at JCW during the season.

Size of Fish Trapped. Steelhead caught at WCW, JCW, and TRH averaged 58.6, 55.1 and 57.0 cm FL, respectively (Figure 14). Adult steelhead (> 41 cm, FL) made up 97.8%, 91.2% and 91.0% of the steelhead trapped at JCW, WCW and TRH, respectively.

Effectively Tagged Fish. We trapped 416 adult steelhead at WCW of which 367 were effectively tagged (Appendix 7). There were no tagging mortalities, 23 fish which were not tagged, and 28 from which anglers reported removing tags. One hundred seventy nine (49.0%) 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 234 (51.3 %) steelhead at WCW, and 16 (35.6 %) at JCW (Appendix 8). All TRH-produced steelhead have been adipose-fin-clipped prior to release from the hatchery since brood year 1997 releases.

Incidence of Gill-net Wounds, Hook Scars and Predator Wounds. Eighteen (3.9 %) of the steelhead trapped at WCW and three (6.7 %) steelhead trapped at JCW had gill-net wounds. Nine (2.0 %) of the steelhead at WCW bore fresh hook-scars. No hooking scars were observed on steelhead trapped at JCW. Predator wounds were observed on 70 (15.4 %) and 2 (4.4 %) of the steelhead trapped at WCW and JCW, respectively.

Table 5. Weekly summary of steelhead trapped in the Trinity River at Willow Creek Weir during the 2000-01 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped 1/2 lbers b/	Number trapped Adults	Number trapped Total	Average catch (fish/night)
34	08/20 - 08/26	3		9	9	3.0
35	08/27 - 09/02	5	3	19	22	4.4
36	09/03 - 09/09	5	0	2	2	0.4
37	09/10 - 09/16	3	8	8	16	5.3
38	09/17 - 09/23	5	2	36	38	7.6
39	09/24 - 09/30	5	3	26	29	5.8
40	10/01 - 10/07	6	4	27	31	5.2
41	10/08 - 10/14	5	1	36	37	7.4
42	10/15 - 10/21	5	4	35	39	7.8
43	10/22 - 10/28	4	1	53	54	13.5
44	10/29 - 11/04	4	14	159	173	43.3
45	11/05 - 11/11	4		4	4	1.0
46	11/12 - 11/18	2		2	2	1.0
	Totals:	56	40	416	456	
	Mean:					8.1

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 14 November (Julian week 46) of 2000.

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

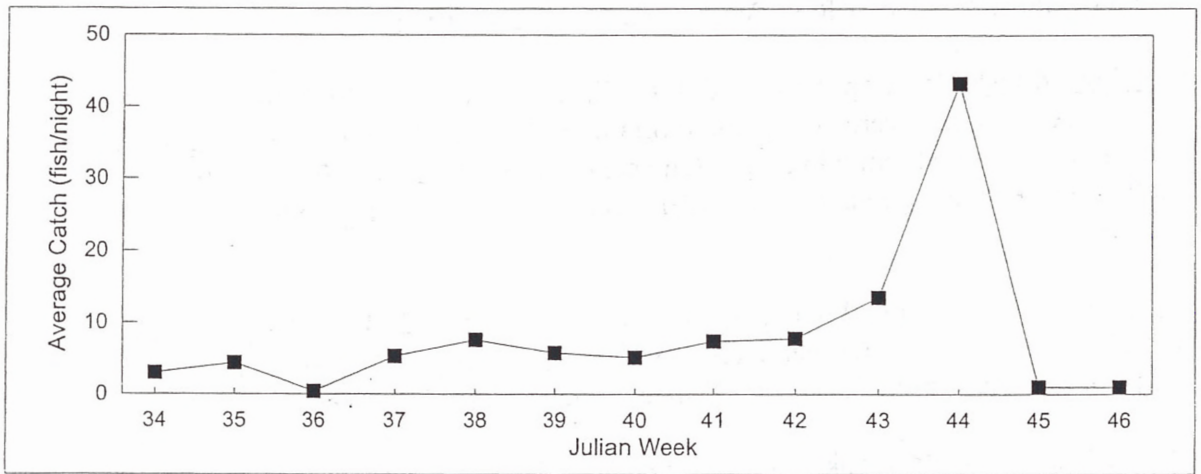


Figure 12. Average catch of steelhead in the Trinity River at Willow Creek Weir during the 2000-01 season.

Table 6. Weekly summary of steelhead trapped in the Trinity River at Junction City Weir during the 2000-01 season. a/

Julian week	Inclusive dates	Nights trapped	Number trapped: Half-pounders b/	Adults	Total	Average catch (fish/night)
26	06/25 - 07/01	1	0	1	1	1.0
27	07/02 - 07/08	3	0	3	3	1.0
28	07/09 - 07/15	5	0	10	10	2.0
29	07/16 - 07/22	5	1	4	5	1.0
30	07/23 - 07/29	5	0	10	10	2.0
31	07/30 - 08/05	5	0	4	4	0.8
32	08/06 - 08/12	5	0	0	0	0.0
33	08/13 - 08/19	5	0	2	2	0.4
34	08/20 - 08/26	5	0	1	1	0.2
35	08/27 - 09/02	5	0	3	3	0.6
36	09/03 - 09/09	5	0	2	2	0.4
37	09/10 - 09/16	5	0	2	2	0.4
38	09/17 - 09/23	5	0	2	2	0.4
39	09/24 - 09/30	5	0	0	0	0.0
	Totals:	64	1	44	45	
	Mean:					0.7

a/ Trapping at Junction City Weir took place from 30 June (Julian week 26) through 27 September (Julian week 39) of 2000.

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

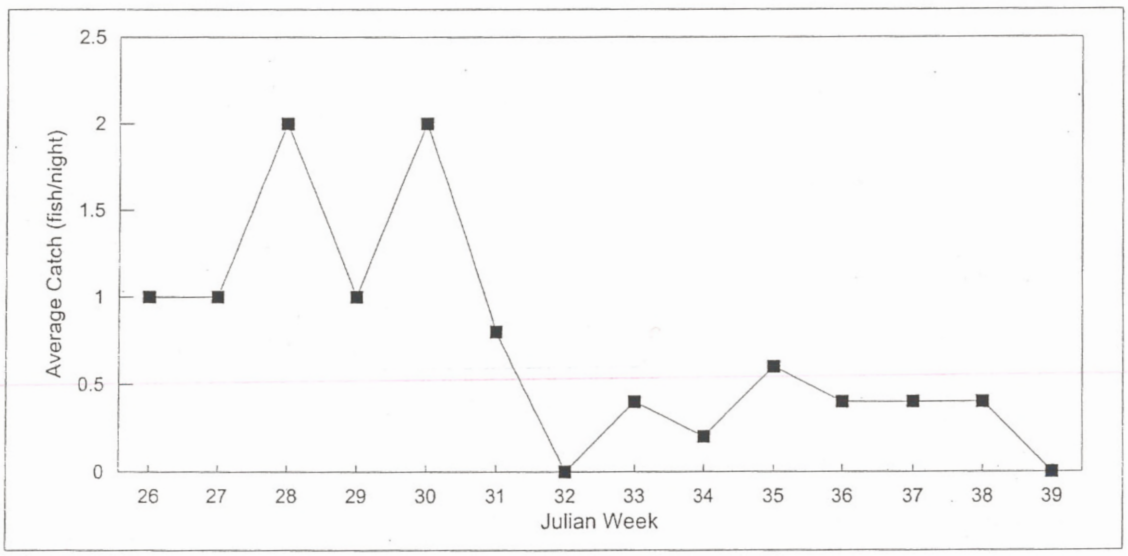


Figure 13. Average catch of steelhead in the Trinity River at Junction City Weir during the 2000-01 season.

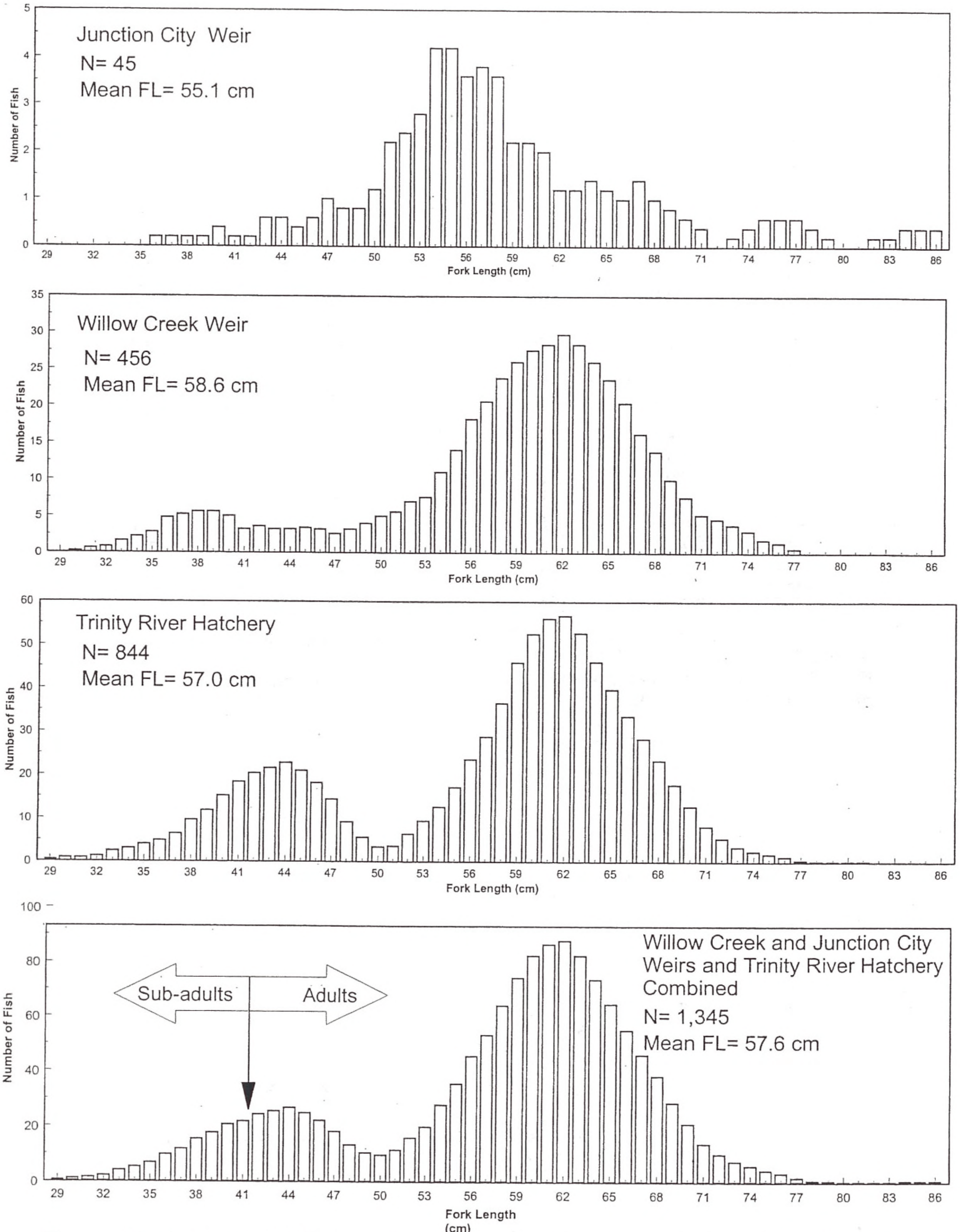


Figure 14. Analysis of fall-run steelhead fork lengths observed at the Trinity River weirs and Trinity River Hatchery during the 2000-2001 season. The number of fish at each fork length is shown as a moving average of five, 1-cm increments. The arrow denotes the size we used to separate sub-adults and adults for analysis.

Recovery of Tagged Fish

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

Slightly over half of the tagged spring (55.1%) and fall chinook (56.7%) were recovered, while only a third (31.1%) of the coho were recovered. Tagged adult steelhead had the lowest recovery rate (17.0%). Interestingly, grilse chinook were recovered at less than half the rate of their adult counterparts. Coho grilse were recovered at slightly lower rate. 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 2000-01 season which may have decreased the number of adult chinook caught by anglers (Appendix 13). The adult fall chinook salmon sport quota for the Trinity River during the 2000-01 season was 1,386 fish, split equally between the lower River (Weitchpec to Cedar Flat) and the upper River (Cedar Flat to Lewiston). Additionally, anglers were allowed to retain adipose-fin-clipped steelhead only. The take of coho was prohibited.

Spring Chinook. Anglers returned 25 tags from harvested spring chinook tagged at JCW (3 grilse and 22 adults). These included 14 reward and 11 non-reward tags (appendix 9). We estimated the harvest rate, based on the return of reward tags, at 15.0% (3/20) for grilse and 6.2% (11/178) for adults.

Anglers reported releasing two reward-tagged adult spring chinook. We estimated the catch-and-release rate to be 1.1% (2/180) for adult spring chinook (appendix 9). No tags were returned from released grilse spring chinook.

Fall Chinook. Anglers returned 62 tags (28 reward and 34 non-reward) from harvested fall chinook salmon (9 grilse and 53 adults) tagged at WCW (appendix 10). Based on the return of reward tags, the estimated harvest rate of fall chinook upstream of WCW was 2.7% (25/940) for adults and 5.4% (3/56) for grilse.

Anglers returned an additional 9 reward tags (eight adults and one grilse) from fish that were caught and released (appendix 10). We estimated that the catch-and-release rate of fall chinook upstream of WCW was 0.8% (8/948) and 1.8% (1/57) for adults and grilse respectively.

Coho Salmon. To discourage the harvest of threatened coho salmon, we tagged coho at WCW with non-reward tags only. None of the tags were returned from anglers, therefore we conclude that no coho salmon were harvested above WCW during the 2000-01 season. No coho were tagged at JCW this year.

Fall-run Steelhead. Anglers returned 5 tags (4 reward and 1 non-reward) from harvested WCW-tagged steelhead (appendix 12). Based on the reward tags returned, we estimated that anglers harvested 2.2% (4/179) of the steelhead migrating upstream of WCW. None of the steelhead captured at JCW were tagged this year.

Anglers returned 28 tags (17 reward and 11 non-reward) from steelhead reported as caught and released (appendix 12). Based on the return of reward tags, we estimated that anglers caught and released 8.7% (17/196) of the steelhead migrating upstream of the WCW.

Spawner Surveys

Spring Chinook. A total of 17 adult chinook tagged at JCW were recovered during the course of spawner surveys (appendix 9). No tagged grilse spring chinook were recovered. The mean FL of carcass recoveries was 68.0 cm, slightly larger than the 66.7 cm mean of adults tagged at JCW.

Fall Chinook. One grilse and 134 adults were recovered during the spawner survey (appendix 10). Adults recovered in the survey averaged were approximately the same size as those tagged at WCW, 68.4 and 68.8 cm, FL, respectively.

Coho. Only four adult coho tagged at WCW were subsequently recovered during the spawner surveys this year, three of which were RM-clipped (appendix 11). 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 this season during spawner surveys.

Trinity River Hatchery

Operation Dates. The fish ladder and trapping facilities at TRH were generally operational from September 5th, 2000 (JW 38) through March 29th, 2001(JW 13). The ladder and trap were closed for a two week period between 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 2000) and continued through JW 46 (12-18 Nov.) (Figure 15, Table 7). We estimated that 11,676 spring chinook entered TRH during the 2000-01 season. However, for the purpose of estimating spring chinook run-size, the 12,165 chinook which entered TRH prior to Julian week 43 (Oct. 22 - Oct. 28) were considered spring-run.

We recaptured 281 fish considered spring chinook (10 grilse and 271 adults) at TRH that we had previously tagged at JCW (Table 8). Thus, we recovered 47.2% of the spring chinook which were effectively tagged at JCW. The mean FL of effectively tagged JCW fish (65.1 cm) and JCW-tagged fish recovered at TRH (65.5 cm) were essentially the same (appendix 4).

We recovered 30 (22.4%) of 134 WCW-tagged fish considered spring chinook at TRH (Table 8). The mean FL of the Project-tagged spring chinook from WCW that entered TRH was 1.5 cm larger than the mean of those effectively tagged at the weir (Appendix 4). Spring chinook tagged at WCW were not used to generate a spring chinook run-size estimate for the basin.

We recovered 2,787 Ad-clipped spring chinook at TRH, from which 2,652 CWT's were recovered (Table 7). Returns of CWT'ed fish were predominately age three fish from the 1997 brood year.

Fall Chinook. Based on the recovery of CWTs, the first fall chinook entered TRH during JW 38 (17-23 Sept. 2000). The run peaked JW 44 when approximately 10,000 chinook entered the facility, decreasing thereafter until the last chinook entered during JW 52 (Figure 15, Table 9). We estimated that 27,534 fall chinook entered TRH during the 2000-01 season. For the purpose of estimating fall chinook run-size, the 27,046 chinook which entered TRH after Julian week 42 (Oct. 15 - Oct. 21) were considered fall run.

We recaptured 142 fish at TRH that were designated as fall chinook (95 grilse and 260 adults) at JCW (Table 8), which was 45.5% of those effectively tagged at the weir. Project-tagged fish recovered at TRH averaged 68.8 cm, FL, slightly smaller than the mean (69.5 cm, FL) of those effectively tagged at JCW (Appendix 5). Fish designated as fall chinook at JCW were not used for basin run-size estimation.

Hatchery recovery of fall chinook tagged at WCW consisted of 28 grilse and 1,460 adults. This total represented 49.3% (1,488/3,016) of those effectively tagged at WCW (Table 8, Appendix 5). The mean FL of effectively tagged chinook and TRH recoveries was essentially the same.

We recovered 6,242 Ad-clipped fall chinook at TRH, from which we recovered 5,860 CWT's (Table 9). Similar to spring chinook, the age structure of TRH fall-run chinook was dominated by age three returns, which composed 91.3% (5,352/5,860) of known age returns.

Coho Salmon. The first coho entered TRH during JW 39 (24-30 Sept. 2000). The coho run peaked eight weeks later during Julian weeks 47 and 48 (19 November through 2 December). The last coho entered TRH the week of January 7th, 2001 (Table 8). We recovered 4,387 coho (926 grilse and 3,461 adults) at TRH during the 2000-01 season.

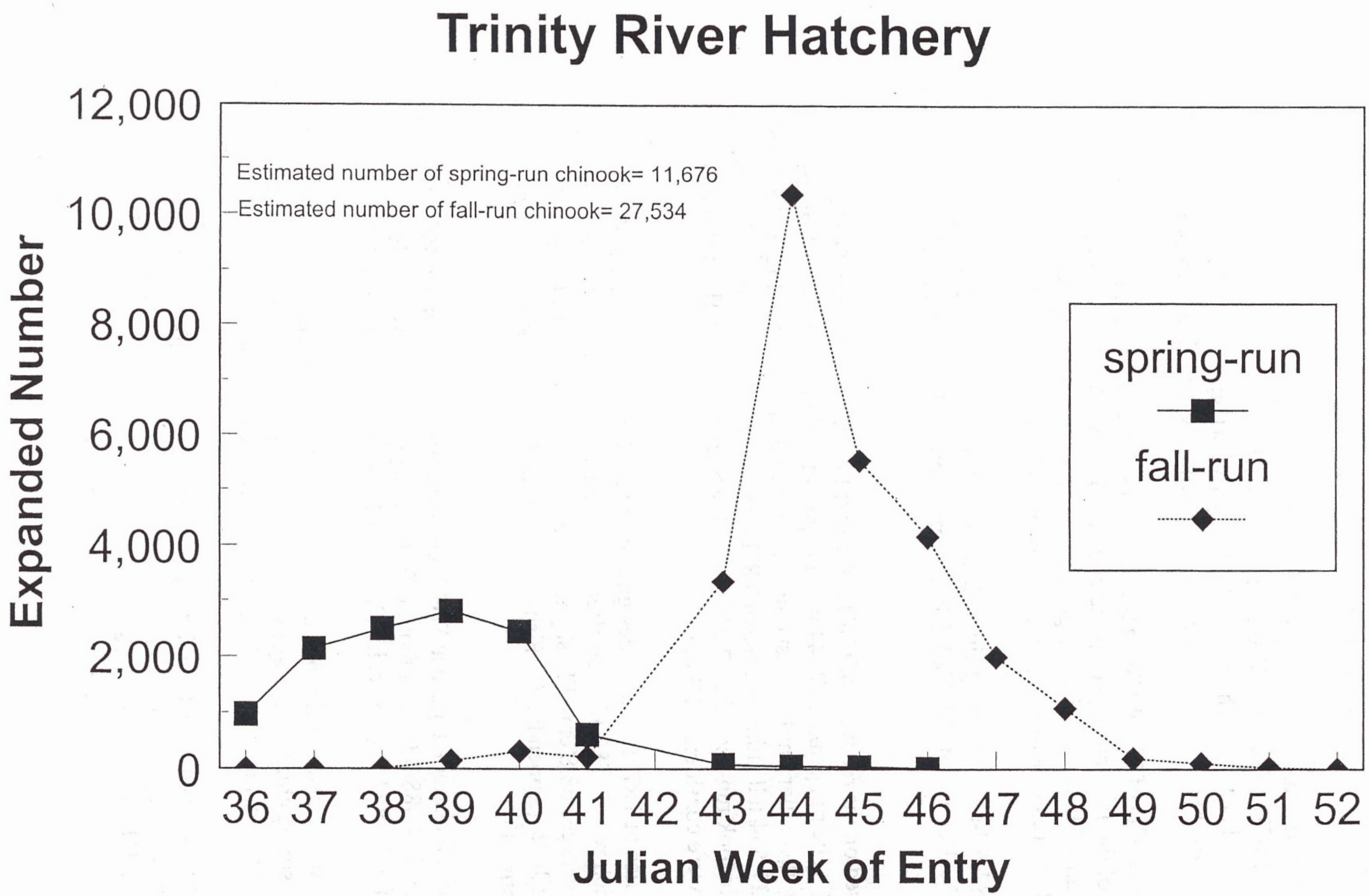


Figure 15. Estimated numbers of spring- and fall-run chinook salmon that entered Trinity River Hatchery during the 2000-01 season, based on expansion of coded-wire tagged fish recovered.

