

State of California
The Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

ANNUAL REPORT
TRINITY RIVER BASIN SALMON AND STEELHEAD MONITORING PROJECT:
CHINOOK AND COHO SALMON AND FALL-RUN STEELHEAD RUN-SIZE
ESTIMATES USING MARK-RECAPTURE METHODS
2015-16 SEASON



On the cover: CA Dept Fish and Wildlife and Hoopa Valley Tribal Fisheries personnel putting in the trap at Junction City weir, July 2016.

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2015-16 SEASON

by

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AUGUST 2016

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Trinity River Basin Salmon and Steelhead Monitoring Project
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FOREWORD

This is the California Department of Fish and Wildlife's (CDFW) Trinity River Basin Salmon and Steelhead Monitoring Project's twenty-seventh annual report to the United States Bureau of Reclamation (Reclamation). Activities reported on occurred between April 2015 and March 2016 and were funded by CDFW/Reclamation Cooperative Agreement Number R13AC20027.

This report presents work performed on the main stem Trinity River and at Trinity River Hatchery. Necessity for performing our Klamath-Trinity basin monitoring activities are outlined in several Acts of Congress including Public Law 386 (69 Stat. 719), August 12, 1955; Public Law 98-541, October 24, 1984; the "Trinity River Basin Fish and Wildlife Management Reauthorization Act" of 1995; and the Trinity River "Record of Decision", 2000.

We refer readers to past reports for general methods and appendices for supporting documentation that enables final analyses.

ACKNOWLEDGMENTS

CDFW fisheries technicians on whom we relied during the 2015 field season include: Jasper Amir, Michael Bradford, Chris Hubler, Todd Newhouse, Laurel Osborne, Lauren Romero, Jane Sartori, Garth Savage, Ron Smith, Steve Strite, Ted Tillinghast, and Nathan Keiki Yamasaki. We were pleased once again to have Loren Aubrey, in addition to Dexter Cooper [Hoopa Valley Tribal Fisheries (HVTF)], at the weir operations this year, and truly appreciate the effort and cooperation of HVTF during weir installation and pull days. Thanks to Robert Sullivan, CDFW, for some much appreciated proofing and humor, and Brenda Tuel and Mary Kuehner for administrative support.

We rely on the CDFW Trinity River Hatchery staff during salmonid recovery; landowners Linda Allan, Doris Chase, Tom O'Gorman, and Pierre LeFuel, and the Bureau of Land Management and the U.S. Forest Service for access, off-season in-basin equipment storage and general project support.

The CDFW monitoring program was approved by the Trinity Management Council (TMC) and funded by Reclamation through the Trinity River Restoration Program (TRRP) office in Weaverville, CA.

Recommended citation: Kier, MC, and J. Hileman. 2016. Chinook and coho salmon and fall-run steelhead run-size estimates using mark-recapture methods; 2015-16 season. Final annual report of the CA Dept. Fish and Wildlife, Trinity River Basin Salmon and Steelhead Monitoring Project. Arcata, CA. 84 pp.

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ABSTRACT

California Department of Fish and Wildlife's Trinity River Project conducted tagging and recapture operations from June 2015 through March 2016 to produce run-size, angler harvest, and spawner escapement estimates of spring- and fall-run Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and fall steelhead (*O. mykiss*) in the Trinity River basin. Monitoring results informs the Trinity River Restoration Program's (TRRP) adaptive management decision making process and helps evaluate progress toward achieving fundamental objectives outlined in the Integrated Assessment Plan (TRRP, 2009)

Using a Petersen mark-recapture methodology, we estimated a run-size of 4,408 (95% CI 3,752 – 5,119) spring-run (spring) Chinook migrated into Trinity River basin upstream of Junction City weir (JCW). The run was comprised of an estimated 1,146 naturally-produced adults and 177 naturally-produced jacks and 2,772 hatchery-produced adults and 313 hatchery-produced jacks. Using tags returned by anglers we estimate 190 spring Chinook were harvested, yielding an escapement of 4,218 fish. Escapement of 1,090 naturally-produced adult spring Chinook was 18.2% of the TRRP goal of 6,000 spring Chinook.

An estimated run-size of 10,365 (95% CI 9,230 – 11,569) fall-run (fall) Chinook migrated past Willow Creek weir (WCW). The run was comprised of an estimated 3,609 naturally-produced adults and 2,226 naturally-produced jack salmon and 4,006 hatchery-produced adults and 524 hatchery-produced jacks. We estimate 56 fall Chinook were harvested by anglers, yielding a total escapement of 10,309 fish. Escapement of 3,592 naturally-produced adult fall Chinook was 5.8% of the 62,000 fish TRRP goal.

Both coho run-size and escapement in the Trinity above Willow Creek were estimated at 4,619 (95% CI 4,169 – 5,094), because no coho were reported as harvested. Coho escapement was comprised of an estimated 748 naturally-produced adult and 65 naturally-produced jack coho and 2,936 hatchery-produced adult and 870 hatchery-produced jacks. Escapement of 748 naturally-produced coho adults was 53.4% of the TRRP goal of 1,400 fish.

An estimated run-size of 11,167 (95% CI 9,962 – 12,445) adult fall steelhead returned to the Trinity River basin upstream of WCW. Anglers harvested an estimated 436 adult fall steelhead above WCW, leaving 10,732 (2,454 naturally-produced and 8,278 hatchery-produced) fish as potential spawners. Escapement of 2,454 naturally-produced adult steelhead was 6.1% of the 40,000 fish TRRP goal.

PROJECT OBJECTIVES

- To determine run-size, composition, distribution, and timing of adult Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and steelhead (*O. mykiss*) in the Trinity River basin [Integrated Assessment Plan (IAP) assessment 13A – Monitor adult escapement of hatchery and naturally produced spring and fall Chinook, coho, and fall steelhead (TRRP, 2009)].
- To determine in-river angler harvest and spawner escapements of Trinity River Chinook salmon and coho salmon, and steelhead (IAP assessments 16A, 17A, 18A, 19A – Monitor harvest (tribal, sport and commercial) of naturally produced spring Chinook, fall Chinook, coho salmon and steelhead).

INTRODUCTION

The California Department of Fish and Wildlife's (CDFW) Trinity River Project (TRP or Project) annually monitor run-size and spawner escapement of spring Chinook salmon in the Trinity River basin upstream of a weir near Junction City, California and the run-size and spawner escapement of fall Chinook salmon, coho salmon, and fall-run steelhead in Trinity River basin upstream of a weir near Willow Creek, California. The project is conducted in cooperation with the Hoopa Valley Tribal Fisheries Department (HVTF). We use a Peterson type mark-recapture methodology to estimate run-size (the number of fish estimated to migrate from the ocean) into the Trinity River basin upstream of the weir sites. Spawner escapement is the number of fish that survive in-river tribal and recreational harvest to spawn in natural areas or enter Trinity River Hatchery (TRH). This is a continuation of studies that began in 1977.

Information from this investigation is provided to the Trinity River Restoration Program (TRRP) to help evaluate program objectives including naturally-produced (progeny of fish that spawned in the river) salmonid escapement goals [13A, 17A, 16A, 18A and 19A] outlined in the Integrated Assessment Plan [IAP (TRRP 2009)]. Current Trinity River basin adult escapement goals set by the TRRP for naturally-produced adults are 6,000 spring Chinook; 62,000 fall Chinook; 1,400 coho; and 40,000 steelhead. Similar goals for hatchery adult escapement are 3,000 spring Chinook; 9,000 fall Chinook; 2,100 coho; and 10,000 steelhead. Investigation data are used to assess progress toward the goal stated in the Record of Decision (ROD) (Interior, 2000) of increasing harvest opportunity for dependent fisheries. Data are also used in the short term to inform adaptive management decisions and in the long term for trend analysis in pre- and post-ROD fish populations, cross-functional ecological and physical evaluations, composition (race and proportion of hatchery-marked¹ or Project-tagged² fish), distribution, and timing of salmonid runs in the Trinity River basin.

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

² Spaghetti tags applied by CDFW personnel to salmonids on their up-river migration (spawning run).

METHODS

Methods are specific to the 2015-16 season; standardized methods across years are found in CDFW, (2014), especially Tasks 1 – 3 (pages 1–87). For ease of navigation throughout this document, the notation of tables, figures, and appendices are hyperlinked.

Trapping, Tagging and Marking

Locations and Periods

Trapping and tagging operations were conducted from 09 June through 01 December 2015 by TRP and HVTF personnel at two temporary weir sites located on the main stem Trinity River (Figure 1).

Junction City weir (JCW) is located at approximately 132.7 river kilometers (rkm) (~river mile [rm] 84.4) upstream from the Klamath River confluence (40° 68' 34.56" N, 123° 02' 73.10" W), upstream of Junction City. The JCW was operated 09 June through 14 August 2015 and is primarily operated to capture, measure, and tag spring-run Chinook salmon (spring Chinook).

Willow Creek weir (WCW) is located 36.5 rkm (~rm 22.7) upstream from the Trinity River's confluence with the Klamath River (40° 58' 29.85" N, 123° 38' 8.61" W) and was operated 26 August through 01 December 2015; WCW is primarily operated to capture, measure, and tag fall-run Chinook salmon (fall Chinook), coho salmon (coho), and steelhead.

Trinity River Hatchery (TRH) is located at rkm 179.8 (~rm 111.7) just below Lewiston Dam, the current termination of salmonid anadromy on the Trinity River. Pre-release clipping of fish reared at TRH is performed by TRP and HVTF staff to identify fish as hatchery produced. All steelhead and 25% of all Chinook produced at TRH are adipose fin-clipped (ad-clipped) before release. Ad-clipped Chinook are also coded-wire tagged (CWT). Additionally, all TRH reared coho have their right maxillary (RM) clipped as a hatchery identifier.