Table 7. Recoveries of coded-wire-tagged, Trinity River Hatchery-produced, spring-run chinook salmon at Trinity River Hatchery during the 2000-01 season. a/

Brood year and coded-wire tag number

julian week		1995		1996		1997			1998				Shed	
of entry b/	Inclusive dates	065223	065225	065229	065231	065237	065238	065240	065247	065248	065249	065250	tags c/	Total
36	09/03 - 09/09		2	21	12	28	28	130			1	3	7	232
37	09/10 - 09/16	1	1	31	23	80	82	253	5	1	3	4	37	521
38	09/17 - 09/23		1	37	30	104	88	281	4	3	3	12	24	587
39	09/24 - 09/30		2	13	17	123	102	320	4	4	3	17	29	634
40	10/01 - 10/07			9	4	96	77	355	5	5	5	29	32	617
41	10/08 - 10/14			1	1	9	15	95	1	2	1	8	6	139
42	10/15 - 10/21					0	0	0				0		0
43	10/22 - 10/28					1	0	17				6		24
44	10/29 - 11/04						0	18						18
45	11/05 - 11/11						1	11						12
46	11/12 - 11/18							3						3
Totals:		1	6	112	87	441	393	1,483	19	15	16	79	135	2,787

a/ The fish ladder was open from 5 September 2000 through 29 March 2001 (Julian week 36 through 13).

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 2000 (JW 42) were considered fall-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 2000-2001 season. a/

Julian week of entry c/	Inclusive dates	Numbers of chinook salmon: Total entering TRH d/	Spring-run from tagging site b/: WCW	Spring-run from tagging site b/: JCW	Fall-run from tagging site: WCW	Fall-run from tagging site: JCW	Numbers of coho salmon: Total entering TRH d/	From tagging site: WCW
36	09/03/00 - 09/09/00	296		14				
37	09/10/00 - 09/16/00	1000		43				
38	09/17/00 - 09/23/00	2,498		55		1		
39	09/24/00 - 09/30/00	4,517	2	76	5	3	1	
40	10/01/00 - 10/07/00	3,030	6	60	5	11	5	
41	10/08/00 - 10/14/00	823	6	29	8	8	37	
42	10/15/00 - 10/21/00	0	0	0	0	0	0	
43	10/22/00 - 10/28/00	3,435	5	2	174	35	35	1
44	10/29/00 - 11/04/00	10,412	10	2	630	61	250	2
45	11/05/00 - 11/11/00	5,593	1		336	19	585	15
46	11/12/00 - 11/18/00	4,188			213	4	487	9
47	11/19/00 - 11/25/00	2,004			79		1,053	17
48	11/26/00 - 12/02/00	1,088			35		1,028	8
49	12/03/00 - 12/09/00	188			3		406	7
50	12/10/00 - 12/16/00	104					241	3
51	12/17/00 - 12/23/00	29					192	
52	12/24/00 - 12/30/00	5					54	
1	12/31/00 - 01/06/01	1					12	
2	01/07/01 - 01/13/01	0					1	
Totals:		39,211	30	281	1,488	142	4,387	62

a/ The fish ladder was open 5 September 2000 through 29 March 2001.

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 2000-2001 season. a/

Brood year and coded-wire tag number

Julian week of entry b/	Inclusive dates	1995	1996		1997						1998					Shed tags c/	Total
		065226	065230	065232	065233	065234	065235	065236	065239	065241	062641	065242	065243	065245	065642		
38	09/17 - 09/23									4							4
39	09/24 - 09/30		3		1	1	2	1		15							23
40	10/01 - 10/07		1		3	0	6	1		59							70
41	10/08 - 10/14		1		1	0	1	1		41	1						46
42	10/15 - 10/21		0		0	0	0	0		0	0						0
43	10/22 - 10/28		11	4	21	36	22	37	4	553	7					47	742
44	10/29 - 11/04	3	40	30	65	79	78	91	21	1,801	33	6	4	1		158	2,410
45	11/05 - 11/11	0	28	27	38	45	26	23	11	958	46	5	2	0	1	69	1,279
46	11/12 - 11/18	1	14	35	34	34	9	13	11	668	50	2	1	1	1	64	938
47	11/19 - 11/25	1	6	24	11	7	2	1	10	312	37	1		1	0	30	443
48	11/26 - 12/02		1	14	2	3	3		1	135	34				1	10	204
49	12/03 - 12/09			2	1	0			1	25	13					2	44
50	12/10 - 12/16			1		1			2	16	4					2	26
51	12/17 - 12/23									4	8						12
52	12/24 - 12/30										1						1
Totals:		5	105	137	177	206	149	168	61	4,591	234	14	7	3	3	382	6,242

a/ The fish ladder was open from 5 September 2000 through 29 March 2001.

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 2000 (Julian week 43) were considered spring-run and are shown in Table 7.

We recovered 62 WCW-tagged coho (17 grilse and 45 adults) at TRH (28.0 % of those effectively tagged). The mean FL of WCW-tagged coho recovered at TRH was 60.5 cm, which was 1.7 cm larger than those effectively tagged (Appendix 6). Three coho were captured, but not tagged at JCW, since this weir is removed prior to the majority of coho passing the site.

Of the 4,387 coho recovered at TRH this season, 4,323 (98.5%) 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 $\leq$ 53 cm, FL were considered grilse (age 2) from the 1998 brood year and accounted for 21.2% (916/4,323) of the total, the remaining 3,407 were considered adults (age 3), progeny of the 1997 brood year. The 64 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 (65.8 cm) than marked coho (63.2 cm).

<u>Fall-run Steelhead.</u> Steelhead entered TRH every trapping week the fish ladder was open, however, appreciable numbers did not enter the hatchery until the beginning of December (Table 11). A total of 76 sub-adults (<42 cm, FL) and 768 adult steelhead entered TRH for the season.

Thirty four WCW-tagged steelhead (9.3% of those effectively tagged) entered TRH (Table 11). These fish had a mean size approximately the same as those effectively tagged at WCW (Appendix 8). Since steelhead were not tagged at JCW, there were no recoveries at TRH.

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 this season (Appendix 8).

At WCW, 236 of 456 (51.8%) steelhead were Ad-clipped, averaging 56.8 cm, fl, slightly smaller than their unmarked counterparts, which averaged 60.4 cm. At JCW, 16 of the 45 (35.6%) steelhead were Ad-clipped. In contrast to WCW, Ad-clipped steelhead trapped at JCW had a larger mean fork length than their unmarked counterparts. Steelhead recovered at TRH this season were composed of 831 Ad-marked fish (98.5% of the total) and 13 unmarked fish. Unmarked steelhead were 2.5 cm longer, on average, than Ad-clipped fish. Sub-adult steelhead, less than 42 cm, FL, comprised 9.0% of the total number of steelhead entering TRH this season. All of the sub-adults were Ad-marked fish (Appendix 8).

Table 10. Recovery of maxillary-clipped coho salmon that returned to Trinity River Hatchery during the 2000-01 season. a/

Julian week of entry c/	Inclusive dates		Brood year b/ 1997	1998	Total
39	09/24/99	09/30/99	1		1
40	10/01/99	- 10/07/99	5		5
41	10/08/99	- 10/14/99	31	5	36
42	10/15/99	- 10/21/99	0	0	0
43	10/22/99	- 10/28/99	9	26	35
44	10/29/99	- 11/04/99	61	187	248
45	11/05/99	- 11/11/99	440	134	574
46	11/12/99	- 11/18/99	360	112	472
47	11/19/99	- 11/25/99	960	82	1,042
48	11/26/99	- 12/02/99	821	196	1,017
49	12/03/99	- 12/09/99	314	88	402
50	12/10/99	- 12/16/99	203	36	239
51	12/17/99	- 12/23/99	145	41	186
52	12/24/99	- 12/30/99	45	8	53
1	12/31/99	- 01/06/2000	11	1	12
2	01/07/2000	- 01/13/2000	1		1
		Totals:	3,407	916	4,323

a/ The fish ladder was open 5 September 2000 through 29 March 2001.

b/ Brood year determinations were estimated using length frequency analysis; coho less than or equal to 53 cm, fl were considered to be from the 1998 brood year, larger coho from the 1997 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 2000-2001 season. a/

Julian week of entry c/	Inclusive dates .			Number entering TRH Adults	Sub-adults d/	Total	Recoveries from tagging site b/ WCW
38	09/17/00	-	09/23/00	2		2	
39	09/24/00	-	09/30/00	1		1	
40	10/01/00	-	10/07/00	2		2	
41	10/08/00	-	10/14/00	0		0	
42	10/15/00	-	10/21/00	0		0	
43	10/22/00	-	10/28/00	1		1	
44	10/29/00	-	11/04/00	4		4	
45	11/05/00	-	11/11/00	4		4	
46	11/12/00	-	11/18/00	1		1	
47	11/19/00	-	11/25/00	1		1	
48	11/26/00	-	12/02/00	4		4	
49	12/03/00	-	12/09/00	10	1	11	1
50	12/10/00	-	12/16/00	10	1	11	0
51	12/17/00	-	12/23/00	15	8	23	1
52	12/24/00	-	12/31/00	18	4	22	0
1	01/01/01	-	01/07/01	31	17	48	0
2	01/08/01	-	01/14/01	29	8	37	0
3	01/15/01	-	01/21/01	5	2	7	1
4	01/22/01	-	01/28/01	93	9	102	5
5	01/29/01	-	02/04/01	61	4	65	4
6	02/05/01	-	02/11/01	36	1	37	6
7	02/12/01	-	02/18/01	9	0	9	0
8	02/19/01	-	02/25/01	161	8	169	8
9	02/26/01	-	03/04/01	119	3	122	0
10	03/05/01	-	03/11/01	100	6	106	6
11	03/12/01	-	03/18/01	21	3	24	1
12	03/19/01	-	03/25/01	19	1	20	1
13	03/26/01	-	04/01/01	11		11	
Totals:				768	76	844	34

a/ The fish ladder was open 5 September 2000 through 29 March 2001.

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 c the previous sorting week.

d/ Steelhead less than or equal to 41 cm FL are considered sub-adults; larger fish were adults.

Run-size, Angler Harvest, and Spawner Escapement Estimates

We tagged and recovered too few grilse chinook and coho salmon to stratify our estimates by adults and grilse this year. Instead, we combined the numbers of adults and grilse tagged and recovered for calculating the population estimate, and then stratified the estimate based on the ratio of adults and grilse observed at each of the respective weirs used to generate each estimate.

Spring-run Chinook Salmon

We estimated that 26,083 (23,923 adults and 2,159 grilse) spring chinook (including those harvested) migrated into the Trinity River basin upstream of JCW during the 2000-01 season. Based on the Poisson Approximation, the 95% confidence interval for the run-size estimate was 23,235-29,404 fish (Table 12).

Anglers caught and kept an estimated 324 (15.0 %) of the grilse and 1,483 (6.2 %) of the adults from the spring run. Anglers caught- and- released an estimated 263 (1.1%) adults. No grilse were reported as caught- and- released (Table 13).

The spawning escapement above JCW during the 2000-01 season was estimated to be 22,440 adult fish, including 11,594 adult spring chinook that entered TRH (Table 13).

Estimated spring chinook run-size has ranged from 62,692 fish in 1988 to 2,381 fish in 1991 (Appendix 15). Mean spring chinook run-size since 1978, excluding year's in which no estimate was made, is 16,691.

Fall-run Chinook Salmon

We estimated that 55,473 (52,310 adults and 3,163 grilse) fall chinook (including those harvested) migrated into the Trinity River basin upstream of WCW during the 2000-01 season. Based on the Normal Approximation, the 95% confidence interval for the fall chinook run-size estimate upstream of Willow Creek Weir was 52,75-58,264 (Table 12).

We estimated that anglers harvested 1,412 adults (2.7%) and 171 (5.4%) grilse from the 2000 fall chinook run (Table 13). Anglers caught-and-released an estimated 57 grilse (1.8%) and 418 adults (0.8%).

We estimated the Trinity River fall chinook spawner escapement at 50,898 adult fish upstream of WCW, including 26,018 (51.1%) 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 spawning 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 43,464 fish, including grilse.

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 2000-2001 season.

Species/ race	Area of Trinity River basin for run-size estimate	Stratum a/	Number effectively-tagged b/	Trinity River Hatchery recoveries: Number examined for tags c/	Trinity River Hatchery recoveries: Number of tags in sample	Run-size estimate d/	Confidence limits 1-P=0.95	Confidence limit estimator
Spring-run chinook	Upstream of Junction City Weir	Grilse	49	571	10	2,159		
		Adults	546	11,594	267	23,923		
		Total	595	12,165	277	26,082	23,235 - 29,404	Poisson Approximation
Fall-run chinook	Upstream of Willow Creek Weir	Grilse	174	1,028	26	3,163		
		Adults	2,842	26,018	1,444	52,310		
		Total	3,016	27,046	1,470	55,473	52,751 - 58,264	Normal Approximation
Coho	Upstream of Willow Creek Weir	Grilse	75	926	17	5,486		
		Adults	147	3,461	45	10,046		
		Total	222	4,387	62	15,532	12,267 - 20,168	Poisson Approximation
Fall-run steelhead	Upstream of Willow Creek Weir	Adults	365	768	34	8,042	5,910 - 11,558	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 2000-2001 season.

				Angler harvest		Spawner escapement		
Species/ race	Area of Trinity River basin for run-size estimate	Stratum a/	Run size	Harvest rate b/	Number of fish c/	Natural d/	Trinity River Hatchery	Total
Spring-run chinook	Upstream of Junction City Weir	Grilse	2,159	15.0%	324	1,264	571	1,835
		Adults	23,923	6.2%	1,483	10,846	11,594	22,440
		Total	26,082	6.9%	1,807	12,110	12,165	24,275
Fall-run chinook	Upstream of Willow Creek Weir	Grilse	3,163	5.4%	171	1,964	1,028	2,992
		Adults	52,310	2.7%	1,412	24,880	26,018	50,898
		Total	55,473	2.9%	1,583	26,844	27,046	53,890
Coho	Upstream of Willow Creek Weir	Grilse	5,486	0.0%	0	4,560	926	5,486
		Adults	10,046	0.0%	0	6,585	3,461	10,046
		Total	15,532	0.0%	0	11,145	4,387	15,532
Fall-run steelhead	Upstream of Willow Creek Weir	Adults	8,042	2.2%	177	7,097	768	7,865

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 coho, which were based on return of non-reward tags.
c/ Calculated as the run size times the harvest rate.
d/ Calculated as run size minus angler-harvest minus hatchery escapement.

Coho Salmon

We estimated that 15,532 (10,046 adults and 5,486 grilse) coho migrated into the Trinity River basin upstream of WCW during the 2000-01 season. Based on the Poisson Approximation, the 95% confidence interval for the coho run-size estimate upstream of WCW was 12,267 to 20,168 fish (Table 12).

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).

The spawning escapement estimate for coho upstream of WCW this year was 15,532 fish, 4,387 (28.2%) 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 15,942 fish.

Adult Fall-run Steelhead

We estimated that 8,042 adult steelhead migrated upstream of WCW during the 2000-01 season. The 95% confidence interval for our estimate, based on the Poisson Approximation, was between 5,910 and 11,558 adult steelhead upstream of WCW (Table 12).

Anglers harvested an estimated 177 (2.2%) adult steelhead (Table 13). Anglers caught-and-released an estimated 700 fish (8.7%).

The adult steelhead spawning escapement was composed of 768 fish which entered TRH and 7,097 fish that spawned in natural areas (Table 13).

Intermittent fall-run 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 year's in which we have estimates, is 9,753 fish.

DISCUSSION

The 2000-01 estimated run-sizes of spring and fall chinook and coho salmon and steelhead to the Trinity Basin all increased over last year. The runs of chinook this year appear to have been bolstered by dominant age three returns (1997 brood year). Run-timing of fall chinook past WCW was relatively early this year, about two weeks compared to previous years.

Marking (tagging) numbers used to make population estimates for spring chinook and coho salmon were less than optimum this season. We trapped too few coho 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 coho salmon estimate was bounded by 95% confidence intervals of +/- 21-30%. Spring chinook confidence intervals, ranged from +/- ~12%, and may not reflect potential bias associated with missing the early part of the run. The wide confidence intervals of 27 to 44% bounding our steelhead estimate may be an artifact of poor TRH entry by both tagged and untagged fish this year. Drought conditions in the basin persisted throughout the timing of steelhead spawning at TRH this year (January through March). Ad-clipped steelhead were observed spawning in the mainstem Trinity, downstream of the fish ladder this year L. Everest, USFS (Personnel Communication). However, "straying" of hatchery produced fish is known to occur frequently and it is unclear wether or not the rate of straying was higher this year.

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 his 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 2000-01 sport fishing season, a quota system for fall chinook salmon was instituted for the Trinity River. For the purposes of continuity, 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. 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-run and fall-run chinook and coho salmon, and adult fall-run steelhead in the Trinity River basin should be continued during the 2000-01 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.

5. Potentially keep JCW in longer to develop estimates for fall chinook, coho and steelhead upstream of this weir.

6. If fish continue to stack up behind our weir sites and this problem leads to excessive angler harvest or illegal activities, we may need to petition for a larger no fishing buffer zone above and below our weir sites.

7. Possibly incorporate a video counting system when not trapping to ascertain how many fish are passing by the weir site.

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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 2000-2001 season. a/

	Brood year											
	1995		1996		1997			1998				
	Coded-wire tag number- age at release b/											
FL (cm)	065223-f	065225-y	065229-f	065231-y	065237-f	065238-f	065240-y	065247-f	065248-f	065249-f	065250-y	Total
40							1					1
41							0				1	1
42							0			1	3	4
43							0		1	0	5	6
44							0		2	1	6	9
45					1		0	1	0	0	7	9
46					0		0	1	1	1	11	14
47					0		0	1	0	4	10	15
48					0		0	4	3	1	9	17
49					0		0	0	1	0	7	8
50					0		1	0	1	2	9	13
51					0		0	2	0	1	2	5
52					0	1	2	0	1	2	7	13
53					0	0	1	2	2	2	1	8
54					0	0	6	2	1	0	0	9
55					1	0	5	2	2	1	0	11
56					3	0	7	1			1	12
57					2	1	16	1				20
58					0	2	19	1				22
59					5	5	30	0				40
60				1	11	8	44	0				64
61				0	7	8	69	1				85
62		1		2	19	17	79					118
63		0		1	17	21	96					135
64		0	2	1	23	24	119					169
65		0	0	4	35	34	125					198
66		0	0	1	46	28	117					192
67		0	1	3	26	23	117					170
68		0	0	2	31	22	125					180
69		0	1	3	25	24	92					145
70		0	4	6	25	27	95					157
71		0	4	5	30	21	70					130
72		0	7	6	25	22	49					109
73		1	4	9	21	12	39					86
74		0	4	3	17	13	47					84
75		1	4	6	22	18	24					75
76		0	12	7	10	18	31					78
77	1	1	13	2	11	13	21					62
78		1	8	7	10	8	11					45
79		0	7	1	5	6	10					29
80		0	7	7	3	4	7					28
81		0	3	4	0	2	2					11
82		0	3	3	3	5	3					17
83		0	6	1	2	1	2					12
84		0	4	0	1	1	1					7
85		0	2	0	2	2						6
86		0	5	1	2	1						9
87		0	2	0		0						2
88		0	4	0		1						5
89		0	2	0								2
90		0	0	0								0
91		0	1	0								1
92		0	0	0								0
93		0	2	0								2
94		1		1								2
												0
Totals:	1	6	112	87	441	393	1,483	19	15	16	79	2,652
Mean FL:	77.0	76.5	78.3	73.8	68.8	69.1	66.8	52.0	49.5	49.0	47.3	67.3

a/ The fish ladder was open from 5 September 2000 through 29 March 2001.
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 2000-2001 season. a/

	Brood year														
	1995	1996		1997						1998					
	Coded-wire tag number- age at release b/														
FL (cm)	065226-y	065230-f	065232-y	065233-f	065234-f	065235-f	065236-f	065239-f	065241-y	065242-f	065243-f	065245-f	065642-y	062641-y	Total
41														1	1
42														2	2
43														1	1
44														0	0
45														2	2
46									1			1		11	13
47					1				4			0	1	21	27
48					0				0			0	0	24	24
49					0				1			0	0	39	40
50					0				1	2	1	1	0	23	28
51					0				4	1	0	0	0	38	43
52					0				5	2	3	0	1	25	36
53					0				1	1	0	0	0	24	26
54					0				5	1	1	0	0	8	15
55					0				2	3	0	0	0	7	12
56					1				8	1	1	0	0	5	16
57					0				14	1	0	0	1	1	17
58				2	0		2		24	0	0	0		0	28
59				1	1		0	1	37	0	0	1		0	41
60				0	1		1	0	55	0	1			0	58
61				0	1	1	1	2	96	1				0	102
62				7	3	2	4	3	155	1				0	175
63				3	5	2	4	2	238					0	254
64				9	6	4	5	0	305					1	330
65			1	5	14	12	8	5	364					0	409
66			0	7	7	10	16	6	394					0	440
67			0	15	17	16	10	7	430					0	495
68			4	15	16	17	17	7	399					0	475
69		1	3	16	21	13	12	0	383					0	449
70		3	0	17	15	12	15	4	342					0	408
71		1	2	13	15	15	10	3	279					1	339
72		4	1	15	16	10	15	2	201						264
73		4	9	9	15	11	11	1	209						269
74		3	7	10	10	7	8	6	161						212
75		4	4	3	8	2	5	3	116						145
76		5	6	7	9	0	7	3	89						126
77		6	17	8	6	3	5	2	68						115
78		8	7	3	1	2	2	1	77						101
79	1	7	11	5	5	2	6	0	38						75
80	3	11	11	0	3	2	2	1	28						61
81	0	4	5	3	1	5	0	0	14						32
82	1	4	6	1	4	0	1	0	7						24
83		5	6	1	0	0	0	0	15						27
84		6	9	1	4	0	1	0	7						28
85		6	4	1		0		1	7						19
86		2	7			1		1	3						14
87		4	3						1						8
88		5	2						0						7
89		4	1						1						6
90		2	5						0						7
91		3	1						1						5
92		1	2						0						3
93		0	0						0						0
94		2	1						1						4
95			0												0
96			0												0
97			0												0
98			2												2
Totals:	5	105	137	177	206	149	168	61	4,591	14	7	3	3	234	5,860
Mean FL:	80.2	80.8	79.8	70.4	70.5	70.0	70.1	69.7	68.3	54.5	53.7	51.7	52.0	50.3	68.2

a/ The fish ladder was open from 5 September 2000 through 29 March 2001.
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 2000-2001 season.