Weir and Trap Design

The 2015 weir configuration at JCW consisted of one trap box and a boat gate; WCW used its standard configuration of two trap boxes and boat gate (Figure 2-4).

Tagging of Fish at Weirs

Tagging in 2015 was similar to that in 2014: Half of all Chinook tagged at JCW received \$20 tags, half received non-reward value tags, and steelhead received \$10 tags. At WCW, tags with \$0 reward, \$10 rewards, and \$20 rewards were applied to adult steelhead at a 1:1:1 ratio, whereas fall Chinook were tagged 1:1:1 with \$0:\$20:\$50 tags. Coho at both weirs are tagged with non-reward tags, and juvenile ("half-pounder") steelhead were not tagged at either weir.

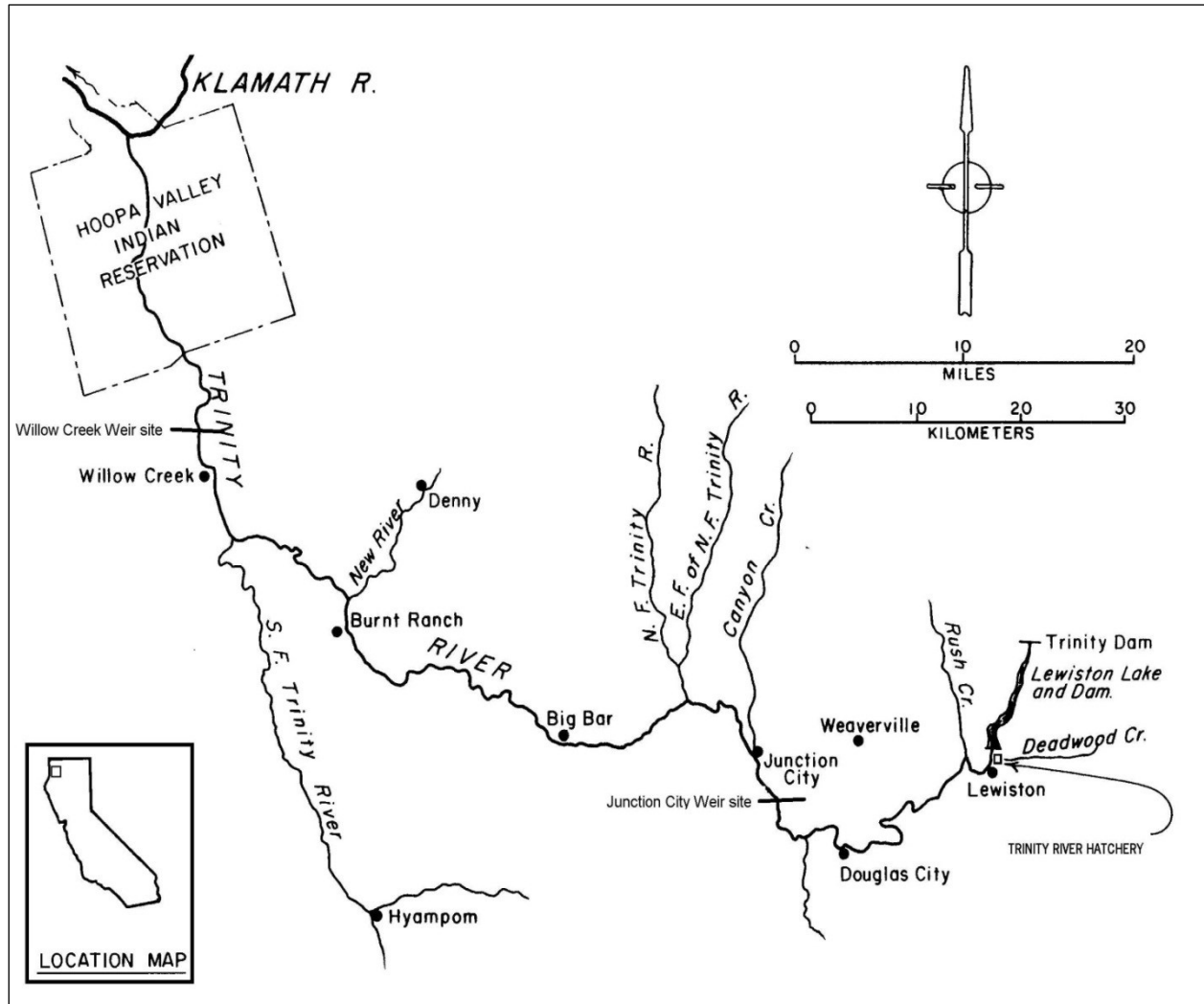


Figure 1. Location of trapping/tagging weirs near Willow Creek, Junction City, and Trinity River Hatchery (TRH), Trinity River basin, 2015.



Figure 2. Photograph of Alaskan-style weir, tripods, support channels, and conduit (looking upstream). Picture taken at Willow Creek weir, 2015.



Figure 3. Set up of Junction City weir (JCW), 2015. Note single trap box with boat gate just beyond.



Figure 4. 2015 Willow Creek weir (WCW) configuration.

Recovery of Tagged Fish

Fish tagged at JCW and WCW were recovered from four different sources: (1) angler return of tags, (2) tags gathered during upper Trinity River spawner surveys, (3) tagging mortalities found on or near the tagging weirs, and (4) from fish returning to Trinity River Hatchery.

Angler Tag Returns

Tags returned to the TRP Arcata field office through 30 April 2016 were included in assessing harvest and catch and release rates for the 2015 runs. Tags returned after that date were processed for payment but not used for analysis. Public service announcements distributed to press throughout the Northern California region, posted online in social media and in store-front windows throughout the Trinity basin encouraged the timely (same-season) return of tags.

Trinity River Hatchery Recovery

Trinity River Hatchery (TRH) commenced 2015-16 spawning operations on 08 September 2015. All fish entering TRH are inspected for project tags during spawning operations. All tags are removed and tag information recorded. Scales were removed from fall Chinook by HVTF personnel, and any fin clips (ie adipose fin clips [ad-clips] or right-maxillary [RM] clips) or marks recorded. All snouts of ad-clipped Chinook were retained during the spawning process for later Coded Wire Tag (CWT) analysis.

Spring Chinook were spawned on ten days (twice a week) from 08 September to 08 October 2015. Hatchery personnel physically closed the bottom of the fish ladder for two weeks, starting on 08 October 2015. This is a routine practice at TRH to temporally segregate spring and fall races of Chinook. Spawning operations resumed on 26 October 2015. Fall Chinook were spawned on thirteen days between 26 October and 16 December 2015. Coho salmon were spawned on six days between 03 November and 08 December 2015. Spawning operations for coho typically occurred once a week on a different day than Chinook spawning operations to facilitate logistics of spawning multiple species concurrently. Steelhead were spawned on eleven days from 30 December 2015 to 10 March 2016.

Trinity River spring Chinook immigrate mainly between April and September, whereas fall Chinook immigrate August through December. Although CDFW acknowledges temporal overlap of runs, for analysis we designate a hard date for a spring/fall separation point, and we use a Julian Week (JW) format, allowing inter-annual comparisons of identical weekly periods (Appendix 1).

Run-size, Angler Harvest and Spawner Escapement Estimates

Run-size Estimates

Run-size estimates in 2015 were calculated using Chapman's version³ of the Petersen Single Census Method [as modified by Ricker (1975)].

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

N = estimated run-size

M = the number of effectively tagged fish⁴

C = the number of fish examined at TRH

R = the number of Project-marked fish recovered in the hatchery sample.

³ Chapman, D. G. 1951. Some properties of the hyper-geometric distribution with applications to zoological census. Univ. CA Publ. Stat. 1:131-160, as cited in Ricker (1975).

⁴ Effectively tagged means the estimated number of tagged fish minus any tagging mortalities (fish having died within 30 days without spawning), and minus tagged fish anglers caught and released after removing the tag.

In the 2015-16 spawning season there were insufficient numbers of jack and adult spring Chinook, fall Chinook, or coho salmon marked/recovered to obtain stratified jack and adult salmon estimates and obtain the 95% confidence interval on each of the strata, therefore the estimate we used in each case was for the total (un-stratified) run-size. After arriving at an estimate of total population run-size we used various methods to derive the jack and adult components of the run.

To obtain the number of jack and adult fall Chinook we used HVTF's scale/aging analysis performed for the Klamath River Technical Team (KRTT, 2016) and applied the scale-based age proportions to the run-size estimate. For comparison we looked at proportions derived by inspection (using nadir) of length-frequency histograms and scale analyses.

We used fork length (FL) distribution (using nadirs) to estimate the length that separates jacks from adults for spring Chinook and coho salmon.

Please refer to CDFW (2014) for full method details and analyses assumptions. Any single digit disagreement in numbers throughout this report is due solely to rounding differences.

RESULTS

Trapping, Tagging and Recovery

Spring/Fall Run Chinook Salmon Separation and Run Timing

We recovered 5,341 Chinook salmon at TRH in 2015, of which 1,162 (21.75%) had adipose clips. We recovered coded-wire tags (CWTs) from 378 known spring Chinook and from 750 known fall Chinook. Chinook with shed, lost, or unreadable CWTs were classified as either spring- or fall-run based on their date of entry into TRH. Spring Chinook CWTs were represented by 17 release (code) groups from the 2010 through 2013 BYs (Appendix 2). Fall Chinook CWTs were composed of 24 release groups representing the 2010 through 2013 BYs.