	Willow Creek Weir a/				Junction City Weir a/			
FL (cm)	Total trapped	Ad-clips b/	Effective tags c/	TRH recoveries	Total trapped	Ad-clips b/	Effective tags c/	TRH recoveries
40					1		1	
41					1		1	
42					3		3	
43	1		1		5		5	
44	0		0		3		3	2
45	0		0		3	2	3	1
46	1		1		1	0	1	0
47	0		0		5	0	5	2
48	1		1		7	1	6	0
49	1		1		4	0	4	1
50	1		1		8	2	8	2
51	1		1		2	0	2	0
52	1		1		5	1	5	2
53	0		0		2	0	2	0
54	0		0		5	2	5	3
55	1	1	1		0	0	0	0
56	2	0	2		3	2	3	1
57	0	0	0		5	3	5	3
58	0	0	0		8	1	8	6
59	2	0	2		14	2	14	6
60	0	0	0		23	4	23	10
61	4	1	4		30	9	29	15
62	3	0	3		41	4	41	23
63	7	0	6	1	37	15	37	24
64	9	0	8	1	43	8	42	23
65	11	1	10	4	52	13	52	23
66	10	2	9	3	41	5	41	19
67	9	1	8	4	38	12	38	21
68	12	3	11	3	33	6	30	9
69	10	1	9	0	27	3	27	14
70	8	0	7	4	34	7	34	22
71	9	1	9	4	20	5	20	11
72	3	0	3	1	18	4	17	8
73	6	0	6	0	14	1	13	4
74	2	0	2	0	12	2	12	7
75	7	2	7	3	15	2	15	4
76	2	0	2	0	12	0	12	4
77	0	0	0	0	7	0	7	5
78	2	0	2	0	4	0	4	1
79	2	1	2	1	3	0	3	1
80	0	0	0		1	0	1	0
81	2	1	2		2	0	2	1
82	0		0		1	1	1	1
83	0		0		2	0	2	0
84	0		0		4	0	4	2
85	0		0		1	0	0	
86	0		0		1	0	1	
87	0		0		3	1	3	
88	0		0					
89	0		0					
90	0		0					
91	2		2					
92	0							
93	0							
94	0							
95	1							
Totals d/:	133	15	124	29	604	118	595	281
Mean FL:	67.6	68.9	67.4	68.9	65.1	64.6	65.1	65.5
Total grilse e/:	7	0	7	0	50	6	49	10
Total adults:	126	15	117	29	554	112	546	271

a/ Trapping at Willow Creek Weir took place from Julian week 34 (23 August) through Julian week 46 (14 November) of 2000. Only chinook trapped through Julian week 34 were considered spring-run chinook. Trapping at Junction City Weir took place from Julian week 26 (30 June) through Julian week 39 (27 september) of 2000. Chinook trapped through Julian week 36 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 tagged and not measured at WCW that was also subsequently recovered at TRH.

e/ Spring-run chinook salmon less than or equal to 53 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 2000-2001 season.

	Willow Creek Weir a/				Junction City Weir a/			
FL (cm)	Total trapped	Ad-clips b/	Effective tags c/	TRH recoveries	Total trapped	Ad-clips b/	Effective tags c/	TRH recoveries
40	3		3					
41	0		0					
42	4		4					
43	7		6					
44	9		7	1				
45	6	1	6	0				
46	13	3	13	2				
47	15	2	14	3				
48	16	1	16	3	1		1	
49	23	6	23	2	0		0	
50	24	4	24	6	0		0	
51	8	2	8	2	0		0	
52	15	2	15	4	2		0	
53	17	2	16	3	1	1	1	1
54	12	2	12	2	1	0	1	1
55	7	0	6	0	0	0	0	0
56	22	1	21	10	1	1	1	0
57	19	1	18	4	0	0	0	0
58	32	6	31	18	0	0	0	0
59	36	3	31	16	3	1	3	0
60	44	7	44	25	2	0	2	0
61	73	18	72	44	7	1	7	4
62	127	38	123	64	11	2	10	5
63	158	37	149	87	10	1	10	8
64	210	40	202	100	19	2	19	10
65	225	56	207	117	27	3	27	10
66	217	44	208	114	16	1	15	5
67	234	45	219	117	21	3	21	12
68	235	52	217	119	34	4	34	20
69	204	35	186	93	32	4	32	14
70	208	26	200	104	20	4	20	8
71	130	23	121	71	16	1	16	5
72	146	26	137	78	15	3	15	7
73	113	18	105	48	13	0	13	9
74	101	18	95	45	14	0	14	5
75	81	7	79	41	7	1	7	5
76	67	11	65	29	10	0	10	4
77	55	2	53	22	6	0	6	2
78	44	6	43	14	2	0	2	0
79	39	1	37	17	2	0	2	1
80	43	7	42	19	3	1	3	1
81	25	2	24	8	2	0	2	1
82	30	0	29	10	5	0	5	1
83	20	2	18	5	3	0	3	1
84	14	1	13	5	2	0	2	0
85	9	2	9	3	0	0	0	0
86	8	0	8	1	3	1	3	1
87	12	2	11	5	2		2	1
88	6		6	2	0		0	
89	4		3	1	0		0	
90	8		6	1	0		0	
91	3		2	0	1		1	
92	1		1	0	1		1	
93	3		3	1	0		0	
94	3		3	1	1		1	
95	0		0	0				
96	1		1	1				
Totals:	3,189	562	3,015	1,488	316	35	312	142
Mean FL:	67.7	66.7	67.7	67.9	69.3	67.5	69.5	68.8
Total grilse d/:	179	25	173	28	5	1	3	2
Total adults:	3,010	537	2,842	1,460	311	34	309	140

a/ Trapping at Willow Creek Weir took place from Julian week 34 (23 August) through Julian week 46 (14 November) of 2000. Only chinook trapped after Julian week 34 were considered fall-run chinook. Trapping at Junction City Weir took place from Julian week 26 (30 June) through Julian week 39 (27 september) of 2000. Chinook trapped after Julian week 36 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/ 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 2000-2001 season.

	Willow Creek Weir a/			
FL (cm)	Total trapped	RM-clips b/	Effective tags c/	TRH recoveries
35	1	1	1	
36	1	1	0	
37	3	3	2	
38	2	2	1	
39	4	4	3	
40	5	4	5	
41	4	4	4	1
42	11	9	10	1
43	10	10	10	3
44	7	7	7	1
45	17	17	16	4
46	6	6	6	1
47	2	2	2	2
48	5	5	3	2
49	2	2	2	1
50	1	1	1	1
51	1	1	1	0
52	0	0	0	0
53	1	1	1	0
54	0	0	0	0
55	1	1	1	0
56	2	2	2	0
57	2	2	1	0
58	2	2	2	1
59	1	1	1	0
60	7	7	6	0
61	7	6	6	2
62	9	9	9	7
63	7	7	7	2
64	11	11	11	2
65	11	11	11	4
66	17	17	17	5
67	12	12	12	3
68	19	19	17	6
69	14	14	14	4
70	10	9	10	5
71	10	8	10	2
72	2	2	2	1
73	3	3	3	1
74	0	0	0	
75	1	1	1	
76	1	1	1	
77	2	2	2	
78	0		0	
79	0		0	
80	0		0	
81	1		1	
Totals:	235	227	222	62
Mean FL:	58.2	58.1	58.7	60.5
Total grilse d/:	83	80	75	17
Total adults:	152	147	147	45

a/ Trapping at Willow Creek Weir took place from 23 August (Julian week 34) through 14 November (Julian week 46) of 2000.

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 53 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 2000-2001 season.

	Willow Creek Weir a/				Junction City Weir a/	
FL (cm)	Total trapped	Fin-clips b/	Effective tags c/	TRH recoveries	Total trapped	Fin-clips b/
32	1					
33	2	2				
34	1	1				
35	4	4				
36	3	3				
37	4	3				
38	12	9			1	
39	3	3			0	
40	6	6			0	
41	3	3	1		0	
42	1	1	0		1	
43	3	2	2		0	
44	5	4	2		0	
45	4	3	2	1	2	
46	3	1	3	0	0	
47	2	1	1	1	0	
48	2	1	2	0	1	
49	2	0	1	0	2	2
50	7	1	5	0	1	0
51	7	0	7	0	0	0
52	7	2	5	1	2	0
53	5	3	4	1	6	1
54	9	3	8	0	3	2
55	10	4	9	0	3	2
56	24	9	21	1	6	2
57	22	10	17	1	2	1
58	26	17	23	4	3	1
59	21	13	20	1	4	0
60	26	15	26	3	2	2
61	35	22	31	5	0	0
62	30	16	27	2	1	1
63	30	16	28	4	2	0
64	28	16	24	3	0	0
65	19	6	16	1	1	1
66	23	9	21	2	1	1
67	18	8	18	1	1	
68	14	7	14	1		
69	7	2	6	0		
70	7	2	6	0		
71	4	0	4	0		
72	6	1	5	0		
73	2	2	1	1		
74	4	1	3			
75	3	1	3			
Totals: d/	455	233	366	34	45	16
Mean FL:	58.6	57.0	60.9	60.6	55.1	56.8
Total half-pounders e/:	39	34	1	0	1	0
Total adults:	416	199	365	34	44	16

a/ Trapping at Willow Creek Weir took place from 23 August through 14 November of 2000. Trapping at Junction City Weir from 26 June through 27 September 2000. Steelhead were not tagged at Junction City Weir.

b/ For brood years 1989 through 1994 and 1997 to 2000, 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 by anglers).

d/ Totals do not include one steelhead that was tagged and not measured at Wilow Creek Weir.

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 2000-2001 season.

	Recovery site					
	Willow Creek Weir a/		Junction City Weir b/		Trinity River Hatchery c/	
	Fin-clip d/					
FL (cm)	Unmk	AD	Unmk	AD	Unmk	AD
29						1
30						0
31			1			1
32	1		0			2
33	0	2	0			0
34	0	1	0			3
35	0	4	1			6
36	0	3	0			4
37	1	3	0			7
38	3	9	2			4
39	0	3	0			11
40	0	6	0			22
41	0	3	1			15
42	0	1	0			24
43	1	2	1			20
44	1	4	0			21
45	1	3	2			28
46	2	1	5		1	20
47	1	1	1		0	15
48	1	1	1		0	6
49	1	0	4	2	1	1
50	6	1	1	0	1	1
51	7	0	2	0	0	3
52	5	2	4	0	0	4
53	2	3	0	1	2	5
54	6	3	0	2	0	16
55	6	4	0	2	0	17
56	15	9	2	2	0	19
57	12	10	0	1	0	27
58	9	17	0	1	0	39
59	8	13	0	0	0	42
60	11	15	1	2	1	55
61	13	22		0	1	65
62	14	16		1	0	60
63	14	16		0	2	55
64	12	16		0	1	44
65	13	6		1	1	35
66	14	9		1	0	33
67	9	8			0	28
68	7	7			0	26
69	5	2			0	19
70	5	2			0	11
71	4	0			0	5
72	5	1			1	2
73	0	2			0	3
74	3	1			1	4
75	2	1				1
76						0
77						0
78						0
79						1
Totals: e/	220	235	29	16	13	831
Mean FL:	60.4	56.8	54.2	56.8	59.5	57.0
Total subadults f/:	5	34	5	0	0	76
Total adults:	215	199	24	16	13	755

a/ Trapping at Willow Creek Weir took place from 23 August through 14 November 2000.
b/ Trapping at Junction City Weir took place from 26 June through 27 September 2000.
c/ The fish ladder was open 5 September 2000 through 27 March 2001.
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 that was not measured at Willow Creek Weir.
f/ Subadults were steelhead less than or equal to 41 cm FL; larger fish were adults.

Appendix 9. Known recoveries of all spring chinook salmon tagged at the Junction City Weir during the 2000-01 season. a/

Fork length (cm)	Total tagged	Recoveries: Tag morts b/	Carcass recoveries c/	TRH d/ recoveries	Angler released e/	Angler harvest f/	Angler found tags g/	Total recoveries	% recoveries
40	1							0	0.0%
41	1							0	0.0%
42	3					1	1	2	66.7%
43	5					0	0	0	0.0%
44	3			2		0	0	2	66.7%
45	3			1		0	0	1	33.3%
46	1			0		0	0	0	0.0%
47	5			2		0	0	2	40.0%
48	7	1		0		1	0	2	28.6%
49	4	0		1		1	0	2	50.0%
50	8	0		2		0	0	2	25.0%
51	2	0		0		0	0	0	0.0%
52	5	0		2		0	0	2	40.0%
53	2	0		0		0	0	0	0.0%
54	5	0		3		0	0	3	60.0%
55	0	0		0		0	0	0	-----
56	3	0		1		0	0	1	33.3%
57	5	0		3		1	0	4	80.0%
58	8	0		6		0	0	6	75.0%
59	14	0		6		0	0	6	42.9%
60	23	0		10		0	0	10	43.5%
61	30	0		15	1	2	0	18	60.0%
62	41	0	1	23	0	0	0	24	58.5%
63	37	0	2	24	0	1	0	27	73.0%
64	43	1	1	23	0	3	0	28	65.1%
65	52	0	3	23	0	2	0	28	53.8%
66	41	0	2	19	0	0	1	22	53.7%
67	38	0	1	21	0	2		24	63.2%
68	33	2	2	9	1	2		16	48.5%
69	27	0	0	14	0	0		14	51.9%
70	34	0	1	22	0	2		25	73.5%
71	20	0	1	11	0	1		13	65.0%
72	17	0	0	8	0	2		10	58.8%
73	14	1	0	4	0	2		7	50.0%
74	12		0	7	0	1		8	66.7%
75	15		2	4	0	1		7	46.7%
76	12		0	4	0			4	33.3%
77	7		0	4	0			4	57.1%
78	4		0	1	0			1	25.0%
79	3		0	1	0			1	33.3%
80	1		0	0	0			0	0.0%
81	2		0	1	0			1	50.0%
82	1		0	1	0			1	100.0%
83	2		1	0	0			1	50.0%
84	4			2	0			2	50.0%
85	1				1			1	100.0%
86	1							0	0.0%
87	3							0	0.0%
Grilse: /h	50	1	0	10	0	3	1	15	30.0%
Adults:	553	4	17	270	3	22	1	317	57.3%
Total:	603	5	17	280	3	25	2	332	55.1%

a/ Trapping at Junction City Weir took place from 26 June through 27 September, 2000. Only chinook tagged prior to 10 September, 2000 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 53 cm, FL.

Appendix 10. Known recoveries of all fall chinook salmon tagged at the Willow Creek Weir during the 2000-01 season. a/

		Recoveries							
Fork length (cm)	Total tagged	Tag morts /b	Carcass recoveries /c	TRH /d recoveries	Angler released /e	Angler harvest /f	Angler found tags /g	Total recoveries	% recoveries
40	3							0	0.0%
41	0							0	-----
42	4							0	0.0%
43	6					1		1	16.7%
44	7			1		0		1	14.3%
45	6			0		0		0	0.0%
46	13			2		1		3	23.1%
47	14			3		0		3	21.4%
48	16			3		0		3	18.8%
49	23			2		3	1	6	26.1%
50	24		1	6		3	0	10	41.7%
51	8		0	2		0	0	2	25.0%
52	15		0	4		1	0	5	33.3%
53	17		0	3	1	0	0	4	23.5%
54	12		0	2	0	0	0	2	16.7%
55	6		0	0	0	0	0	0	0.0%
56	21		0	10	0	0	0	10	47.6%
57	19		0	4	1	2	0	7	36.8%
58	31		0	18	0	1	0	19	61.3%
59	31		1	16	0	2	0	19	61.3%
60	44		2	25	0	1	0	28	63.6%
61	72		2	44	0	3	0	49	68.1%
62	123		7	64	0	1	1	73	59.3%
63	150		6	87	1	2	0	96	64.0%
64	205		12	100	3	4	2	121	59.0%
65	212	2	14	118	3	7	1	145	68.4%
66	213	0	11	114	5	4	0	134	62.9%
67	221	0	12	117	2	1	0	132	59.7%
68	222	0	9	118	5	6	1	139	62.6%
69	190	0	10	93	4	4	1	112	58.9%
70	200	0	13	104	0	1	0	118	59.0%
71	123	0	4	71	2	3	0	80	65.0%
72	141	1	6	78	3	1	0	89	63.1%
73	106	0	3	48	1	1	1	54	50.9%
74	95	0	5	45		1	1	52	54.7%
75	79	0	3	41		3		47	59.5%
76	65	0	3	29		1		33	50.8%
77	53	0	3	22		1		26	49.1%
78	43	0	3	14		2		19	44.2%
79	37	0	0	17		0		17	45.9%
80	42	0	3	19		0		22	52.4%
81	24	0	0	8		0		8	33.3%
82	29	0	1	10		0		11	37.9%
83	18	0	0	5		0		5	27.8%
84	13	0	0	5		0		5	38.5%
85	9	0	0	3		0		3	33.3%
86	8	0	1	1		0		2	25.0%
87	11	0		5		1		6	54.5%
88	6	0		2				2	33.3%
89	3	0		1				1	33.3%
90	7	1		1				2	28.6%
91	2			0				0	0.0%
92	1			0				0	0.0%
93	3			1				1	33.3%
94	3			1				1	33.3%
95	0			0				0	
96	1			1				1	100.0%
Grilse: /h	174	0	1	28	1	9	1	40	23.0%
Adults:	2,876	4	134	1,460	30	53	8	1,689	58.7%
Total:	3,050	4	135	1,488	31	62	9	1,729	56.7%

a/ Trapping at Willow Creek Weir took place from 23 August through 14 November, 2000. Only chinook tagged after 26 August, 2000 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. Known recoveries of all coho salmon tagged at the Willow Creek Weir during the 2000-01 season. a/

Fork length (cm)	Total tagged	Recoveries: Tag morts b/	Carcass recoveries c/	TRH d/ recoveries	Angler released e/	Angler harvest f/	Angler found tags g/	Total recoveries	% recoveries
35	1							0	0.0%
36	0							0	-----
37	2							0	0.0%
38	1							0	0.0%
39	3							0	0.0%
40	5							0	0.0%
41	4			1				1	25.0%
42	10			1			2	3	30.0%
43	10			3			0	3	30.0%
44	7			1			0	1	14.3%
45	16			4			0	4	25.0%
46	6			1			0	1	16.7%
47	2			2			0	2	100.0%
48	3			2			0	2	66.7%
49	2			1			0	1	50.0%
50	1			1			0	1	100.0%
51	1			0			0	0	0.0%
52	0			0			0	0	-----
53	1			0			0	0	0.0%
54	0			0			0	0	-----
55	1			0			0	0	0.0%
56	2		1	0			0	1	50.0%
57	1		0	0			0	0	0.0%
58	2		0	1			0	1	50.0%
59	1		0	0			0	0	0.0%
60	6		0	0			0	0	0.0%
61	6		0	2			0	2	33.3%
62	9		0	7			0	7	77.8%
63	7		0	2			0	2	28.6%
64	11		0	2			0	2	18.2%
65	11		1	4			0	5	45.5%
66	17		0	5			0	5	29.4%
67	12		0	3			0	3	25.0%
68	17		0	6			0	6	35.3%
69	14		1	4			0	5	35.7%
70	10		0	5			1	6	60.0%
71	10		1	2				3	30.0%
72	2			1				1	50.0%
73	3			1				1	33.3%
74	0							0	-----
75	1							0	0.0%
76	1							0	0.0%
77	2							0	0.0%
78	0							0	-----
79	0							0	-----
80	0							0	-----
81	1							0	0.0%
Grilse h/:	75	0	0	17	0	0	2	19	25.3%
Adults:	147	0	4	45	0	0	1	50	34.0%
Total:	222	0	4	62	0	0	3	69	31.1%

a/ Trapping at Willow Creek Weir took place from 23 August through 14 November, 2000.
b/ Tagged fish found dead and unspawned within 30 days of tagging.
c/ Fish recovered in upper Trinity River spawner surveys.
d/ TRH=Trinity River Hatchery
e/ Fish reported as caught-and-released by anglers.
f/ Fish reported as harvested by anglers.
g/ Tags found on dead fish or found unattached.
h/ Grilse were considered fish less than or equal to 53 cm, FL.

Appendix 12. Known recoveries of all fall-run adult steelhead tagged at the Willow Creek Weir during the 2000-01 season. a/

Fork length (cm)	Total tagged	Recoveries: Tag morts b/	Carcass recoveries c/	TRH d/ recoveries	Angler released e/	Angler harvest f/	Angler found tags g/	Total recoveries	% recoveries
43	3				1			1	33.3%
44	3				1			1	33.3%
45	2			1	0			1	50.0%
46	3			0	0			0	0.0%
47	2			1	1			2	100.0%
48	2			0	0			0	0.0%
49	2			0	1			1	50.0%
50	5			0	0			0	0.0%
51	7			0	0			0	0.0%
52	7			1	2			3	42.9%
53	5			1	1			2	40.0%
54	8			0	0			0	0.0%
55	9			0	0			0	0.0%
56	24			1	3			4	16.7%
57	20			1	3	1		5	25.0%
58	24			4	1	0		5	20.8%
59	21			1	1	0		2	9.5%
60	26			3	0	1		4	15.4%
61	34			5	3	1		9	26.5%
62	30			2	3	0		5	16.7%
63	30			4	2	1		7	23.3%
64	25			3	1	0		4	16.0%
65	17			1	1	1		3	17.6%
66	22			2	1			3	13.6%
67	18			1	0			1	5.6%
68	14			1	0			1	7.1%
69	6			0	0			0	0.0%
70	7			0	1			1	14.3%
71	4			0	0			0	0.0%
72	5			0	0			0	0.0%
73	2			1	1			2	100.0%
74	3							0	0.0%
75	3							0	0.0%
Total h/:	393	0	0	34	28	5	0	67	17.0%

a/ Trapping at Willow Creek Weir took place from 23 August through 14 November, 2000.
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 steelehad greater than 41 cm, fl were tagged.