Trinity River Hatchery-origin spring Chinook passed through JCW from Julian week 24 through JW 33 (Figure 5). Using CWT analysis we designated all Chinook trapped at JCW in 2015 to be spring Chinook.

No Chinook tagged at WCW arrived at TRH before JW 40, and no TRH-origin spring CWT fish were tagged at WCW and recovered at TRH during 2015. We therefore determined all Chinook trapped at WCW in 2015 to be fall run Chinook.

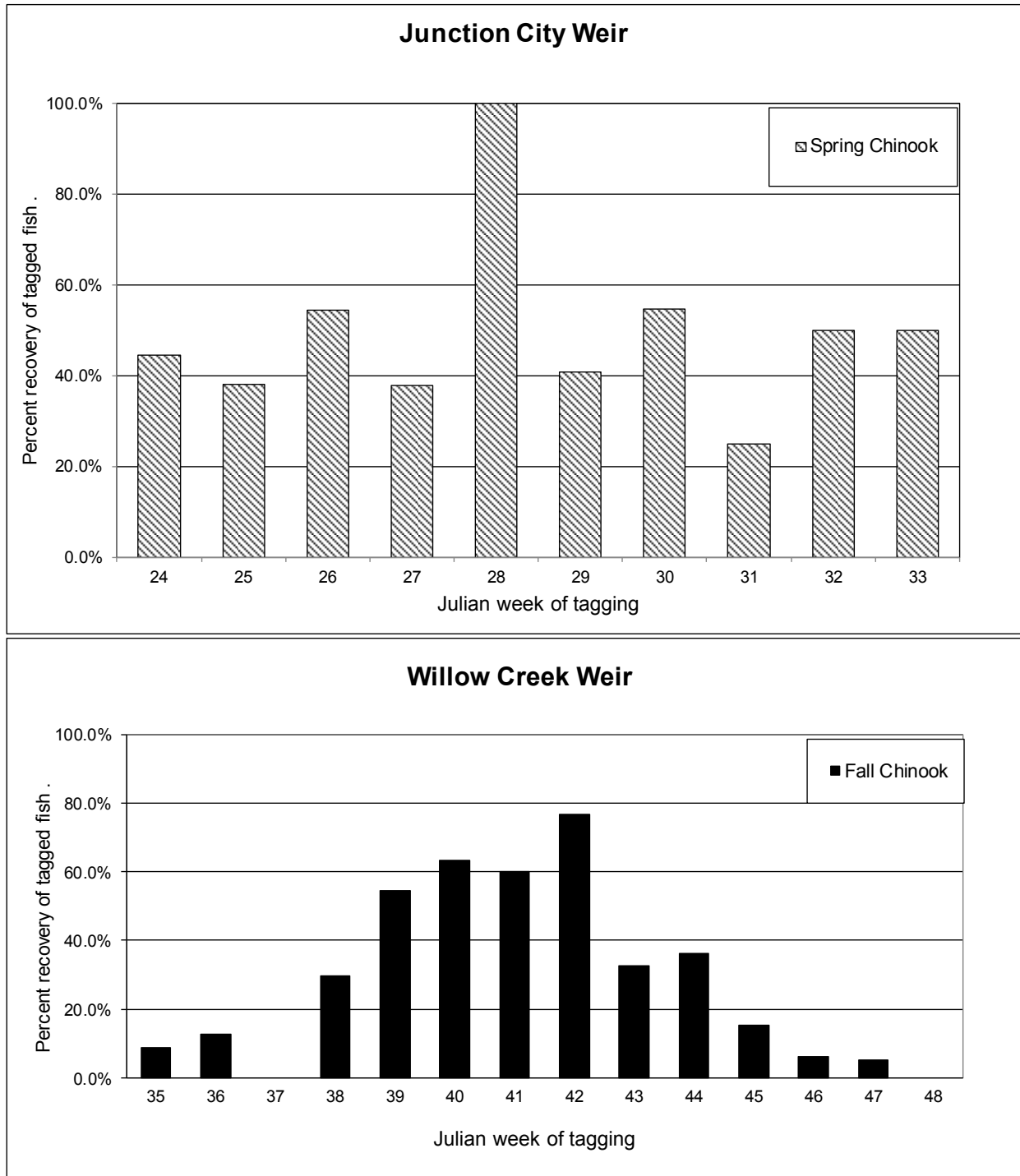


Figure 5. Percent recovery of Junction City weir and Willow Creek weir marked Chinook at Trinity River Hatchery during the 2015-16 season. Junction City weir trapped during Julian weeks 24 through 33; Willow Creek during Julian weeks 35 through 48. No data was collected in Julian week 37 due to high flows.