Appendix 13. California Fish and Game Commission regulations that affected salmonid harvest in the Trinity River during the 2000-01 season. [a/]

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. **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***.**	1 hatchery trout or 1 hatchery steelhead. 2 King salmon. No more than 4 salmon over 24 inches in any 7 consecutive days. No more than 8 salmon may be possessed, of which no more than 4 may be over 24 inches total length.
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.	
6. From Hawkins Bar Bridge (Road to Denny) to the mouth of the South Fork Trinity.	Fourth saturday in May through Mar. 31 **i) Special king salmon seasons: Sept. 9 through Sept. 30 and Oct. 29 through Nov. 30*****	
7. The main stem Trinity River downstream from mouth of the South Fork of the Trinity.	All year. **i) Special king salmon season: Sept. 9 through Sept. 30 and Oct. 29 through Nov. 30*****	
8. South Fork of the Trinity River downstream from the mouth of Grouse Creek.	Saturday preceding Memorial Day through Mar. 14. **i) Special king salmon seasons: Sept. 9 through Sept. 30 and Oct. 29 through Nov. 30*****	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 articial 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.		

a/ From State of California, Fish and Game Commission, California Code of Regulations for 2000, 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 2000-2001 season. a/

FL (cm)	Unmarked	Right maxillary clip b/	Total
31		1	1
32		0	0
33		0	0
34		4	4
35	1	4	5
36	0	9	9
37	0	18	18
38	0	21	21
39	0	47	47
40	1	85	86
41	3	89	92
42	0	99	99
43	1	124	125
44	0	117	117
45	1	76	77
46	2	75	77
47	0	44	44
48	1	40	41
49	0	28	28
50	0	15	15
51	0	6	6
52	0	9	9
53	0	5	5
54	1	3	4
55	0	6	6
56	0	13	13
57	0	12	12
58	0	27	27
59	0	44	44
60	0	44	44
61	0	80	80
62	1	94	95
63	0	124	124
64	2	161	163
65	4	191	195
66	4	208	212
67	5	293	298
68	4	306	310
69	4	331	335
70	7	316	323
71	3	294	297
72	3	246	249
73	4	202	206
74	4	137	141
75	1	92	93
76	4	70	74
77	0	51	51
78	0	28	28
79	0	18	18
80	2	7	9
81	0	6	6
82	0	1	1
83	0	1	1
84	0	0	0
85	0	1	1
86	0		0
87	0		0
88	0		0
89	1		1
Totals:	64	4,323	4,387
Mean FL:	65.8	63.2	63.2
Total Grilse: c/	10	916	926
Total Adults:	54	3,407	3,461

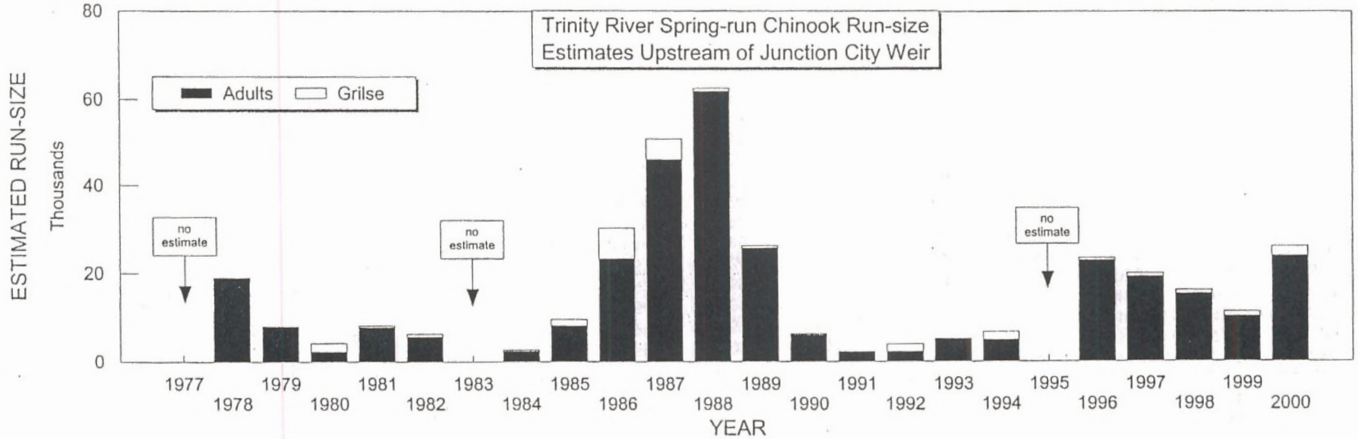
a/ The fish ladder was open from 5 September 2000 through 29 March 2001.

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 53 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 2000.

Year	Run-size estimate: Grilse Number	Grilse Percent	Adults Number	Adults Percent	Total	Spawner escapements: Natural Grilse	Natural Adults	Natural Total	Trinity River Hatchery Grilse	Trinity River Hatchery Adults	Trinity River Hatchery Total	Angler harvest: Grilse	Adults	Total
1977			no estimates				no estimates		385	1124	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	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	8722	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

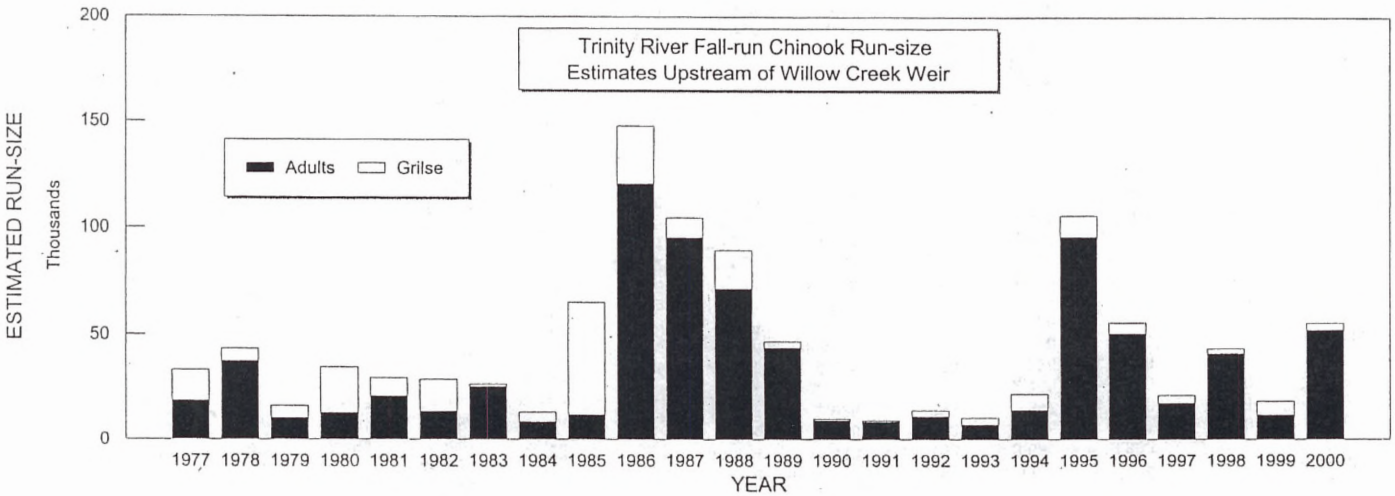


a/ The 1978 sport harvest of spring-run chinook was limited by a salmon fishing closure beginning 25 August 1978.

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 2000.

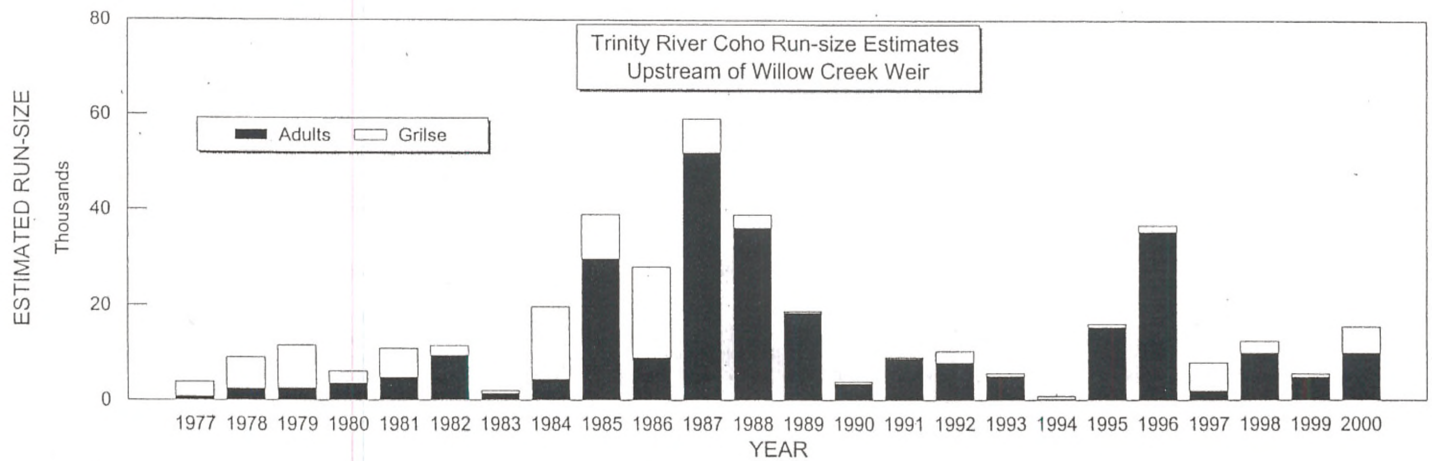
	Run-size estimate					Spawner escapements						Angler harvest		
						Natural			Trinity River Hatchery					
	Grilse		Adults		Total	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults	Total
Year	Number	Percent	Number	Percent										
1977	14,318	43.5%	18,596	56.5%	32,914	9,737	13,501	23,238	2,177	2,035	4,212	2,404	3,060	5,464
1978	6,037	14.0%	37,086	86.0%	43,123	4,712	31,052	35,764	1,325	6,034	7,359	Fishing closure a/		0
1979	5,665	35.0%	10,520	65.0%	16,185	3,936	8,028	11,964	964	1,335	2,299	765	1,157	1,922
1980	21,549	62.7%	12,797	37.3%	34,346	16,837	7,700	24,537	2,256	4,099	6,355	2,456	998	3,454
1981	8,366	28.6%	20,884	71.4%	29,250	5,906	15,340	21,246	1,004	2,370	3,374	1,456	3,174	4,630
1982	14,938	52.2%	13,653	47.8%	28,591	8,149	9,274	17,423	4,235	2,058	6,293	2,554	2,321	4,875
1983	1,240	4.7%	25,138	95.3%	26,378	853	17,284	18,137	271	5,494	5,765	116	2,360	2,476
1984	4,575	34.8%	8,556	65.2%	13,131	3,416	5,654	9,070	766	2,166	2,932	393	736	1,129
1985	53,062	81.6%	11,954	18.4%	65,016	29,454	9,217	38,671	18,166	2,583	20,749	5,442	154 b/	5,596
1986	27,506	18.6%	120,382	81.4%	147,888	20,459	92,548	113,007	3,609	15,795	19,404	3,438	12,039	15,477
1987	9,325	8.9%	95,287	91.1%	104,612	5,949	71,920	77,869	2,453	13,934	16,387	923	9,433	10,356
1988	18,113	20.3%	71,309	79.7%	89,422	10,626	44,616	55,242	4,752	17,352	22,104	2,735	9,341	12,076
1989	2,991	6.4%	43,631	93.6%	46,622	2,543	29,445	31,988	239	11,132	11,371	209	3,054	3,263
1990	634	6.3%	9,358	93.7%	9,992	241	7,682	7,923	371	1,348	1,719	22	328	350
1991	681	7.4%	8,526	92.6%	9,207	382	4,867	5,249	205	2,482	2,687	94	1,177	1,271
1992	2,932	20.7%	11,232	79.3%	14,164	2,563	7,139	9,702	211	3,779	3,990	158	314 b/	472
1993	3,381	32.2%	7,104	67.8%	10,485	2,473	5,898	8,371	736	815	1,551	172	391 b/	563
1994	7,494	34.2%	14,430	65.8%	21,924	2,505	10,906	13,411	4,442	3,264	7,706	547	260 b/	807
1995	9,892	9.4%	95,833	90.6%	105,725	9,262	77,876	87,138	76	15,178	15,254	554	2,779 b/	3,333
1996	5,072	9.1%	50,574	90.9%	55,646	4,478	42,646	47,124	249	6,411	6,660	345	1,517 b/	1,862
1997	3,767	17.6%	17,580	82.4%	21,347	2,845	11,507	14,352	820	5387	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



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 2000 sport harvest of Trinity River fall-run chinook was managed with a quota system. In 2000, the quota was 1,386 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 2000.

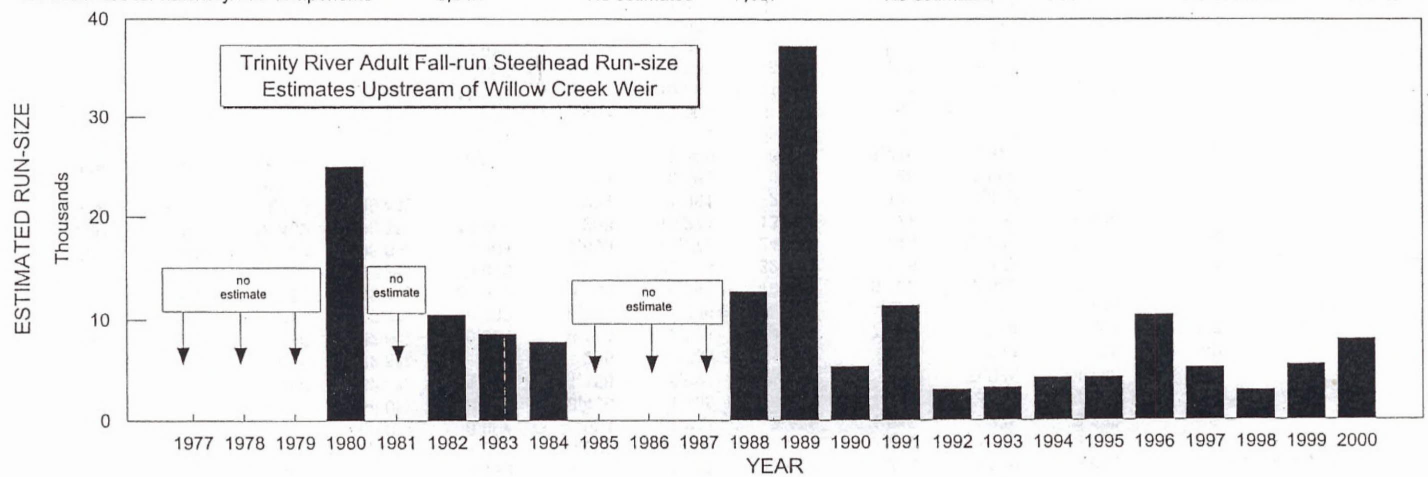
	Run-size estimate					Spawner escapements						Angler harvest		
						Natural			Trinity River Hatchery					
	Grilse		Adults		Total	Grilse	Adults	Total	Grilse	Adults	Total	Grilse	Adults	Total
Year	Number	Percent	Number	Percent										
1977	3,106	80.5%	752	19.5%	3,858	1,756	25	1,781	1,230	698	1,928	120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



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-'00 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 2000. a/

	Run-size estimate					Spawner escapement						Angler harvest		
	Hatchery b/		Wild c/			Natural			Trinity River Hatchery					
Year	Number	Percent	Number	Percent	Total	Hatchery	Wild	Total	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				8,605			6,661			599			1,345
1984	"				7,833			6,430			142			1,261
1985			No estimates				No estimates				461		No estimates	
1986			"				"				3,780		"	
1987			"				"				3,007		"	
1988	No estimates for hatchery/wild components				12,743			11,926 d/			817		"	
1989	"				37,276			28,933			4,765			3,578
1990	"				5,348			3,188			930			1,230
1991	"				11,417			8,631			446			2,340
1992	1,315	43.2%	1,731	56.8%	3,046	759	1,540	2,299	430	25	455	126	166	292
1993	1,894	58.4%	1,349	41.6%	3,243	801	1,176	1,977	875	10	885	218	163	381
1994	1,477	34.8%	2,767	65.2%	4,244	878	2,410	3,288	403	8	411	196	349	545
1995	1,595	37.2%	2,693	62.8%	4,288	1,424	1,867	3,291	24	681	705	147	145	292
1996	8,598	82.4%	1,837	17.6%	10,435	4,127	1,703	5,830	3,964	48	4,012	507	86	593
1997	No estimates for hatchery/wild components				5,212		No estimates	4,267		No estimates	429		No estimates	516
1998	No estimates for hatchery/wild components				2,972		No estimates	2,463		No estimates	441		No estimates	68 e/
1999	No estimates for hatchery/wild components				5,470		No estimates	3,817		No estimates	1,571		No estimates	82 e/
2000	No estimates for hatchery/wild components				8,042		No estimates	7,097		No estimates	768		No estimates	177 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 or dorsal fin erosion.

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2000-01 SEASON

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

by

Wade Sinnen

ABSTRACT

Recovery of marked spring-run (spring) and fall-run (fall) chinook salmon (*Oncorhynchus tshawytscha)* at Trinity River Hatchery (TRH) was conducted between 5 September, 2000 and 25 March, 2001. Of the 39,211 chinook salmon that entered TRH, we recovered 9,029 adipose fin-clipped (AD) chinook salmon, 23% of the total. Of these, coded-wire tags (CWT) were recovered from 2,652 spring chinook and 5,860 fall chinook salmon.

We estimated that 4,842 marked (AD+CWT) spring chinook returned to the Trinity River upstream of the Junction City Weir and 9,167 marked fall chinook returned to the Trinity River upstream of the Willow Creek weir during the 2000-01 season.

Run-size, in-river angler harvest, and spawner escapements of marked spring- and fall-run chinook salmon of the 1995 through 1998 brood years are presented. Complete returns are only available for both runs of fish from the 1995 brood year, returning as two- through five-year-olds. TRH-produced spring chinook from this brood year returned at estimated rates of 0.23% and 1.55% for fingerling and yearling releases respectively. Similarly, fall chinook returned at rates of 0.13% and 2.82%. Chinook released as yearlings returned at rates 6.8 (spring chinook) and 21.2 (fall chinook) times that of their fingerling (smolt) released counterparts.

Based on estimated total spring chinook run-size above Junction City Weir and fall chinook run-size above Willow Creek Weir, we estimate that the hatchery produced portion of these two runs was 75.6% and 70.1 % 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 5 September, 2000 through 29 March, 2001, 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 and 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 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:

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

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

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

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:

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

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

<u>Coded-wire tag recovery</u>

We recovered 9,029 AD-clipped chinook at TRH this season, of which we recovered CWT's from 2,652 spring chinook and 5,860 fall chinook. The remaining 517 AD-clipped fish had either shed their CWT or the CWT was lost or unreadable. Chinook without CWT's were classified as either spring- or fall-run based on their date of entry into TRH. Fish which entered the hatchery prior to 11 October were considered spring chinook, while chinook entering after 25 October were considered fall fish. Recovered spring chinook CWT's were composed of 11 release groups from the 1995 through 1998 BY's. Recovered fall chinook with CWT's were from 14 groups representing the 1995 through 1998 BY's (Table 1).

Table 1. Release and recovery data for adipose fin-clipped chinook recovered at Trinity River Hatchery (TRH) during the 2000-2001 season.

Release data							Recovery data				
CWT a/ code	Egg source	Brood year	Date	Number	Size (No./lb)	Site	Males No.	Males FL b/	Females No.	Females FL b/	Total No.
Spring-run chinook salmon											
065223	TRH	1995	06/3-13/96	196,211	118.8	TRH	1	77	0	-	1
065225	TRH	1995	10/1-7/96	101,934	26.4	TRH	2	86	4	71.8	6
065229	TRH	1996	06/2-6/97	218,881	51.0	TRH	39	83.6	73	75.5	112
065231	TRH	1996	10/1-7/97	110,330	10.8	TRH	42	75.6	45	72.2	87
065237	TRH	1997	06/15/98	104,577	49	TRH	217	71.3	224	66.5	441
065238	TRH	1997	06/15/98	104,578	49	TRH	194	71.9	199	66.5	393
065240	TRH	1997	10/1-7/98	147,507	13	TRH	878	68.0	605	65.1	1,483
065247	TRH	1998	06/1-7/99	54,378	55	TRH	19	52.0	0	-	19
065248	TRH	1998	06/1-7/99	61,516	64	TRH	15	49.5	0	-	15
065249	TRH	1998	06/1-7/99	61,074	67	TRH	16	49.0	0	-	16
065250	TRH	1998	10/4-13/99	137,602	11.25	TRH	79	47.3	0	-	79
100000 c/ d/							68	69.5	67	67.0	135
				Spring-run chinook salmon totals:			1,570		1,217		2,787
Fall-run chinook salmon											
065226	TRH	1995	10/1-7/96	110,327	35.2	TRH	1	82.0	4	79.8	5
065230	TRH	1996	06/5-12/97	217,981	88	TRH	50	83.7	55	78.1	105
065232	TRH	1996	10/1-7/97	109,869	18.2	TRH	67	82.6	70	77.0	137
065233	TRH	1997	06/15/98	50,947	110	TRH	96	72.0	81	68.5	177
065234	TRH	1997	06/15/98	49,353	108	TRH	114	71.4	92	69.3	206
065235	TRH	1997	06/15/98	49,786	100	TRH	66	72.0	83	68.4	149
065236	TRH	1997	06/15/98	48,382	88	TRH	79	71.2	89	69.1	168
065239	TRH	1997	06/15/98	18,304	160	TRH	40	71.0	21	67.1	61
065241	TRH	1997	10/1-7/98	313,080	23.2	TRH	2,735	69.4	1,856	66.7	4,591
062641	TRH	1998	10/4-13/99	334,726	19.05	TRH	234	50.3	0	-	234
065242	TRH	1998	06/1-7/99	46,399	106	TRH	14	54.5	0	-	14
065642	TRH	1998	10/4-13/99	16,673	19.05	TRH	3	52.0	0	-	3
065243	TRH	1998	06/1-7/99	42,659	118	TRH	7	53.7	0	-	7
065244	TRH	1998	06/1-7/99	49,332	135	TRH	0	-	0	-	0
065245	TRH	1998	06/1-7/99	46,391	141	TRH	3	51.7	0	-	3
100000 c/ e/							222	68.6	160	67.7	382
				Fall-run chinook salmon totals:			3,731		2,511		6,242

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 4,842 CWT'ed spring chinook salmon returned to the Trinity River above JCW during the 2000-01 season. An estimated 320 of these fish were harvested by anglers during the season. Escapement of CWT'ed spring chinook was divided between 2,652 fish recovered at the TRH and 1,870 estimated to have spawned naturally (Table 2).

1995 brood year

Two spring chinook CWT groups from the 1995 BY completed their life cycle this season, having reached the age of five. CWT group 065223 (smolt release) had an overall return rate of 0.229%. The yearling-released group, 065225, returned at a rate of 1.550%, 6.8 times that of their smolt-released counterpart. Both of these groups experienced their highest returns as three-year-old fish (Table 3).

1996 brood year

Spring chinook yearlings (CWT 065231) from the 1996 BY have returned at a rate approximately equal to that of their smolt (CWT 065229) released counterparts thus far. Tagged fish from this BY can be expected to return as five-year-olds in 2001 (Table 3).

1997 brood year

Three release groups, 065237 and 065238 (fingerling releases) and 065240 (yearling release), have returned as age two and three-year-old fish thus far. Estimated return of yearling releases, through age three are approaching 2%, which is approximately 2.5 times that of the fingerling releases (Table 3). Generally, most river returns for any release type are less than 2%, indicating that survival rates for CWT 065240 were exceptional. Spring chinook from these groups will be returning as four- and five-year-olds during 2001 and 2002 respectively.

1998 brood year

Four release groups from the 1998 BY returned as two-year-olds. The one yearling release group, 065250, has returned at a rate approximately 4.5 times that of the three smolt groups, 065247, 065248 and 065249 (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 2000-01 season.

Run-size estimates a/		Angler harvest rates b/		% TRH Ads With CWTs c/	% Weir Ads d/	Ad+CWT Run-size estimates e/
		Grilse	Adults			
Spring Chinook (JCW)	26,083	15.0%	6.2%	95.20%	19.50%	4,842
Fall Chinook (WCW)	55,473	5.4%	2.7%	93.90%	17.60%	9,168

CWT code	BY	Age	TRH Total No.	% of Total	Run-size	Angler harvest	Spawning escapement TRH	Natural	Total
Spring-run chinook salmon									
065223	95	5	1	0.0%	2	0	1	1	2
065225	95	5	6	0.2%	11	1	6	4	10
066229	96	4	112	4.2%	204	13	112	79	191
065231	96	4	87	3.3%	159	10	87	62	149
065237	97	3	441	16.6%	805	50	441	314	755
065238	97	3	393	14.8%	718	44	393	281	674
065240	97	3	1,483	55.9%	2,708	167	1,483	1,058	2,541
065247	98	2	19	0.7%	35	5	19	11	30
065248	98	2	15	0.6%	27	4	15	8	23
065249	98	2	16	0.6%	29	4	16	9	25
065250	98	2	79	3.0%	144	22	79	43	122
			2,652	100%	4,842	320	2,652	1,870	4,522
Fall-run chinook salmon									
065226	95	5	5	0.1%	8	0	5	3	8
065230	96	4	105	1.8%	164	4	105	55	160
065232	96	4	137	2.3%	214	6	137	71	208
065233	97	3	177	3.0%	277	7	177	93	270
065234	97	3	206	3.5%	322	9	206	107	313
065235	97	3	149	2.5%	233	6	149	78	227
065236	97	3	168	2.9%	263	7	168	88	256
065239	97	3	61	1.0%	95	3	61	31	92
065241	97	3	4,591	78.3%	7,182	194	4,591	2,397	6,988
062641	98	2	234	4.0%	366	20	234	112	346
065242	98	2	14	0.2%	22	1	14	7	21
065243	98	2	7	0.1%	11	1	7	3	10
065245	98	2	3	0.1%	5	0	3	2	5
065642	98	2	3	0.1%	5	0	3	2	5
			5,860	100%	9,167	259	5,860	3,048	8,908

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 angelr 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. This estimate is the product of run-size times TRH Ads with a CWT times % weir Ads.

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 1997 through 2000.

Release data					Estimated returns						
CWT a/ code	Brood year	Date b/	Number	Site	Age	Run-size	% of release	River harvest	Spawning escapement TRH c/	Natural	Total
065223	1995	6/3-13/96	196,211	TRH	2	30	0.015	0	15	15	30
					3	353	0.180	37	138	178	316
					4	65	0.033	4	33	27	60
					5	2	0.001	0	1	1	2
				Totals: d/		450	0.229	41	187	221	408
				Total Adults: e/		420	0.214	41	172	206	378
065225	1995	10/1-7/96	101,934	TRH	2	28	0.027	0	14	14	28
					3	974	0.956	103	381	490	871
					4	567	0.556	35	290	241	531
					5	11	0.011	1	6	4	10
				Totals: d/		1,580	1.550	139	691	749	1,440
				Total Adults: e/		1,552	1.523	139	677	735	1,412
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
065231	1996	10/1-7/97	110,330	TRH	2	8	0.008	1	3	5	8
					3	143	0.140	9	73	60	133
					4	159	0.156	10	87	62	149
065237	1997	06/15/98	104,577	TRH	2	41	0.039	2	21	18	39
					3	805	0.770	50	441	314	755
065238	1997	06/15/98	104,578	TRH	2	61	0.058	2	31	27	58
					3	718	0.687	44	393	281	674
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	2541
065247	1998	06/1-7/99	54,378	TRH	2	35	0.064	5	19	11	30
065248	1998	06/1-7/99	61,516	TRH	2	27	0.044	4	15	8	23
065249	1998	06/1-7/99	61,074	TRH	2	29	0.047	4	16	9	25
065250	1998	10/4-13/99	137,602	TRH	2	144	0.105	22	79	43	122

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 1995. 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 9,168 CWT'ed fall chinook salmon returned to the Trinity River above WCW during the 2000-01 season. We estimated that anglers harvested 267 CWT'ed fall chinook. Escapement of CWT'ed fall chinook was divided between 5,860 fish recovered at TRH and 3,040 estimated to have spawned naturally (Table 2).

1995 brood year

Two fall chinook CWT groups from the 1995 BY completed their life cycle this season, having reached the age of five. No age five returns were observed for the 1995 BY smolt release group 065224. An estimated eight fish released as yearlings (CWT 065226), did return as five-year-olds. This group experienced an estimated return rate of 2.816%, over 21 times that of the smolt releases. Both release types experienced their highest returns as three-year-olds, during the 1998 season (Table 4).

1996 brood year

Yearlings from the 1996 BY have returned at a rate 1.8 times that of their smolt released counterparts thus far. Returns of smolt releases were greatest in 1999 as age three fish. The highest return of yearling chinook was during the 2000 season, as four-year-old fish (Table 4). Fish released from this BY are expected to return as five-year-olds during the 2001 season.

1997 brood year

Returns of 1997 BY fall chinook are complete through age 3 only. Six release groups have returned (5 smolt and 1 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 approximately 4.6 times that of smolts. All BY 1997 releases returned at a very high rate this year, approximately 0.5% for the smolt groups and over 2% for the yearling group (CWT 065241). Fish from both release groups should return as four and five-year-old fish in 2001 and 2002, respectively.

1998 brood year

Five CWT groups (3 smolt and 2 yearling) from the 1998 brood year returned as two-year-olds during the 2000 season. One smolt group, CWT 065244, was not recovered at TRH this year, which precluded estimation of returns upstream of WCW (Table 4). The only group that returned at a rate exceeding 0.1% was the yearling release group 062641. Chinook from BY 1998 are expected to return as adults (age three through five) during the next three seasons.

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 escapements for the two races of chinook are presented in Table 5. We estimate that the 2000-01 run-size of spring chinook was composed of the 19,730 chinook of TRH origin. This represents

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 1997 through 2000.

Release data					Estimated returns						
CWT a/ code	Brood year	Date b/	Number	Site	Age	Run-size	% of release	River harvest	Spawning escapement TRH c/	Natural	Total
065224	1995	06/3-13/96	216,051	TRH	2	40	0.019	1	23	16	39
					3	212	0.098	11	111	90	201
					4	33	0.015	2	17	14	31
					5	0	0.000	0	0	0	0
				Totals: d/		285	0.132	14	151	120	271
				Total Adults: e/		245	0.113	13	128	104	232
065226	1995	10/1-7/96	110,327	TRH	2	61	0.055	2	35	24	59
					3	2,405	2.180	125	1,257	1,023	2,280
					4	633	0.574	8	327	298	625
					5	8	0.007	0	5	3	8
				Totals: d/		3,107	2.816	135	1,624	1,348	2,972
				Total Adults: e/		3,046	2.761	133	1,589	1,324	2,913
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
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
065233	1997	06/15/98	50,947	TRH	2	29	0.057	0	15	14	29
					3	277	0.544	7	177	93	270
065234	1997	06/15/98	49,353	TRH	2	72	0.146	1	37	34	71
					3	322	0.652	9	206	107	313
065235	1997	06/15/98	49,786	TRH	2	37	0.074	0	19	18	37
					3	233	0.468	6	149	78	227
065236	1997	06/15/98	48,382	TRH	2	64	0.132	4	33	27	60
					3	263	0.544	7	168	88	256
065239	1997	06/15/98	18,304	TRH	2	17	0.093	1	9	7	16
					3	95	0.519	3	61	31	92
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
062641	1998	10/4-13/99	334,726	TRH	2	366	0.109	20	234	112	346
065242	1998	06/1-7/99	46,399	TRH	2	22	0.047	1	14	7	21
065243	1998	06/1-7/99	42,659	TRH	2	11	0.026	1	7	3	10
065244	1998	06/1-7/99	49,332	TRH	2	0		0	0	0	0
065245	1998	06/1-7/99	46,391	TRH	2	5	0.011	0	3	2	5
065642	1998	10/4-13/99	16,673	TRH	2	5	0.030	0	3	2	5

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 1995. These fish have reached five years of age and are considered to have completed their life cycle.
e/ The term "adults" includes chinook aged three through five.

Table 5. Expanded run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery-produced, spring and fall chinook salmon returning to the Trinity River during the 2000-01 season. a/

CWT code b/	BY c/	Age	TRH expansion factor d/	Run-size	Expanded run-size e/	Angler harvest	Expanded angler harvest	Spawning escapement					
								TRH f/	Expanded TRH	Natural	Expanded natural	Total	Expanded total
Spring-run chinook salmon													
065223	95	5	5.38	2	11	0	0	1	5	1	5	2	11
065225	95	5	3.97	11	44	1	4	6	24	4	16	10	40
066229	96	4	4.64	204	947	13	60	112	520	79	367	191	886
065231	96	4	3.69	159	587	10	37	87	321	62	229	149	550
065237	97	3	6.18	805	4,975	50	309	441	2,725	314	1,941	755	4,666
065238	97	3	6.18	718	4,437	44	272	393	2,429	281	1,737	674	4,165
065240	97	3	2.85	2,708	7,718	167	476	1,483	4,227	1,058	3,015	2,541	7,242
065247	98	2	6.93	35	243	5	35	19	132	11	76	30	208
065248	98	2	6.28	27	170	4	25	15	94	8	50	23	144
065249	98	2	6.30	29	183	4	25	16	101	9	57	25	158
065250	98	2	2.90	144	418	22	64	79	229	43	125	122	354
				4,842	19,730	320	1,307	2,652	10,806	1,870	7,617	4,522	18,423
Fall-run chinook salmon													
065226	95	5	8.24	8	66	0	0	5	41	3	25	8	66
065230	96	4	9.63	164	1,579	4	39	105	1,011	55	530	160	1,541
065232	96	4	8.13	214	1,740	6	49	137	1,114	71	577	208	1,691
065233	97	3	10.69	277	2,961	7	75	177	1,892	93	994	270	2,886
065234	97	3	11.18	322	3,600	9	101	206	2,303	107	1,196	313	3,499
065235	97	3	10.91	233	2,542	6	65	149	1,626	78	851	227	2,477
065236	97	3	11.5	263	3,025	7	81	168	1,932	88	1,012	256	2,944
065239	97	3	11.02	95	1,047	3	33	61	672	31	342	92	1,014
065241	97	3	2.9	7,182	20,828	194	563	4,591	13,314	2,397	6,951	6,988	20,265
062641	98	2	2.89	366	1,058	20	58	234	676	112	324	346	1,000
065242	98	2	11.18	22	246	1	11	14	157	7	78	21	235
065243	98	2	11.18	11	123	1	11	7	78	3	34	10	112
065245	98	2	11.25	5	56	0	0	3	34	2	23	5	56
065642	98	2	2.95	5	15	0	0	3	9	2	6	5	15
				9,167	38,885	258	1,085	5,860	24,859	3,049	12,942	8,909	37,801

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.

75.6% (19,730/26,083) of the total estimated run upstream of JCW. The fall run, upstream of WCW, was estimated to be composed of 38,885 TRH-produced chinook, which represents 70.1% (38,885/55,473) of the total estimated run.

DISCUSSION

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

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

Hatchery produced chinook returns, both spring and fall races, to the Trinity River this year were dominated by age three fish from the 1997 BY. This would indicate that survival conditions, both in-river and in the marine environment, were exceptional during 1998 through the spring of 2000 period.

The estimated hatchery contribution rates 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 would 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.

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) 19.5%; fall chinook (WCW) 17.6%; TRH springs 23.6%; TRH falls 22.8%. Performing the calculations results in a contribution rate of 82.6% for spring chinook and 77.2%

for fall chinook. These are slightly higher than our reported rates, but within 10%.

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 2000-01.

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
2000-2001 SEASON

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

by

Wade Sinnen and Robert Null

ABSTRACT

Project personnel marked 512,986 1999 brood year coho salmon (*Oncorhynchus kisutch)* with a right maxillary clip prior to their release from Trinity River Hatchery (TRH) in March of 2001. These fish are expected to return as two and three-year-old fish during the 2001-02 and 2002-03 seasons respectively.

An estimated 15,532 coho returned to the Trinity River, upstream of the Willow Creek weir (RK 48), during the 2000-01 season. We estimated the TRH-produced component of this run to be 14,993 fish (96.5%). There was no angler harvest reported this season. Spawning escapement of TRH-produced coho was divided between 4,323 fish which entered TRH and 10,670 fish estimated to have spawned outside of the hatchery facility.

TRH-produced coho from the 1997 brood year are considered to have completed their life cycle this year. An estimated 10,296 coho from the 1997 brood year returned to the Trinity River basin, upstream of Willow Creek weir, the past two seasons (1999-00). This represents 1.99% of the 517,196 coho released from TRH. Estimated TRH-produced coho returns from the 1998 brood year are complete for age two returns only. An estimated 5,289 coho have returned thus far, representing 1.07% 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 (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 2000-01 coho run above WCW. Data compilation and analysis is reliant upon previously reported data in Sinnen and Moore, 2000, Lau et al., 2000, and Lau et al., 1998.

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.

Total coho run-size estimates were stratified by grilse and adults based on trapping percentages observed at WCW this year.

To estimate the TRH-produced component of the run above WCW, we multiplied total coho run-size (performed under TASK 1) times the ratio of marked coho observed at WCW (Total coho run-size X [number of marked coho observed at WCW/ total number of coho at observed at WCW]). The estimate was stratified for grilse and adults by multiplying the ratio of marked coho for each age class observed at WCW times the total run-size for each strata. The remaining coho were considered naturally produced. Age class determinations were based on length frequency analysis of fish trapped at WCW and TRH combined (Task I).

RESULTS

Marking

Staff personnel marked (right maxillary-clip) approximately 513,500 BY 1999 coho, representing the entire 1999 brood year at Trinity River Hatchery. We began marking on January 10, 2001 and finished on March 8, 2001.

We performed a quality control check on March 12, 2001. We measured and examined 4,899 coho, of which 4,893 (99.9%) bore complete right maxillary clips. We therefore estimate that we effectively marked 512,986 of the total coho released (Table 1). These fish ranged in size from 84 to 325 mm fork length (FL), with a mean length of 162 mm (FL). All BY 1999 coho were volitionally released from TRH beginning on March 15, 2001.

Table 1. Estimated number of BY 1999 coho salmon released from Trinity River Hatchery with incomplete and complete right maxillary clips.

Stratum 1/	Percent in sample 2/	Estimated number released 3/
Incomplete Clip	0.1%	514
Effective Clip	99.9%	512,986
Totals:	100.00%	513,500

1/ Incomplete Clip = ≥25% of the right maxillary bone intact
Effective clip = > 75% of right maxillary bone removed

2/ Percent of the total coho check from each stratum

3/ Release estimates based on TRH estimates of total released; deducts hatchery mortality estimates from the total tagged.

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

Total (natural and TRH-produced) coho run-size, above WCW, was estimated at 15,532 fish (TASK 1), of which 5,486 were grilse (age 2) and 10,046 were adults (age 3) for the 2000-01 season. Age classes were determined using length frequency analysis. The size separating grilse and adults was 53 cm, FL (TASK 1). Therefore all coho ≤ 53 cm, FL were considered grilse and larger fish adults.

The percentage of right maxillary-clipped (RM) coho observed at WCW was 96.4% (80/83) for grilse salmon and 96.7% (147/152) for adults. The overall marked coho total observed at WCW for the 2000-01 season was 96.6% (227/235). Therefore, we estimate that the 2000-01 coho run was composed of 539 naturally-produced fish and 14,993 TRH-produced fish (Table 2.).

Since none of the project tags applied to coho salmon at WCW were returned, we estimated that anglers did not harvest any coho during the 2000-01 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 2000-01 return year.

					Spawning escapement	
Strata	BY a/	Age b/	Run-size	Angler harvest	TRH c/	Natural
Naturally	98	2	197	0	10	187
produced	97	3	342	0	54	288
		Totals:	539	0	64	475
TRH	98	2	5,289	0	916	4,373
produced	97	3	9,704	0	3,407	6,297
		Totals:	14,993	0	4,323	10,670
		Grand Totals:	15,532	0	4,387	11,145

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 1997 brood year, TRH-produced coho salmon, was approximately 2% (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 1998 brood year coho is approximately 1%. These fish will return during the 2001-02 season as three-year-olds.

Spawning escapement of 1997 brood year, TRH-produced coho, consisted of 3,788 (36.8%) fish that entered TRH and 6,508 (63.2%) fish estimated to have spawned in natural areas (Table 3).

Estimated escapement of TRH-produced, two-year-old coho, from the 1998 brood year was composed of 916 (17.3%) hatchery spawners and 4,373 (82.7%) 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 1999 through 2000.

Release Data					Estimated Returns				Spawning Escapement		
Clip a/	Brood Year	Date	Number	Site	Age b/	Run-size	% of release	River harvest	TRH c/	Natural	Total
RM	97	3/15-22/99	517,196	TRH	2	592	0.114	0	381	211	592
					3	9,704	1.88	0	3,407	6,297	9,704
					Totals:	10,296	1.99	0	3,788	6,508	10,296
RM	98	3/15-20/00	493,233	TRH	2	5,289	1.07	0	916	4,373	5,289

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 15,523 fish produced under task 1 of this report was based on only 222 effectively tagged fish. Confidence intervals (1-p=0.95) for this estimate are in the 21-30% range. Additionally, the Willow Creek weir was only operational through 14, November, 2000. 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 97 BY coho, estimated at 2%, 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 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 its doubtful that this harvest rate approaches historical harvest rates for all combined fisheries (ocean, commercial, in-river and gill-net).

The reported number of hatchery-produced coho estimated to have spawned in natural areas surpassed those that were counted at TRH, may indicate that TRH-produced coho strayed 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 416 coho salmon carcasses recovered, 384 (92.1%) were RM-clipped. It must be noted that the surveys were only performed in the mainstem and were discontinued after December 15th, 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 four 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.

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ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2000-01 SEASON

TASK 4
SALMON SPAWNER SURVEYS IN THE UPPER TRINITY RIVER

by

Wade Sinnen and Bob Null

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), conducted a salmon spawner survey of the Trinity River from 2 October through 15 December, 2000. 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 6,150 chinook salmon (Oncorhynchus tshawytscha) and 416 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 68.9 cm (range: 38 - 99 cm) and 70.3 cm (range: 38-108 cm). Coho salmon fork lengths averaged 66.9 cm (range: 30-86 cm). Adult chinook salmon composed 95.3% of the spring chinook, 95.6% of the fall chinook, and 92.9% of the coho.

Both races of chinook salmon had male:female sex ratios of approximately 1:1. Male coho were less prevalent than female coho recoveries. The coho sex ratio was 0.88:1 male to female.

We estimated female pre-spawning mortality of spring and fall chinook at 2.9% and 7% respectively. Coho female pre-spawn mortality was estimated at 11.9%.

Based on the recovery of adipose-fin-clipped chinook salmon carcasses, we estimated that 28.0% of the spring-run and 14.9% of the fall-run salmon spawners observed in the mainstem survey 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 Yurok Tribe.

Spawner surveys have been conducted intermittently on the Trinity River since 1955. Spawning surveys prior to 1964 included areas now impassable 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 2 and December 15, 2000. Crews from the YT and CDFG surveyed sections 1-7, the USFWS surveyed sections 8-10. We attempted to survey sections 1-7 on a consecutive basis with each section surveyed at least every other week, however logistical and manpower constraints caused some sections to be excluded on several occasions. Sections 8-10 were surveyed on a bi-weekly basis.

Table 1. Description and Lengths of river zones used in the 2000 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 11111
9	14.8	Big Flat Public Boat Launch - Del Loma
10	13.7	Del Loma - Cedar Flat Recreation Area

The survey was conducted using 12-ft. Avon[1] 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 weir or the Willow Creek weir. 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

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

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 6,150 chinook carcasses throughout an 11 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 416 coho salmon, 402 of which were found in sections 1 and 2.

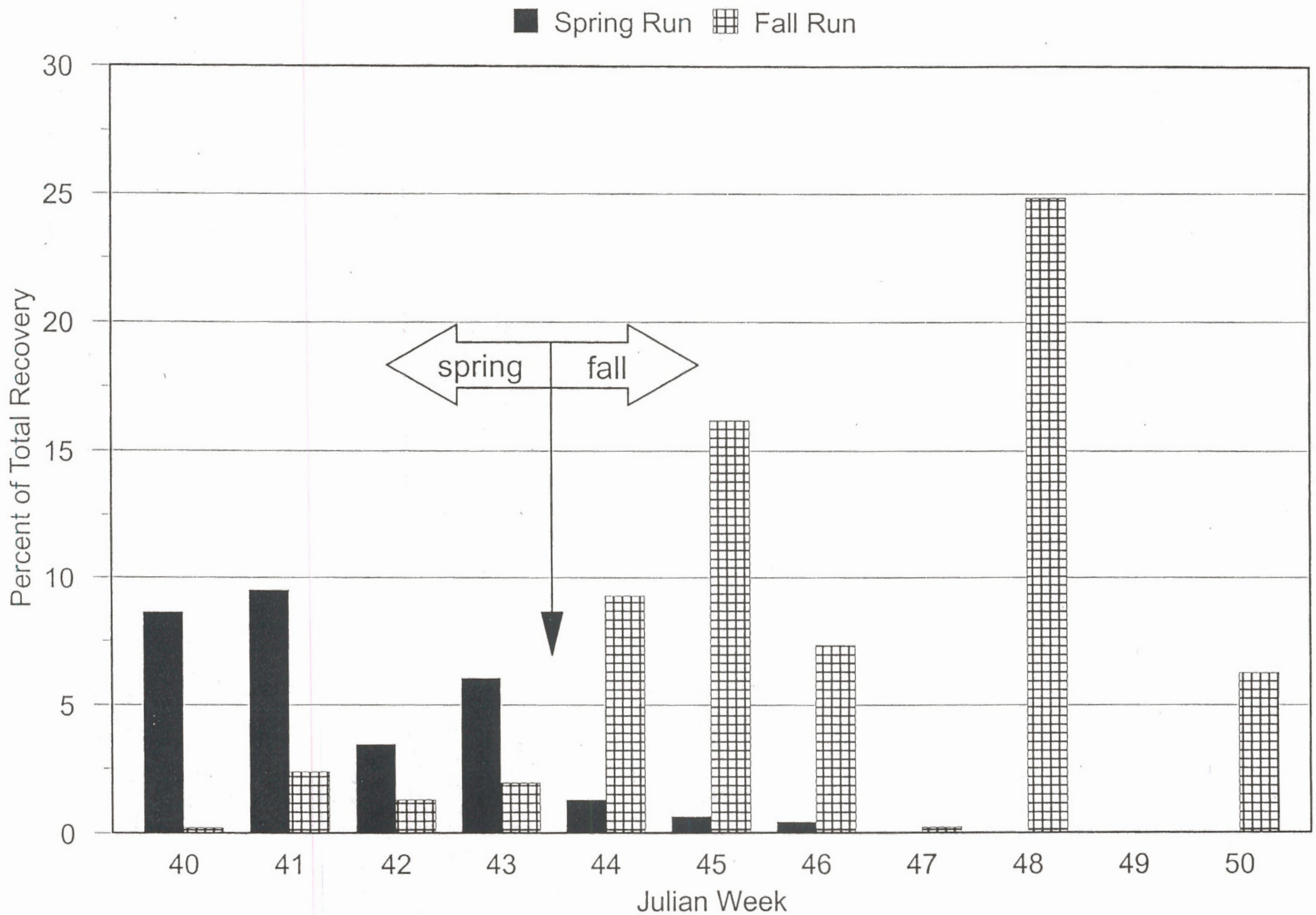


Figure 1. Weekly proportions of coded-wire tagged and Program-marked spring- and fall-run chinook salmon observed in the 2000 mainstem Trinity River spawner survey. The arrow denotes the designated separation between the spring and fall runs.