Spring Chinook Trapping and Tagging

California DFW and HVTF installed JCW 09 June (JW 23) and trapped the first night. The number of spring Chinook trapped peaked during JW 26, with 14 fish per night (Table 1, Figure 6). The weir was modified (conduit was removed or raised) 18 August (JW 34) to accommodate Hoopa Valley Tribe Ceremonial Boat Dance flow releases from Lewiston Dam, which were directly followed by emergency augmentation flow releases. The emergency release was to address fish health concerns in the lower Klamath River. Trapping was not resumed for the remainder of the season due to the high water.

A total of 343 spring Chinook were trapped at JCW, of which 327 (18 jack and 309 adult) were effectively tagged (Appendix 3). There were 11 tagging mortalities and five fish reported as caught and released by anglers. Ad-clipped fish comprised 16.6% of the spring Chinook captured (57 of 343) at JCW. All Chinook trapped and tagged at JCW were determined to be spring Chinook.

Size and Age of Trapped Fish

Spring Chinook trapped at JCW and TRH averaged 66.3 and 66.4 cm FL, respectively, with a combined average 66.4 cm FL (Figure 7). Fork length distribution analysis shows the nadir separating jack from adult spring Chinook was between 52 and 53 cm FL. Data from known age, hatchery-marked spring Chinook that entered TRH supported the minimum adult fork length of 53 cm. Although there was some overlap between sizes of age 2 and age 3 fish (Appendix 4), the mean FL of those CWT brood years (BY) were distinctly different. Applying the minimum adult size of 53 cm FL to the observed population, an estimated 5.5% and 12.0% of the spring Chinook observed were jacks at JCW and TRH, respectively.

Spring Chinook Recovery

Angler Tag Recovery

Anglers reported no harvest of Project-tagged jack spring Chinook in 2015 and a harvest of 15 Project-tagged adult spring Chinook representing an estimated harvest of 190 total fish (Appendix 3). Total harvest rate of Project-tagged spring Chinook upstream of JCW was 0% for jacks, 4.9% for adults. There were five tag returns from adults (none from jacks) in the catch and release fishery, and two tags found and returned by anglers or other river enthusiasts.

Spawner Survey Recovery

Main stem Trinity spawner surveys were conducted by Project personnel in cooperation with YTFP, HVTF, USFS and the USFWS from 31 August to 19 December 2015, from TRH to Weitchpec. During the spawner surveys five Project-tagged spring Chinook were recovered.

Tagging Mortalities

Eleven spring Chinook were identified as tagging mortalities at JCW in 2015.

Table 1. Weekly summary of spring Chinook trapped in the Trinity River at Junction City weir during 2015.^a

Julian week	Inclusive dates	Nights Trapped	Number trapped						Fish/night	
			Jacks ^b	Ad-clip Jacks	Adults	Ad-clip Adults	Total	Ad-clip total		
Spring Chinook										
23	4-Jun - 10-Jun	1	0	0	0	0	0	0	0	0.0
24	11-Jun - 17-Jun	5	0	0	11	3	11	3	3	2.2
25	18-Jun - 24-Jun	5	1	0	29	5	30	5	5	6.0
26	25-Jun - 1-Jul	5	1	1	71	16	72	17	17	14.4
27	2-Jul - 8-Jul	7	0	0	78	17	78	17	17	11.1
28	9-Jul - 15-Jul	5	0	0	4	0	4	0	0	0.8
29	16-Jul - 22-Jul	5	7	1	74	7	81	8	8	16.2
30	23-Jul - 29-Jul	5	7	1	39	4	46	5	5	9.2
31	30-Jul - 5-Aug	4	2	0	10	1	12	1	1	3.0
32	6-Aug - 12-Aug	5	2	0	4	1	6	1	1	1.2
33	13-Aug - 19-Aug	2	1	0	2	0	3	0	0	1.5
Total:		49	21	3	322	54	343	57		
Mean:										7.0

a/ Trapping at Junction City weir took place June 10 - August 14, 2015 (Julian weeks 23-33).

b/ Spring Chinook <53 cm FL were considered jacks in 2015.

c/ Adipose fin-clipped Chinook. Number shown is a subset of weekly jack and adult Chinook totals.

d/ Weir out of operation past Julian week 33 due to flow releases from Lewiston Dam.

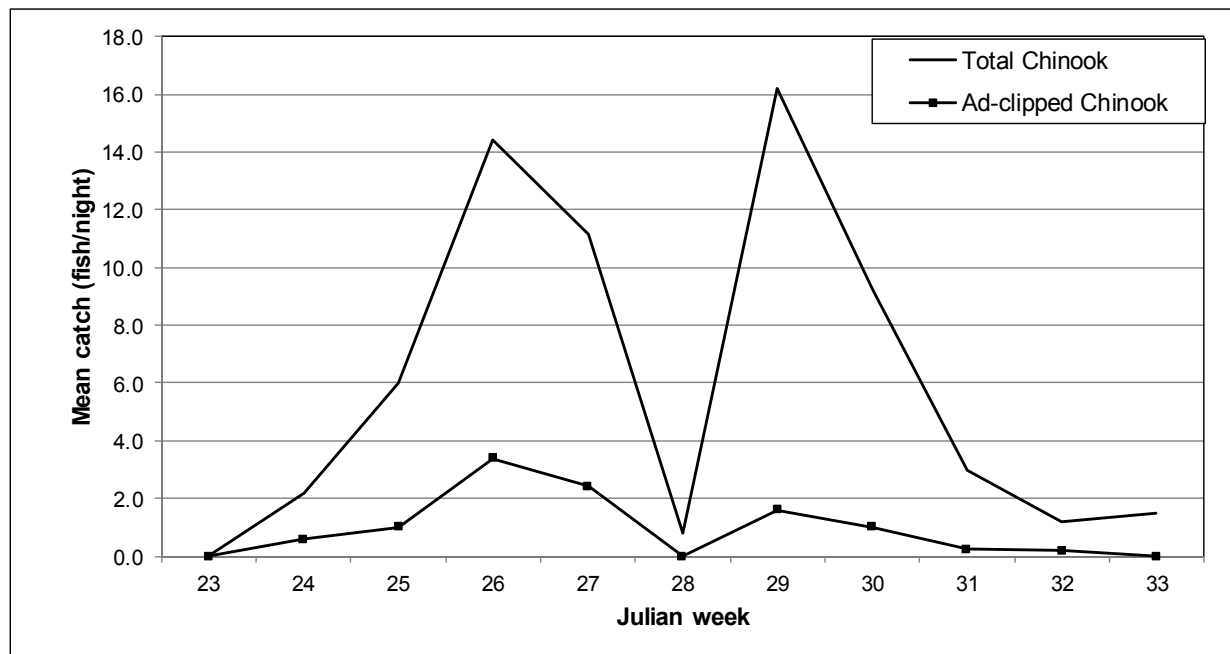


Figure 6. Mean catch of spring Chinook in the Trinity River at Junction City weir, 2015.