Table 2. Recovery of all chinook salmon by Julian week and section in the mainstem Trinity River spawner survey during the 2000-01 season.

		Julian week of chinook recovery											
		40	41	42	43	44	45	46	47	48	49	50	
Section	Number of surveys	Number of chinook recovered											Section Totals
1	7	64	313		318	515	702			1,549		878	4,339
2	7	43	168		157	207		200		387		185	1,347
3	7	18		51	32	50	27	44		47		33	275
4	6	17		25	10		27	17			6		102
5	6	1		10		5	6		7		7		36
6	5	2		3		6	1		3				15
7	3	0		4			1						5
8	5	0		1		5		2		0			8
9	5	1		1		5		5		3			15
10	5	0		2		1		5		0			8
	Weekly Totals:	146	481	97	517	794	737	273	10	1,986	13	1,096	6,150

Spring chinook salmon

There were 1,241 chinook classified as spring-run examined during the survey (Table 3), of which, 380 (30.6%) chinook were classified as condition-one. The largest number (695) and greatest density (217.19 fish/km) of spring chinook carcasses were recovered in section 1, followed by section 2, where recovery densities dropped to about 22% of section 1. Less than 10 fish/km were recovered in the remaining 8 sections surveyed. The lowest density (0.10 fish/km) of spring chinook recoveries were observed in section 8, located between the mouth of the North Fork Trinity and Big Flat.

Fall chinook

There were 4,909 fall chinook examined during the survey (Table 4), of which, 930 (18.9%) were classified as condition-one. Similar to spring chinook, the largest number (3,644) and greatest density (1,138.75 fish/km) of fall chinook carcasses were recovered in section 1, followed by section 2, where recovery densities dropped to about 10% of section 1. Less than eight fish/km were recovered in the remaining 8 sections surveyed. The lowest density (0.11 fish/km) of fall chinook recoveries were observed in section 7, located between Junction City and the mouth of the North Fork Trinity.

Table 3. Number, density, incidence of Ad-clips and project tags, and condition of spring chinook salmon recovered during the 2000 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	695	217.19	40	(17)	15	(6)	178	517
2	7.9	368	46.58	10	(5)	6	(2)	110	258
3	10.2	101	9.90	3	(2)	2	(2)	44	57
4	10.4	52	5.00	0		3	(2)	33	19
5	15.7	11	0.70	0		1		6	5
6	7.2	5	0.69	0		0		5	2
7	8.8	4	0.45	0		0		2	1
8	9.7	1	0.10	0		0		0	1
9	14.8	2	0.14	1	(1)	0		2	0
10	13.7	2	0.15	1		0		0	2
Totals:	101.6	1,241	12.21	55	25	27	12	380	861

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 2000 mainstem Trinity River spawner survey.

Section	length (km)	Number observed	Density (fish/km)	Ad-clips a/ Total	Ad-clips a/ C-1	Project tags b/ Total	Project tags b/ C-1	Cond.-1c/	Cond.-2 d/
1	3.2	3,644	1,138.75	78	(25)	131	(28)	631	3,013
2	7.9	979	123.92	8	(3)	22	(4)	192	787
3	10.2	174	17.06	6	(3)	4		54	120
4	10.4	50	4.81	1	(1)	2	(2)	24	26
5	15.7	25	1.59	0		0		11	14
6	7.2	10	1.39	0		1	(1)	3	7
7	8.8	1	0.11	0		0		1	0
8	9.7	7	0.72	0		0		4	3
9	14.8	13	0.88	0		0		8	5
10	13.7	6	0.44	0		0		2	4
Totals:	101.6	4,909	48.32	93	32	160	35	930	3,979

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 417 coho were recovered during the survey, of which 189 were classified as condition-1 and 228 as condition-2 (Table 5). The highest density (90.94 fish/km) of coho salmon carcasses were recovered in section 1. Recovery density of coho in section 2 dropped to slightly more than a third of section 1, 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	291	90.94	272	2	135	156
2	7.9	112	14.18	100	1	45	67
3	10.2	8	0.78	8	0	5	3
4	10.4	1	0.10	1	0	1	1
5	15.7	2	0.13	2	0	2	0
6	7.2	0	0.00	0	0	0	0
7	8.8	0	0.00	0	0	0	0
8	9.7	2	0.21	0	1	1	1
9	14.8	0	0.00	0	0	0	0
10	13.7	1	0.07	1	0	0	1
Totals:	101.6	417	4.10	384	4	189	228

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.

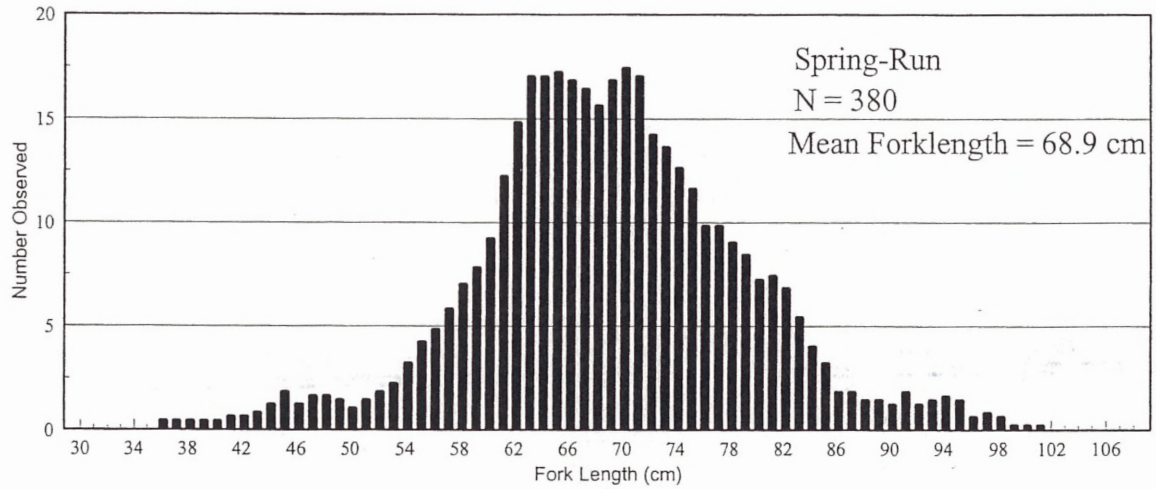
d/ Condition-2 fish are those with both eyes cloudy and considered to have died more than a week previous to recovery.

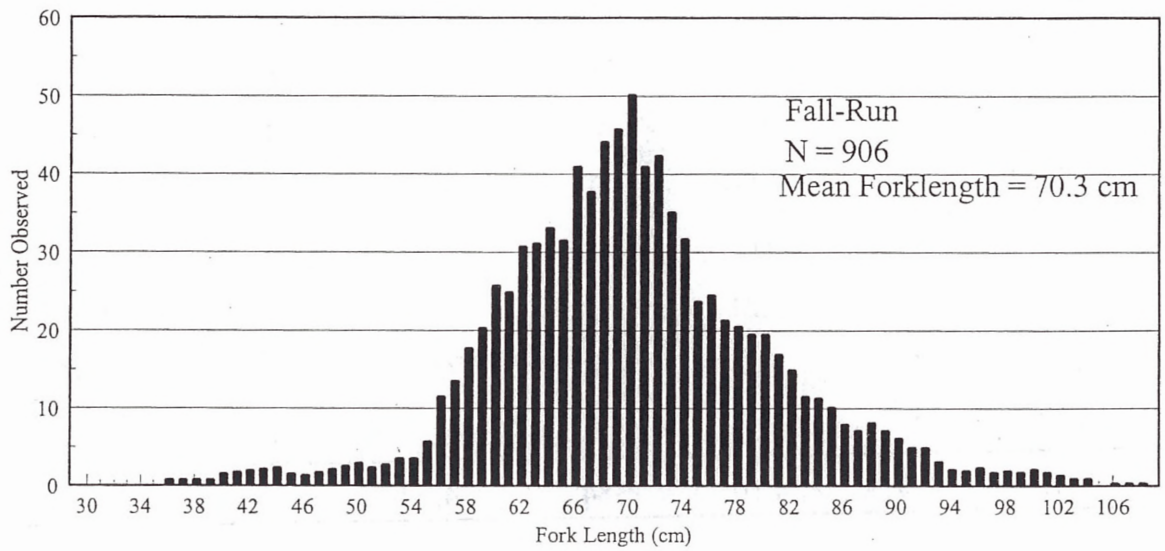
Size composition

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 380 condition-1 spring chinook salmon averaged 68.9 cm and ranged between 38 - 99 cm (Figure 2). Grilse accounted for 4.7% (18/380) of condition-1 spring chinook. Grilse were considered fish $\leq$ 53 cm, FL, based on analysis performed under Task 1 of this report.





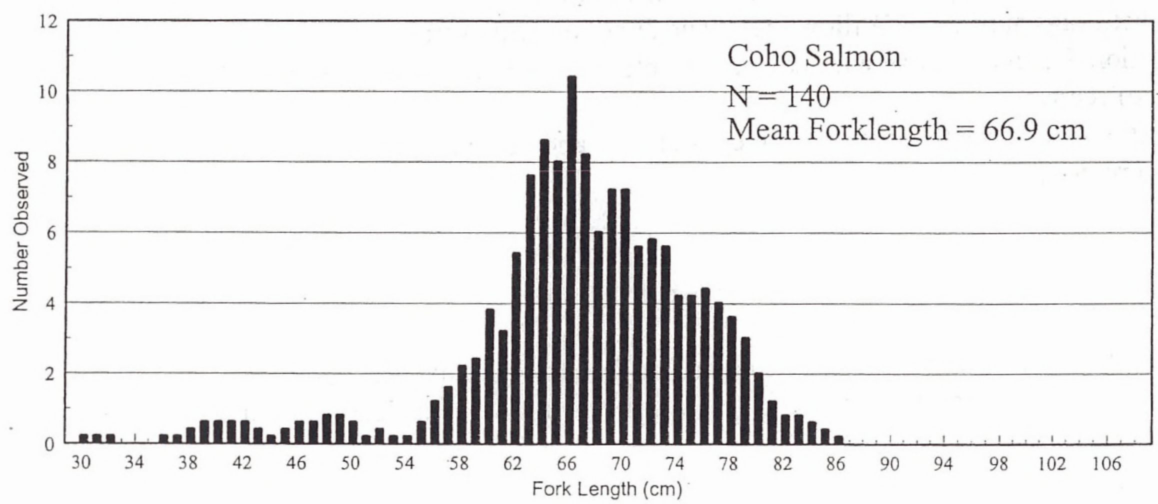


Figure 2. Length frequency histogram for condition-1 Chinook and Coho salmon measured in the mainstem Trinity River during the 2000 adult spawner survey. The number of fish at each fork length is shown as a moving average of five, 1 cm increments.

Fall chinook

Fork lengths of 906 condition-1 fall chinook salmon averaged 70.3 cm and ranged between 38 - 108 cm (Figure 2). Twenty-four condition-1 fish were not measured and were excluded from length analysis. Grilse accounted for 4.4% (40/906) of condition-1 fall chinook. Grilse were considered fish ≤ 55 cm, FL, based on analysis performed under Task 1 of this report.

Coho

Fork Lengths of 140 coho salmon were examined (Figure 2). The average size of coho examined was 66.9 cm and the range of sizes was 30 to 86 cm. Forty-nine condition-1 coho were not measured. Nine (6.4%) coho were considered grilse. Grilse were considered fish ≤53 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 911 adult spring chinook recovered that were measured and sexed, 471 were sexed as males and 440 as females, a male:female ratio of 1.1:1. Two adult fish could not be reliably sexed.

We examined 576 female spring chinook salmon, of which 17 were classified as pre-spawn mortalities, a rate of 2.9%.

Fall chinook

Of the 2,711 adult fall chinook that were measured and sexed, 1,368 were sexed as males and 1,343 as females, a male:female ratio of 1.02:1. The gender of 24 adult chinook could not be reliably determined.

Of the 2,086 female fall chinook carcasses examined, 146 were classified as un-spawned, a rate of 7.0%.

Coho salmon

We measured 272 adult coho during the survey, of which 141 were males, 129 were females and 2 were of unknown sex. The male:female ratio was 1.09:1.

A total of 218 female coho carcasses were examined for spawning success, of which 26 (11.9%) were classified as un-spawned.

Incidence of Program marked salmon

Spring chinook

A total of 27 project spaghetti tags were recovered from spring chinook (Table 3), of which 12 were recovered from condition-1 fish. Eight of the tags were applied at Willow Creek weir and 19 at Junction City weir. Slightly over half of all tags were recovered in section 1.

Fall chinook

A total of 160 project spaghetti tags were recovered from fall chinook (Table 4), of which 35 were found on condition-1 fish. Chinook tagged at Willow Creek weir accounted for 137, while chinook tagged at Junction City weir accounted for 23. Approximately 82% of all tags were recovered in section 1.

Coho salmon

Four 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).

Incidence of hatchery produced chinook and coho salmon

Spring chinook

Twenty-five (6.6%) of the condition-one and 55 (4.4%) of all spring chinook bore Ad-clips. The majority (50/55) of Ad-clipped chinook were recovered in sections 1 and 2 (Table 3). Coded-wire tags (CWT's) were recovered from 22 and 41 of the total and condition-1 fish respectively (Table 6). Twenty-six (63.4%) of the 41 total CWT's were from Trinity River Hatchery (TRH) produced, three-year-old spring chinook and ten (24.4%) were from four-year-olds.

Fall chinook

Thirty-three (3.4%) of the condition-one and 93 (1.9%) of all fall chinook bore Ad-clips. The majority (78/93) of the Ad-clipped fish were found in section 1 (Table 4). CWT's were recovered from 37 and 24 of all and condition-1 fish respectively (Table 6). Three-year-old fall chinook accounted for 86.5% (32/37) of all CWT's.

Coho

The incidence of right maxillary clips (RM) was found on 384 of 417 (92.1%) coho examined (Table 5). We combined both condition-1 and -2 fish in this analysis because RM clips, unlike adipose fin clips, remain recognizable well after the fish has died and are therefore subject to less observer error.

Table 6. Tag code, brood year, age, race and numbers recovered for coded -wire tagged chinook salmon during the 2000 Trinity River spawner survey.

				Recovery Period a/			
				Spring		Fall	
Tag Code	Brood Year	Age	Race	Total	C-1	Total	C-1
065229	1996	4	Spring	7	2	0	0
065230	1996	4	Fall	0	0	1	1
065231	1996	4	Spring	3	2	0	0
065232	1996	4	Fall	0	0	2	2
065233	1997	3	Fall	0	0	4	1
065234	1997	3	Fall	1	0	0	0
065235	1997	3	Fall	1	1	3	1
065236	1997	3	Fall	0	0	6	6
065237	1997	3	Spring	9	6	0	0
065238	1997	3	Spring	7	3	0	0
065240	1997	3	Spring	10	6	2	2
065241	1997	3	Fall	2	1	18	11
065248	1998	2	Spring	1	1	0	0
065249	1998	2	Spring	1	0	0	0
Shed Tag				14	3	57	9
			Totals:	55	25	93	33

a/ The recovery period for spring chinook was October 2- October 28; fall chinook recovery period was October 29- December 15, 2000. Total and condition-1 (C-1) recoveries shown.

DISCUSSION

The spawner survey conducted this year included both carcass recovery and redd enumeration and mapping. Additionally, sections 8-10 (North Fork Trinity confluence downstream to Cedar Flat) were added this season. 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 are not directly comparable. Redd mapping will be the best method for identifying spawner use 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, Zuspan 1996, 1997, and Lau et al 1998), 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 half 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). 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.

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 is presented in appendix 1. The proportion of spring chinook grilse observed in the spawner survey was 4.7%, identical the observed proportion at Trinity River Hatchery (TRH) and lower than the observed proportion (8.3%) at Junction City weir (JCW).

For fall chinook, the grilse proportion (4.4%) observed in the spawner survey was intermediate between proportions observed at Willow Creek weir (WCW) and TRH, which were 5.6% and 3.8%, respectively (appendix 1).

The proportion (6.4%) of grilse coho 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.

Adult sex composition and female pre-spawn mortality

For both races of chinook and coho salmon, adult males slightly out numbered females. Previous studies on the Trinity presented in Aguilar (1996), suggest this is somewhat unusual 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 1987-2000 period (Appendix 2). This year's pre-spawn mortality rates of 2.9% and 7.0% for spring and fall chinook respectively are intermediate as compared to these earlier studies. 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 2000 season, the percentage of tags found on chinook and coho during carcass surveys was lower than observed at the hatchery (Appendix 3). The difference was less than 1% for spring chinook and coho and 2.2% for fall chinook. Several factors may account for this. Hatchery fish may be more vulnerable to capture at the weirs for several potential reasons; 1) they are less "trap shy" than their natural counterparts, 2) their run timing is less protracted and inclusive of weir operation times, or 3) the number of hatchery fish greatly out numbers naturally produced fish, which may increase their sampling probability. Also, it is known that the public routinely finds and sends tags for processing that they have found on dead fish in the river. Since a portion of our tags offer a monetary reward, it may be that the public scours the river for these tags. If they remove tags and leave the fish in the river (highly likely) our tag percentage estimates will be biased low.

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 (6.6%) of spring chinook found in the mainstem Trinity River were lower than at either JCW (19.5%) and TRH (23.6%). Using the above estimation method and assumption, we estimate that hatchery-produced spring chinook, upstream of Junction City weir composed 82.6% (19.5/23.6) of the total run and 28% (6.6/23.6) 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 75.6% of the spring run upstream of Junction City was composed of hatchery produced spring chinook. 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 Ad-clip rate (3.4%) of fall chinook found in the mainstem spawner survey was also lower than that observed at WCW (17.6%) and TRH (22.8%). We estimate that 77.2% (17.6/22.8) of the fall chinook, upstream of Willow Creek weir, were of hatchery origin and that 14.9% (3.4/22.8) of mainstem spawners were of hatchery origin. Using task 2 results, we estimated that 70.1% of chinook above Willow Creek weir were of hatchery origin.

The incidence of coho RM-clips was greater than 90% at all sites, which indicates that the Trinity River coho population, upstream of Willow Creek weir is almost entirely composed of 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 2000-01 season.

Spring chinook

	Junction City weir	Trinity River Hatchery	Spawner survey
Grilse a/	50	571	18
Adults	554	11,594	362
% Grilse	8.3%	4.7%	4.7%

a/ Spring chinook grilse were ≤ 53 cm, FL; larger fish were adults

Fall chinook

	Willow Creek weir	Trinity River Hatchery	Spawner survey
Grilse a/	179	1,028	40
Adults	3,010	26,018	866
% Grilse	5.6%	3.8%	4.4%

a/ Fall chinook grilse were ≤ 55 cm, FL; larger fish were adults

Coho

	Willow Creek weir	Trinity River Hatchery	Spawner survey
Grilse a/	83	926	9
Adults	152	3,461	131
% Grilse	35.3%	21.1%	6.4%

a/ Coho grilse were≤ 53 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 2000.

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)							2076	32	1.5
1956 a/	Weber (1965)							3438	219	6.0
1963 a/	LaFaunce (1965)							4953	328	6.2
1968 a/	Rogers (1970)							1494	124	7.7
1969 a/	. Smith (1975)							1889	23	1.2
1970 a/	Rogers (1973)							632	34	5.1
1971 b/	" (1982)									
1972 a/	Miller (1972)							791	110	12.2
1973 a/ c/	" (1973)									12.0
1974 a/ c/	" (1974)									9.1
1976 a/ c/	" (1976)									8.4
1978 a/ c/	" (1978)									7.2
1979 a/ c/	" (1979)									6.0
1980 a/ c/	" (1980)									36.5
1981 a/ c/	" (1981)									2.6
1982 a/ c/	" (1982)									1.5
1984 b/	" (1984)									
1985 b/	" (1985)									
1987 c/	Stempel (1988)			49.9			18.8			30.8
1988	Zuspan (1991)	11	27	71.1	479	372	43.7	490	399	44.9
1989	Zuspan (1992a)	194	327	62.8	1546	464	23.1	1740	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 (1996)	202	2	1.0	380	12	3.1	582	14	2.3
1995	Zuspan (1997)	2711	517	16.0	8502	3188	27.3	11213	3705	24.8
1996	Zuspan (1997)	1243	42	3.3	1058	90	7.8	2301	132	5.4
1997	Lau/Moore (1998)	1263	34	2.6	491	28	5.4	1754	62	3.4
2000	current study	559	17	2.9	1,940	146	7.0	2,499	163	6.1

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 2000-01 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	8	380	2.1%	6	930	0.6%	-----	-----	-----
WCW	4	380	1.0%	29	930	3.1%	1	190	0.5%
Totals:	12	380	3.1%	35	930	3.7%	1	190	0.5%
	Trinity River Hatchery								
JCW	300	12,164	2.5%	123	27,046	0.4%	-----	-----	-----
WCW	32	12,164	0.3%	1,486	27,046	5.5%	62	4,387	1.4%
Totals:	332	12,164	2.8%	1,609	27,046	5.9%	62	4,387	1.4%

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 2000-01 season.

	Spring chinook			Fall chinook			Coho		
Site a/	Ad-clips	Total	% Ad-clips	Ad-clips	Total	% Ad-clips	RM-clips	Total	% RM-clips
JCW	118	604	19.5%	-----	-----	-----	-----	-----	-----
WCW	-----	-----	-----	562	3,192	17.6%	227	235	96.6%
TRH	2,873	12,165	23.6%	6,156	27,046	22.8%	4,323	4,387	98.5%
TR b/	25	380	6.6%	32	930	3.4%	384	417	92.1%

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
2000-2001 SEASON

TASK 5
VISUAL ESTIMATES OF ABUNDANCE AND DISTRIBUTION OF SPRING-RUN CHINOOK SALMON AND SUMMER STEELHEAD POPULATIONS WITHIN THE SOUTH FORK TRINITY RIVER BASIN

by

Patrick Garrison

TASK OBJECTIVES

To determine the abundance and distribution of spring chinook and spring (summer) steelhead runs in the South Fork Trinity River (SFTR) basin.

ABSTRACT

Snorkel surveys were conducted during two days in late August on selected areas of the SFTR basin to count spring-run chinook (*Oncorhynchus tshawytscha*) and summer steelhead (*O. Mykiss*). A total of 256 chinook salmon and 76 adult steelhead were enumerated by teams of surveyors.

INTRODUCTION

During FY 00-01, we conducted snorkel surveys to count adult spring chinook and summer steelhead in the South Fork Trinity River and in Hayfork Creek. This year marks the tenth consecutive year of performing snorkel surveys in the SFTR basin. This year's effort was a cooperative effort with personnel from various participating agencies, including the U.S. Forest Service (USFS), Hoopa Valley Tribal Fisheries Department, U.S. Fish and Wildlife Service (USFWS), Natural Resource Conservation Service (NRCS), and South Fork Coordinated Resource Management Program (SFCRMP).

METHODS

Teams of snorkel surveyors examined portions of the South Fork Trinity River (SFTR) basin to count spring run chinook salmon and summer steelhead from August 22 through August 23,

2000. We surveyed a total of 15 sections on the SFTR from the East Fork of the SFTR downstream to the confluence with the Trinity River and three adjacent sections of Hayfork Creek from approximately RK 21.0 downstream to the confluence with the SFTR (Figure 1). Surveys were conducted in a downstream manner.

RESULTS

We observed a total of 256 chinook salmon and 76 adult summer steelhead during the snorkel survey (Table 1). Section I was not surveyed due to poor visibility caused by the active discharge of the Hitchcock Creek slide. Within that section, one adult chinook was seen from the bank at the confluence of Butter Creek. Section N was not surveyed due to safety and logistical concerns, and was left unsurveyed when no fish were seen in the lower half of Section M.

According to notes taken by the snorkel survey crews, the majority of adult spring chinook and summer steelhead were observed holding in deep pools. Spring chinook were reported to be in excellent condition. Fish also appeared to be larger this year than last. Salmon and steelhead numbers were higher than in most recent years. The steelhead count was the second highest of the past ten years and spring chinook numbers observed increased over the past two years (Table 2).

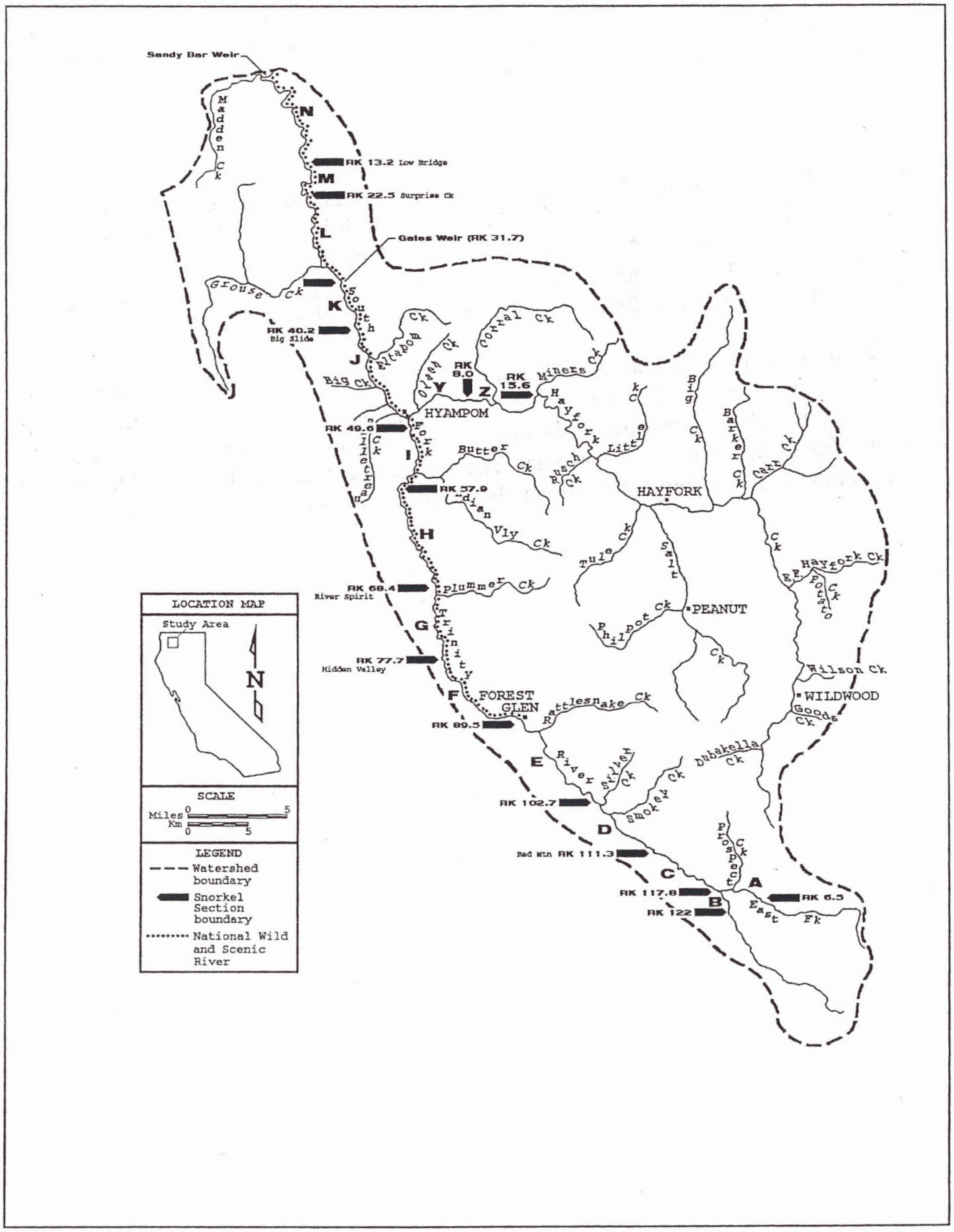

Figure 1. South Fork Trinity River Chinook Salmon Snorkel Survey Sections.

Table 1. South Fork Trinity River spring chinook and summer steelhead snorkel survey results by section.

Section	Adult Chinook	Grilse [1]	Steelhead	½ lb Steelhead[2]
A (East Fork South Fork Trinity River)	0	0	0	0
B (Raspberry Creek to East Fork confluence)	0	0	2	0
C (East Fork confluence to Red Mountain Creek)	3	0	6	5
D (Red Mountain Creek to Silver Creek)	20	0	5	1
E (Silver Creek to Scott's Flat)	28	12	10	19
F (Scott's Flat to Hidden Valley Ranch)	73	8	4	26
G (Hidden Valley Ranch to River Spirit)	29	0	11	6
H (River Spirit to Hitchcock Creek)	20	0	3	4
I (Hitchcock Creek to Lover's Leap)	1(at Butter Crk.)	not surveyed		
J (Lover's Leap to Big Slide campground)	9	0	0	3
K (Big Slide campground to old Gates weir)	18	2	5	5
L (Old Gates weir to Surprise Creek)	1	1	3	2
M (Surprise Creek to Low Bridge)	2	0	0	3
Total South Fork Trinity	**204**	**23**	**49**	**74**
Hayfork Creek				
X (Nine Mile Bridge to Miners Creek)	2	2	12	17
Y (Miner's Creek to Bar 717 Ranch)	23	0	14	5
Z (Bar 717 Ranch to Mouth)	2	0	1	19
Total Hayfork Creek	**27**	**2**	**27**	**41**

[1] Grilse=chinook salmon <55 cm long (FL).
[2] ½ lb steelhead < 42 cm long (FL)

Table 2. Total numbers of adult summer steelhead and spring chinook counted in the South Fork of the Trinity River and Hayfork Creek during previous snorkel surveys.

Year	Total Adult Steelhead	Total Chinook
1991	8	66
1992	21	166
1993	23	284
1994	22	243
1995	42	579
1996	11	1097
1997	95	655
1998	37	172
1999 [1]	38	175
2000	76	256

[1] 1999 numbers are incomplete due to excessive turbidity caused by Hitchcock Creek slide. Five reaches were not surveyed.

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT
2000-01 SEASON

TASK 6
ANGLER CREEL SURVEYS IN THE LOWER KLAMATH RIVER

By
Sara Borok

ABSTRACT

During August 6th through November 4th, 2000, a creel census was conducted in the lower (Mouth to Coon Creek Falls) Klamath River to determine numbers of upstream migrating chinook salmon, coho salmon and steelhead trout harvested by sport anglers. The fall-run chinook quota was met on September 2nd, 2000 with a total of 3,276 (2,196 adults and 1,080 grilse) chinook salmon and 130 (72 adults and 50 half-pounders) steelhead harvested. Seasonal summaries and comparisons of angler effort and catch, catch timing, length frequencies, species composition, hatchery fin clips and tag recoveries are presented. The entire basin (Klamath-Trinity) quota for this season was 4,200 adult fall-run chinook salmon.

INTRODUCTION

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

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

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

Although sport angling has been popular throughout the Klamath River for many decades angler harvest data of anadromous salmonids within the Klamath River system prior to 1978 is limited.

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

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

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

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

The numbers of fall chinook salmon entering the Klamath 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 (Boydstun 1979, 1980; Lee 1984a,1984b, 1985, Lau 1992,1993,1994,1995,1996,1997; Pisano 1998; Borok 1999).

This report covers the period July 1, 2000 through June 30, 2001. 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. Creel sampling took place in the lower 30 miles of the river from August 6th to November 4^{th}, 2000. A section between Johnsons Riffle and Weitchpec was surveyed by the Yurok Tribe. Results are included within creel results. Trinity River fall chinook angler harvest data during the corresponding time is contained in a separate CDFG report.

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

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

The Fish and Game Commission establishes all angling regulations and quotas for the Klamath River. These regulations are enforced by the CDFG. The Commission adopts the quota recommendations made by the Pacific Fishery Management Council. For the 2000 season, the in-river sport chinook quota was 8% of the overall allowable harvest, or 15% of the non tribal fisheries harvest (4,200 adults).

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. The ten percent was included in the 4,200 fish thus, making the actual number to be harvested 3,780 fish. This number 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). These percentages worked out to 1,890 fish for the Lower Klamath River, 644 for the upper Klamath River and 623 for each section on the Trinity River (1,246 total for Trinity River).

During the 2000 season, fishing regulations allowed anglers to harvest one adult chinook salmon and one grilse chinook salmon (or two grilse) 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 fall-run chinook adult/grilse cutoff. No harvest of Coho salmon was permitted. Regulations stated: one "hatchery" trout or one "hatchery" steelhead could be harvested. This eliminated the 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 2000 season fishing at the mouth was closed when 15% of the basin quota was met, which occurred on August 29th , 2000. Very little shore angling actually took place in Area 1 this year.

All boat angling effort in the estuary originated from ten resort boat docks in the estuary area. Two resort docks and the public launch 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. Two resort boat docks and a public boat launch ramp , also located in the lower 5 km, were the principal boat facilities in the area . Creel sampling occurred at all of 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 two boat docks 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 docks 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 four years. It is checked sporadically, but no effort was recorded.

The Yurok Tribe received funds to assist us in our creel census of the lower 34 miles of the Klamath River. They surveyed the section from Johnsons Riffle up to Coon Creek Falls. Because of low water this year, most anglers entering the river at the Roy Rook Boat Ramp did not take their boats over the riffles around Johnson. The methods used to survey this section of river were identical to the methods used in our Lower Creel surveys. It was suggested that the Tribal Technicians use the same methods employed by our Upper Klamath River Crew, but they were able to interview all anglers encountered on a given sample day. Confusion on scheduling lead to slightly different sampling days(a few extra). But for the most part this upper portion of Area 2 was sampled the same days as the rest of Area 2. The upper portion of Area 2 is reported separately from the rest of Area 2

Creel Census Methods

Study methods and procedures used in the Lower Klamath Creel (Area 1 and 2) during the 2000 seasons were essentially the same as those described for the 1984-1987 seasons (Hopelain 1989, unpublished). Data is presented in Standard Julian Week (JW) format throughout this report (Appendix 1).

Daily Real Time Harvest Estimates and Projections

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

As we neared the in-river quota, I computed the daily estimates using the estimate procedure described above. I then calculated the harvest projections by using an estimate formula for each area and then projecting harvest forward based on current and projected data. For 2000, the quota was met on September 2. This procedure was very accurate for the next day harvest in each area. However, the three day harvest projections were off either high or low. The purpose of the three-day projection was to alert us when a trend was occurring that could lead to over harvesting if the catch rate continued.

RESULTS

The creel census for the lower Klamath River began on August 6 and ran through November 4 (JW 32 through 44)of 2000. Chinook salmon harvested in the creel fishery ranged in size from 34 to 98 cm in fork length (FL) and averaged 64.6 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 58 cm FL (Figure 1A) instead of the 55cm separation used during the creel season. This adjustment accounted for only 27 fish being re-classified from adults to grilse. All numbers sited in this report are based on the adjusted adult -grilse separation.

This adult-grilse separation is the same as the 58 cm FL break off observed in the 1999 season. The grilse component of the angler harvest ranged in size from 34 to 58 cm FL and averaged 48 cm FL. The adult chinook salmon component of the harvest ranged in size from 59 to 98 cm FL and averaged 72.9 cm FL (Figure1A). When discussing the 2000 season, I define adult chinook salmon as a fish with a fork length of 59 cm and larger and a grilse as fish 58 cm and smaller. This separation is slightly larger than that used by Trinity River Hatchery and the Willow Creek Weir. They made the separation at 55 cm FL (personnel communication Wade Sinnen). This separation in the sport fishery is slightly larger than observations at Iron Gate Hatchery (Figure1B). From recovery operations at Iron Gate Hatchery we determined the grilse-adult break off at 57 cm FL.

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.

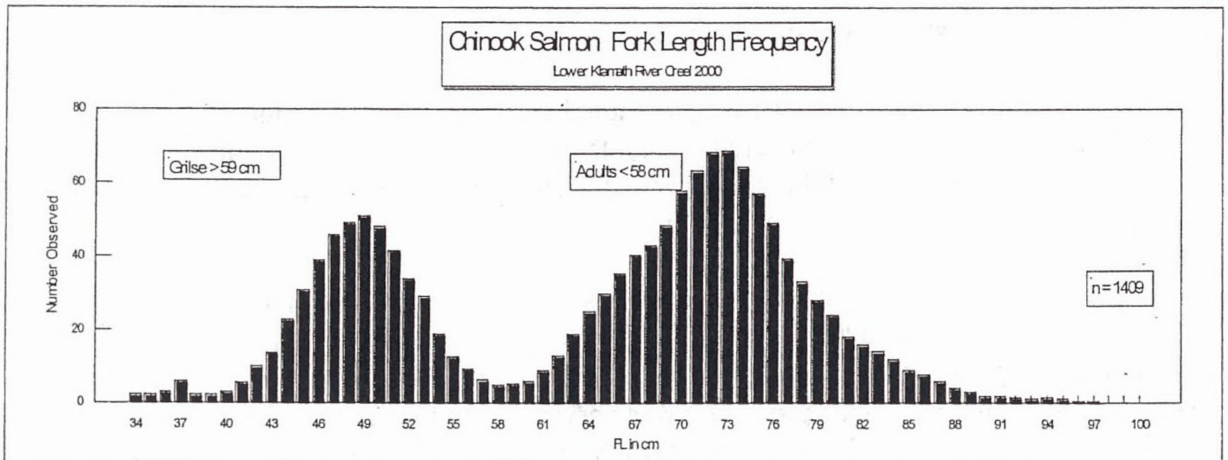

Figure 1A. Fork Length Frequency of Chinook Salmon Harvested in the Lower Klamath River Creel During the 2000 Season.

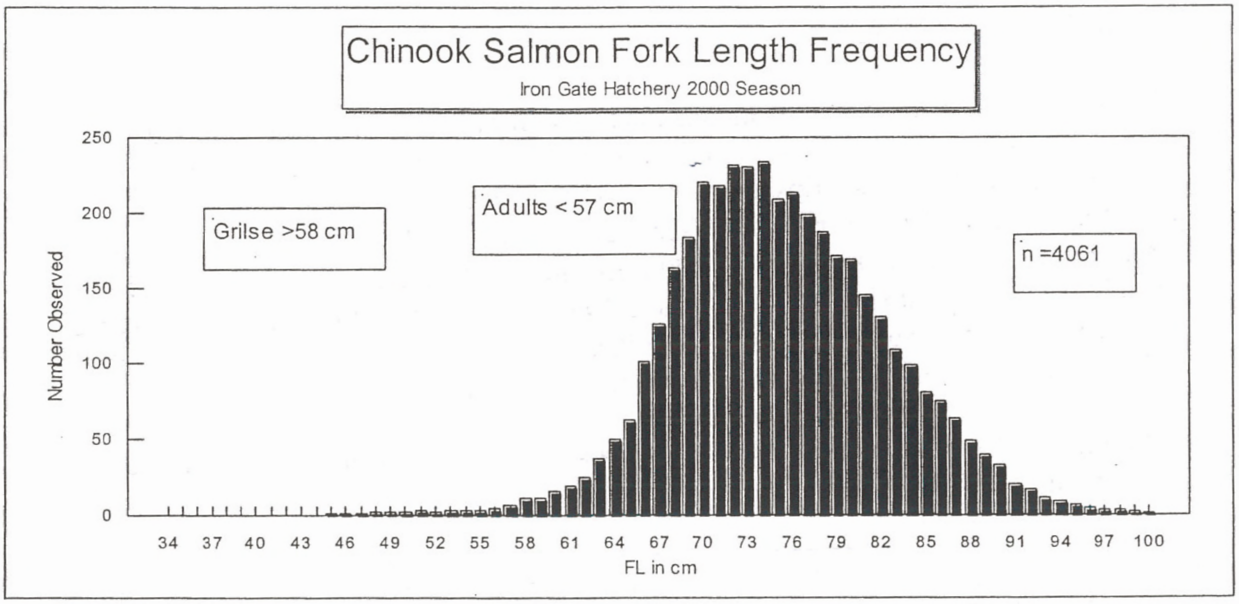

Figure 1B. Fork Length Frequency of Chinook Salmon Sampled at Iron Gate Hatchery During the 2000 season.

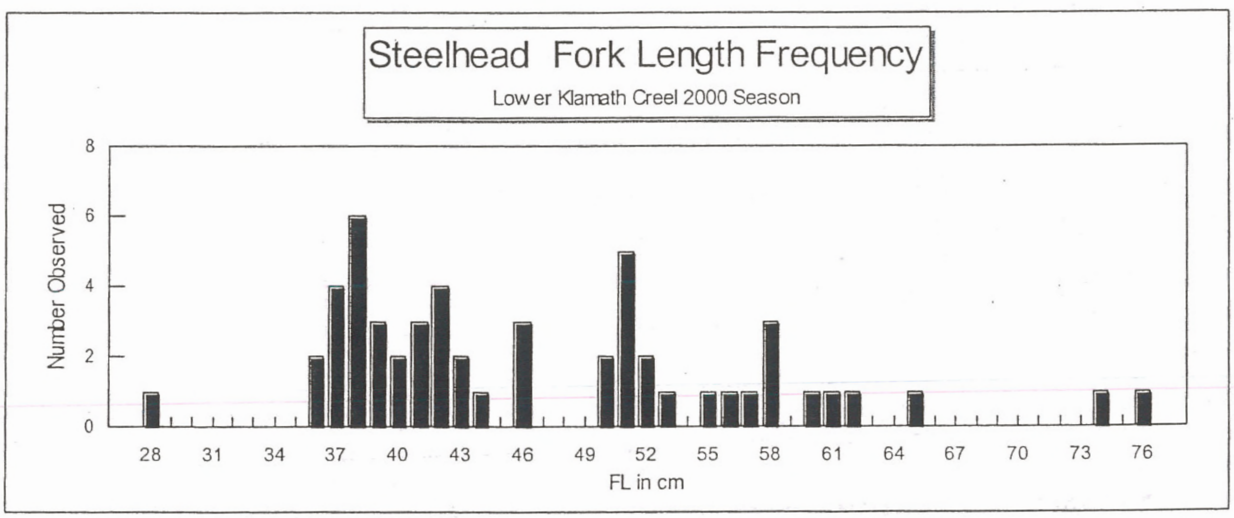

Figure 1C. Length Frequency of Steelhead Caught in the Lower Klamath River Creel during the 2000 Season.

Estimated Angler Effort and Harvest

During the 2000 season, I estimate that anglers made a total of 14,150 trips in both Areas combined. Of the 14,150 trips 6,264 were in Area 1, 6,938 were in Lower Area 2 and 948 were in Upper Area 2 (Table 1). These trips resulted in a total of 57,184 fishing hours. As in previous seasons, boat anglers out-numbered shore anglers in both Areas (Table 1). I estimate the total harvest at 3,276 chinook salmon (1,080 grilse and 2,196 adults), 130 steelhead (58 half-pounders and 72 adults). Adults composed 67 % (2,196/3,276) of the estimated chinook harvest. Adult steelhead trout composed 69.9 % of the steelhead harvest (72/130; Table 1). The Upper Area 2 only accounted for 0.09 % of the adult chinook harvested.

Table 1. Summary of Estimated Angler Effort and Harvest During the 2000 Lower Klamath River Creel Census.

Site	Angler		Steelhead		Chinook Salmon	
Location	Trips	Hours	<42cm	>41cm	<59cm	>58cm
Area 1 -Mouth to Highway 101 Bridge						
Shore	505	1,371	9	0	2	15
Boats	5,760	18,645	9	2	106	1,175
Total	6,264	20,016	18	2	108	1,190
Lower Area 2 - Highway 101 to Johnsons Bar						
Shore	1,385	4,114	8	10	17	49
Boats	5,553	28,904	13	58	955	955
Total	6,938	33,017	21	68	972	1,004
Upper Area 2 - Johnson Bar to Coon Creek Falls						
Shore	699	3,054	5	0	0	2
Boats	249	1,097	14	2	0	0
Total	948	4,151	19	2	0	2
Grand Total	14,150	57,184	58	72	1,080	2,196
1999 season	11,852	45,109	9	38	894	1,226

2000 Harvest and Effort Patterns

For the 2000 season, the number of angler trips exceeded the 1999 season but fell below the previous seven seasons. The average length of each trip expanded to 4.0 hours per trip. The typical angler trip in the past averaged closer to three hours (Table 2).

During the 2000 season, Area 2 anglers harvested more fish than Area 1 (Table 1). Anglers (boat and shore) in Area 2 accounted for 60.0% (1,978 / 3,276) of the chinook salmon and 83.8% (109 /130) of the steelhead harvested. Anglers in Area 1 harvested the remainder. Area 2 anglers accounted for 55.7% (7,886/ 14,150) of angler trips and 64.9% of the angler hours (37,168/ 57,184).

Anglers in Area 1 harvested 54.2%, slightly more adult chinook than Area 2. Most of these fish were harvested by boat anglers as the mouth was not conducive to shore fishing this season.

As in past seasons, boat anglers interviewed at the Roy Rook Boat Ramp accounted for a large percentage of the total harvest and effort. These anglers had greater fishing success than their percentage of trips would suggest. Roy Rook boat anglers caught 47.3% (1,553/ 3,280) of the total chinook salmon and 48.4% (63 / 130) of the total estimated steelhead harvested (Table 1). Meanwhile, these anglers accounted for 32.3% (4,577/ 14,150) of the total estimated trips and 44.3% of the total estimated hours (25,351 / 57,184, Table 1). During peak hours (1100 to 1400), we needed to station two to four creel technicians at this site to interview the anglers.

In both Areas combined, boat anglers were more successful in catching fish than shore anglers. As a group, boat anglers harvested 96.9% (2,129/ 2,195) of the adult and 98.1% (1,065/1,085) of the grilse chinook salmon 62.0% (36/ 58) of the halfpounders and 86.1% (62/72) adult steelhead. Shore anglers harvested the remainder (Table 1).

Table 2. The Number of Angler Trips, Hours, and Average Length of Trip in the Lower Klamath River Sport Fishery for the Last Nine Seasons, 1992-2000.

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	3.3
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

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. The numbers reported here show a different trend than that of last season. I estimated anglers released 8,103 half-pounders, 1,129 adult steelhead, 757 grilse, and 6,253 adult chinook salmon. In addition, 17 grilse and 43 adult coho salmon were released 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 where released while anglers fished for grilse salmon (Table 3).

In Area 1 during the 2000 season, anglers released 912 chinook (145 grilse and 767 adults), 192 steelhead (139 half-pounders and 53 adults) and 0 coho. Of these 760 chinook, (93 grilse and 667 adults) were released after the quota was met. Only 1.8% of the released chinook were caught by shore anglers, 98.2% were released by boat anglers (Table 4). The majority of steelhead released were also by boat anglers.

Area 2 anglers released 5,791 chinook (307 grilse and 5,484 adults), 5,075 steelhead (4,083 half-pounders and 992 adults) and 60 coho (17 grilse and 43 adults). Of the adult chinook released in Area 2, 96.2% were released after the quota was met. In Areas 1 and 2 combined, 95.0% of the adult chinook were released after the quota was met. Suggesting the majority of fish passed through the river after the quota was met.

Anglers in the upper portion of Area 2 (Johnsons Bar to the falls at Coon Creek) caught and released the majority of half-pounders (47.8%) and grilse (42.4%) chinook salmon. This area is used mostly by fly fishermen. Anglers fishing out of Roy Rook boat ramp had the next highest numbers of catch and released fish. This is explainable as the majority of guides who promote catch and release fishing put their clients in the water there.

Table 3. Number of Chinook Salmon and Steelhead Caught and Released from the Lower Klamath River Creel For the Last Four Seasons 1997-2000.

Year	Chinook Grilse	Adults	Steelhead <42	>41
97	34	1,015	1,479	2
98	330	1,317	2	393
99	1,897	1,164	1,189	346
00	757	6,253	8,103	1,129

Table 4. Summary of Estimated Catch and Releases During the 2000 Lower Klamath River Creel Census.

Site	Angler		Steelhead		Chinook Salmon	
Location	Trips	Hours	<42cm	>41cm	<59cm	>58cm
Area 1 -Mouth to Highway 101 Bridge						
Shore	505	1,371	58	7	50	5
Boats	5,760	18,645	81	46	95	763
Total	6,264	20,016	139	53	145	767
Lower Area 2 - Highway 101 to Johnsons Bar						
Shore	1,385	4,114	1,624	191	52	124
Boats	5,553	28,904	2,459	801	255	5,360
Total	6,938	33,017	4,083	992	307	5,484
Upper Area 2 - Johnson Bar to Coon Creek Falls						
Shore	699	3,054	2,998	80	305	2
Boats	249	1,097	883	4	0	0
Total	948	4,151	3,881	84	305	2
Grand Total	14,150	57,184	8,103	1,129	757	6,253
1999 season	11,852	45,109	1,189	346	1,897	1,164

Run Timing

Julian Week 35 was the peak week for harvest of adult fall-run chinook (Figure 2). The quota was met at the end of this week (September 2, 2000). This was just the beginning of the run, as just over 2000 adult chinook were released during Julian week 36 and just over 1500 adults were released during Julian Week 37. The angler effort dropped off in Julian Week 38, but another smaller pulse of fish entered the river during Julian week 39 as indicated by the number of fish released during that week (Figure 3). Grilse chinook lagged behind the adults by a couple of weeks. Anglers targeted the grilse after the adult quota was met. The peak for grilse released was Julian Week 37 (Figure 3) and the peak for grilse harvested was Julian week 39 (Figure 2).

In Area 2 more adult steelhead (68) were harvested than half-pounders (23). The peak of the adult steelhead harvested was Julian week 36 and for half-pounders it was Julian week 35. The peak of steelhead (both half-pounders and adults) released was Julian week 36 (Figure 4).

The upper portion of Area 2 was primarily used by fly fishermen who targeted the half-pounder run this season. Regulations stating that only hatchery steelhead could be kept worked well to reduce the number of steelhead harvested. Only 21 steelhead were harvested in this portion of the river. The peak for half-pounders released was during Julian week 37. Numbers released remained fair and seemed to follow effort. We switched our sampling effort to Area 3 after Julian Week 42 as most of the anglers entering the Area were putting in at Big Bar (which is in Area 3) and taking out at Youngs Bar. Anglers indicated most of the fishing activity was in Area 3 and Youngs Bar was a convenient spot to pull out.

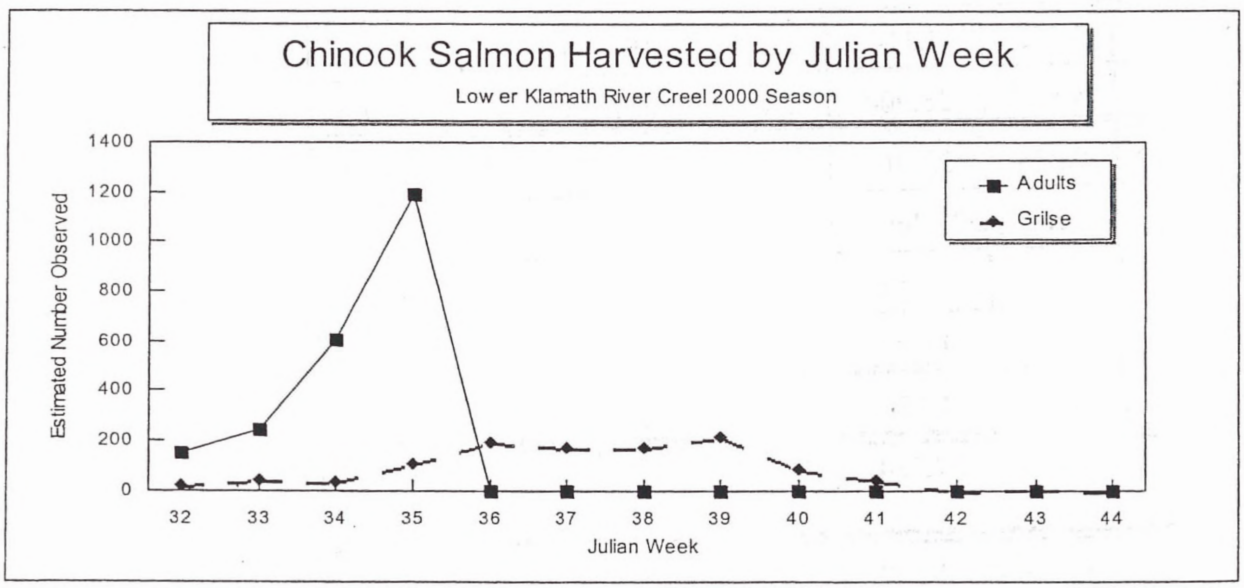

Figure 2. Chinook Salmon Harvest By Julian Week in Lower Klamath River for the 2000 Creel Season.

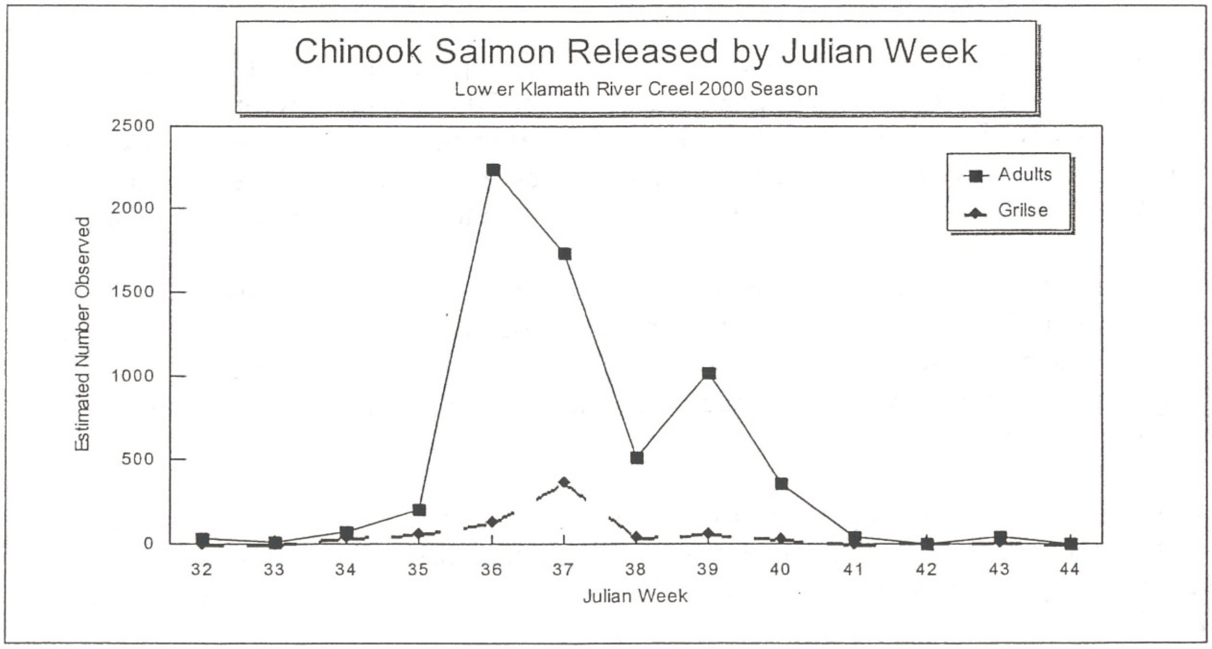

Figure 3. Chinook Salmon Released By Julian Week in the Lower Klamath River for the 2000 Creel Season.

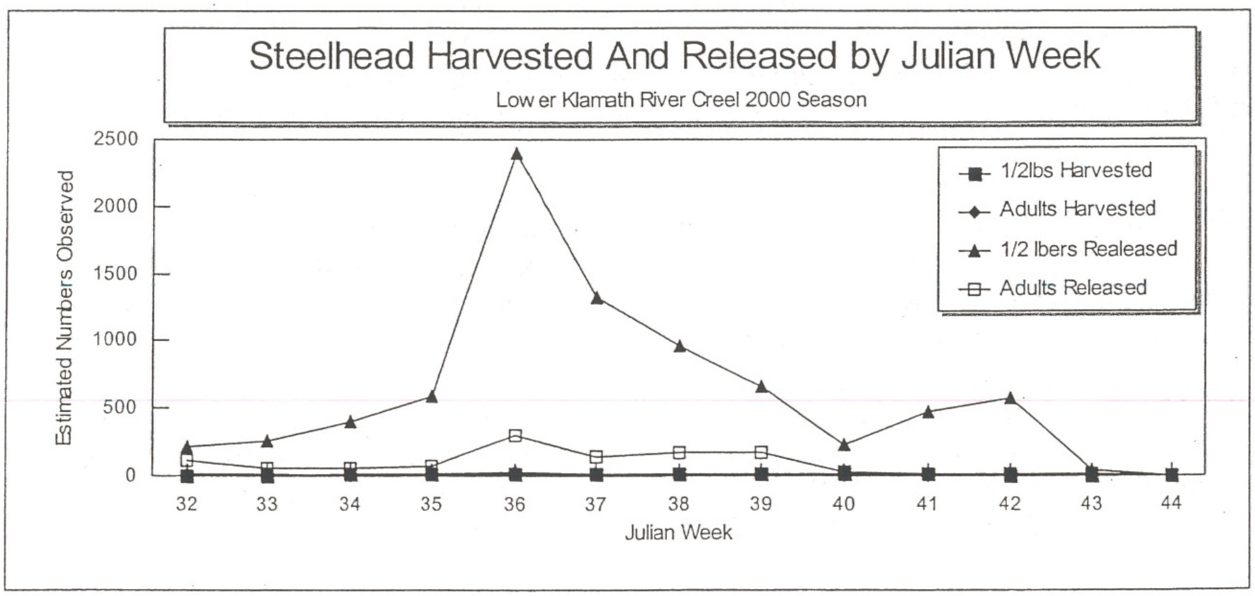

Figure 4. Steelhead Harvested and Released for the Lower Klamath River 2000 Creel Season.

Coded-Wire Tag Recovery

Klamath River Project personnel recovered 130 heads of adipose fin-clipped (Ad+CWT) chinook salmon during Julian Weeks 28 through 42 of the 2000 season. Twenty-six 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 5).

Of these 130 tags, 93 were adult salmon while 37 were grilse salmon. Fin-clipped grilse ranged in size from 43 to 56 cm FL and averaged 48 cm FL. Fin-clipped adults ranged in size from 53 to 85 cm FL and averaged 72 cm FL. 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, tags lost; 200000, and tags unreadable; 400000. For the heads recovered this season, ten salmon had shed their tags (100000), none were lost during extraction (200000), no tags were unreadable (400000), while the 120 remaining were all decoded .

Hatchery Contribution

Randomly recovered, marked chinook composed 7.1 % (104/1,447) of the chinook harvested. Of this, 4.6 % (67/1,447) were from adult chinook and 2.5% (37/1,447) were from grilse chinook in the observed catch from the Lower Klamath River Creel. Based on these percentages, I estimate 233 (151 adults and 82 grilse) marked chinook were harvested. We recovered 103 random recovered tags from Klamath and Trinity Basin origin chinook. One tag was recovered from an adult fish originating at the Feather River Hatchery on the Sacramento River from the 1996 brood year.

In addition to the random recovered tags, we had 26 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 10 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 code 100000. Of these, 6 were from adults (3 random and 3 NRR) and 4 from grilse based on fork length at the time of recovery. This left 95 known Klamath and Trinity River origin tags.

Klamath River Origin Chinook Salmon

We decoded 34 random recovered tags from Klamath River origin chinook (2 five-year-olds, 5 four-year-olds, 24 three-year-olds and 3 two-year-olds). These chinook represent nine marked groups from Iron Gate Hatchery. Klamath River origin chinook represented 35.7% (34/95) of all the marked chinook recovered in the angler survey.

The peak for Klamath River origin chinook harvest was Julian Week 35, similar to the last two seasons. Personnel recovered Klamath River coded-wire-tagged fish between Julian week 32 and Julian week 36. Harvest of marked chinook dropped off completely by the end of Julian week 36 (Figure 5).

Trinity River Origin Chinook Salmon

We decoded 62 random recovered tags from Trinity River origin chinook (0 five-year-olds, 0 four-year-olds, 32 three-year-olds and 30 two-year-olds). Of these tags, 6 fall-run and 3 spring-run Trinity River Hatchery mark groups were represented. Trinity River origin fish represented 65.2% (62/95) of all the marked chinook in the angler survey.

Trinity River fall-run chinook tag recovery began during Julian Week 28 and extended through Julian Week 42. Tag recoveries peaked during Julian Week 39.

During the 2000 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 35. A smaller peak for Trinity River fall-run chinook happened during Julian week 35, but the bulk of the Trinity River fall-run tags were collected during Julian week 39. All coded-wire tagged chinook were gone by Julian week 42 (Figure 5).

Pls - Rtn to Brenda @ Proven

Table 5. Coded-Wire Tag Information from Iron Gate Hatchery (IGH), Trinity River Hatchery (TRH) and Feather River Hatchery (FRH) for Chinook Salmon Obtained from the Lower Klamath River [illegible] season.

Release Data				Recovery Data			
CWT Code	Run	BY	Site	Creel	NRR	FL	Dates
		Adult Chinook					
060102020[illegible]	Fall	95	IGH	1	0	71	08/18
0601020207	Fall	95	IGH	1	1	84	09/01
0601020211	Fall	96	IGH	0	1	a/	08/09
06-38-30	Fall	96	IGH	3	2	79- 82	8/7-11, 9/2
06-38-31	Fall	96	IGH	2	0	70, 85	8/25, 9/1
06-25-41	Fall	96	FRH	1	0	54	9/16
0601020212	Fall	97	IGH	10	3	66-85	8/9 - 9/2
0601020213	Fall	97	IGH	10	5	68 - 80	8/9 - 9/2
0601020214	Fall	97	IGH	4	1	74 - 85	8/22 - 8/31
0601020215	Fall	97	IGH	0	1	a/	8/25
06-52-33	Fall	97	TRH	1	1	68	8/30
06-52-34	Fall	97	TRH	1	1	73	9/2
06-52-35	Fall	97	TRH	2	0	67, 70	8/26, 9/1
06-52-36	Fall	97	TRH	3	0	60, 68	8/18 - 9/2
06-52-37	Sprin g	97	TRH	0	1	a/	8/1
06-52-38	Sprin g	97	TRH	0	1	a/	7/10
06-52-40	Sprin g	97	TRH	17	5	63 - 77	8/6 - 8/31
06-52-41	Fall	97	TRH	8	0	53 - 74	8/26 - 10/2
100000	no tag found			3	3		
Total				67	26		

Grilse Chinook							
0601020301	Fall	98	IGH	1	0	51	9/3
0601020302	Fall	98	IGH	2	0	40	9/3
06-26-41	Fall	98	TRH	23	0	43 - 56	9/20 - 10/8
06-56-42	Fall	98	TRH	1	0	51	9/16
06-52-50	Sprin g	98	TRH	6	0	46 - 50	8/20 - 9/5
100000	No tag found			4	0		
200000	Tag Lost			0	0		
Totals				37	0		
Grand Total				104	26		

a/ We estimated size of fish from head as larger than 55 cm.

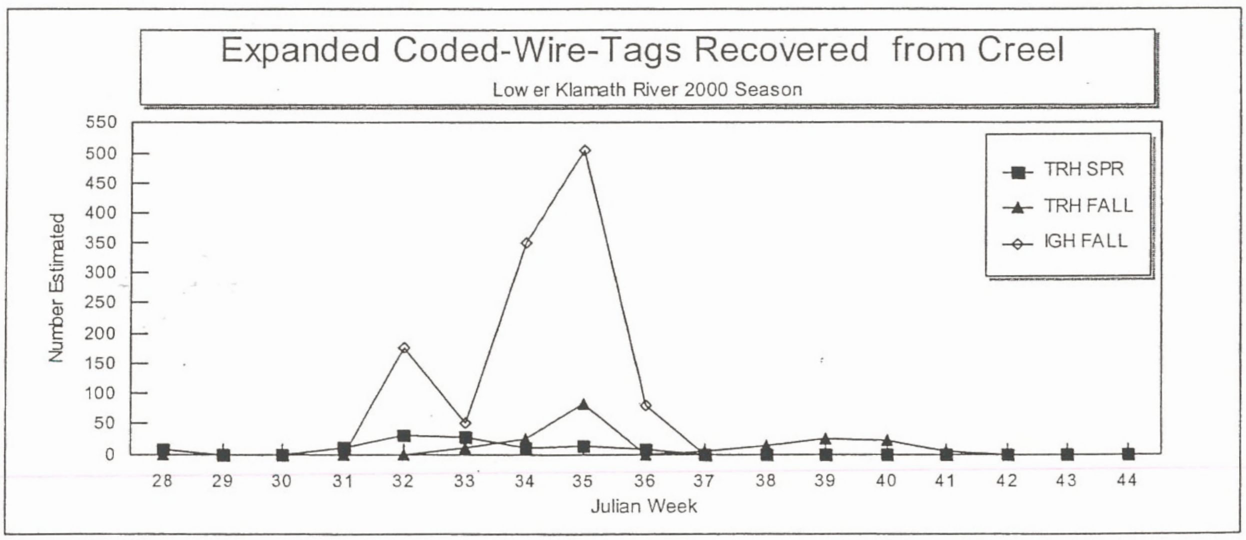

Figure 5. Timing by Julian Week of Coded Wire Tags Recovered from Chinook Salmon in the Lower Klamath River 2000 Creel Season.

DISCUSSION

During the 2000 creel season, a gear restriction at the mouth was in place to reduce the chance of fish being snagged. There was very little effort by shore anglers at the mouth. This data does not provide enough information to test the changes in the regulations.

Because the forecast of the run size appears to have been underestimated, numerous anglers and guides approached me about creating a mechanism to reopen the fishery mid-season should a situation such as this arise again. Perhaps a mid-season adjustment should be discussed within the department as this has been a problem previously.

CONCLUSION

The 2000 season quota of 2,100 fish (50% of 4,200) was met during the Labor Day weekend. The peak for adult chinook caught and released was two weeks later, after the quota was met. The forecast of the run size for this season may have been underestimated.

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 close to the actual size observed.

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

ulian week	Inclusive dates			Julian week	Inclusive dates		
1	01-Jan	-	07-Jan	27	02-Jul	-	08-Ju
2	08-Jan	-	14-Jan	28	09-Jul	-	15-Ju
3	15-Jan	-	21-Jan	29	16-Jul	-	22-Ju
4	22-Jan	-	28-Jan	30	23-Jul	-	29-Ju
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-Oc
15	09-Apr	-	15-Apr	41	08-Oct	-	14-Oc
16	16-Apr	-	22-Apr	42	15-Oct	-	21-Oc
17	23-Apr	-	29-Apr	43	22-Oct	-	28-Oc
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.