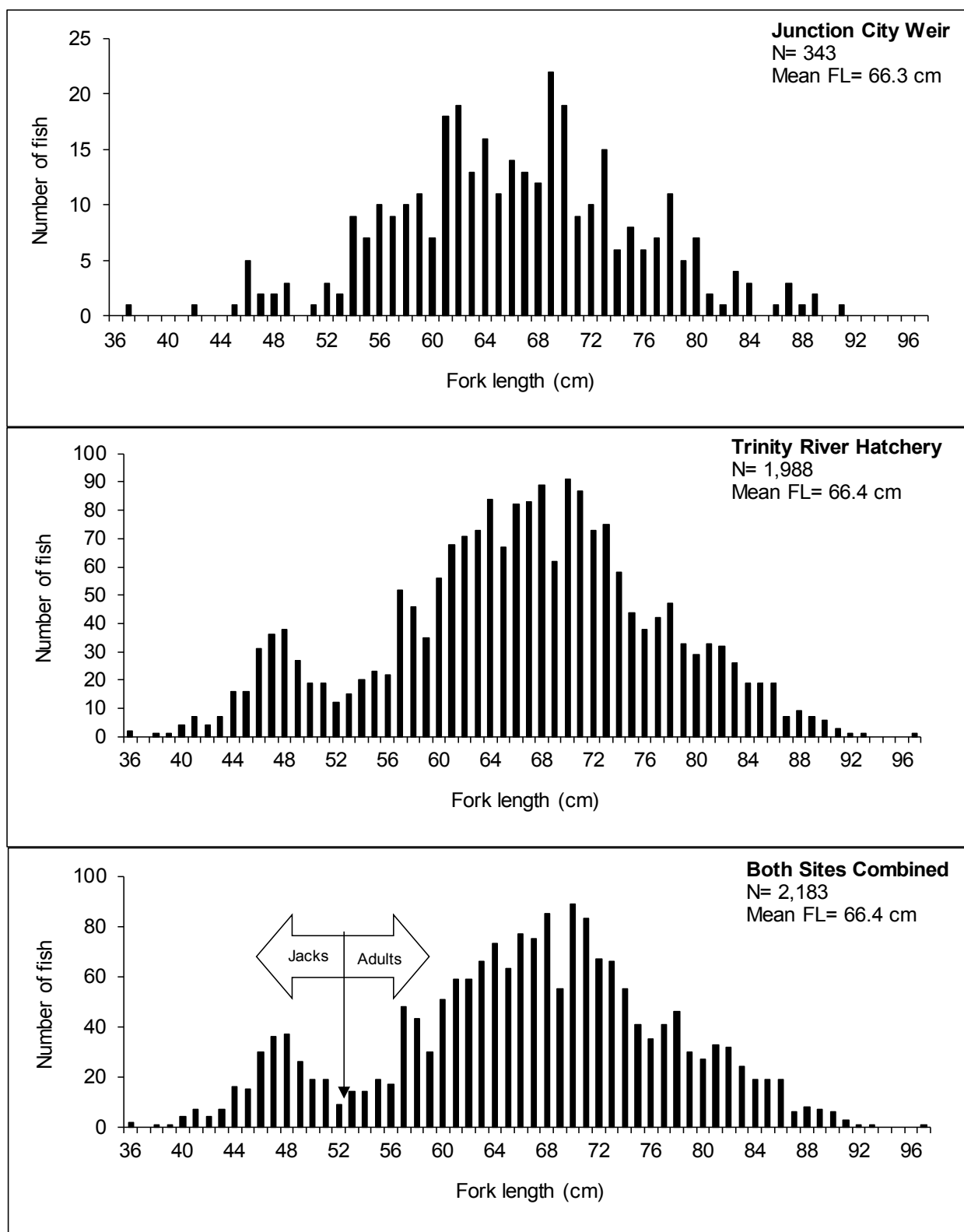


Figure 7. Spring Chinook fork lengths (cm) observed at Junction City weir, Trinity River Hatchery, and both sites combined during the 2015-16 season. Arrow denotes size used to separate jacks and adults for analysis.

Trinity River Hatchery Recovery

Spring Chinook began entering TRH on 04 September (during JW 36). They continued to enter TRH through JW 41 (Appendix 5). Recovery of spring Chinook peaked in JW 38 when 693 Chinook entered, although the peak week of CWT fish was JW 36 (Table 2). Of 327 spring Chinook tagged at JCW, 147 (45.0%) were recovered at TRH. Based on run-timing (by CWT analysis) an estimated 1,988 (240 jack and 1,748 adult) spring Chinook were recovered at TRH, from which 378 readable CWTs were recovered. Lost tags are accounted for in the expansions, shed tags are accounted for in the expansion multiplier at the time of release.

Run size, Angler Harvest and Escapement of Coded-wire Tagged Spring Chinook

Based on estimated total Chinook run-size above JCW, ad-clip rate of spring Chinook at JCW, estimated angler harvest rate, and recovery of spring-run CWT fish at TRH, 706 (75 jack and 631 adult) CWT spring Chinook returned to the Trinity River above JCW during the 2015 season (Table 3). We estimate 0 jack and 31 adult CWT spring Chinook were harvested by anglers during the season. Escapement of CWT spring Chinook was divided between 380 fish recovered at TRH and 295 estimated available to spawn in natural areas. Based on CWTs, the known age composition of the 2015 hatchery-produced spring Chinook run was composed of 75 (10.59%) age 2, 236 (33.47%) age 3, 367 (51.94%) age 4, and 28 (4.00%) age 5 fish.

Table 2. Recoveries at Trinity River Hatchery (TRH), by Julian week, of TRH-origin coded-wire tagged spring Chinook during the 2015-16 season.

Coded-wire tag number and release type ^c	Brood year	Number of spring Chinook entering TRH, by Julian week ^{ab}							Totals
		35	36	37	38	39	40	41	
068774-f	2010		2		1		1		4
068775-f	2010							1	1
068776-y	2010		8	1	1				10
068838-f	2011		18	16	7	1			42
068839-f	2011		8	10	3	1	1		23
068840-f	2011		8	8	4	6	2		28
068846-y	2011		48	20	13	17	3		101
060490-f	2012		24	15	9	5			53
060491-f	2012		6	3	5	6	1		21
060492-f	2012		4	5	2	1			12
060497-y	2012		18	10	3	4			35
068843-f	2012		2	1	1				4
060605-f	2013			12	4	4	1		21
060606-f	2013			2	5	4	2		13
060607-f	2013			1	1	3	3		8
060612-y	2013			1					1
068848-f	2013			1					1
No CWT ^d			3	4	4	2			13
Weekly totals:		0	149	110	63	54	14	1	391

a/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 8, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

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

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

d/ No CWTs were recovered from these ad-clipped fish. Chinook with shed or lost tags recovered after JW 41 were considered fall run.

Table 3. Run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery (TRH)-produced, coded-wire tagged, spring Chinook salmon, expanded for lost or unreadable tags, returning to the Trinity River during the 2015-16 season.

				Run-size estimate		Harvest rates		TRH Ad-clips with	Percentage of ad clips at weir		Ad+CWT run-size estimates		
				Jacks	Adults	Jacks	Adults	CWTs	Jacks	Adults	Jacks	Adults	Total
Spring Chinook (JCW)				490	3,918	0.00%	4.85%	96.6%	15.79%	16.67%	75	631	706

CWT code	BY	Age	TRH Total No.	% of total	Run-size	Angler harvest	Spawning escapement		
							TRH	Natural	Total
Spring Chinook salmon									
Adults									
068774	10	5	4.00	1.19%	7.52	0.36	4.00	3.15	7.15
068775	10	5	1.00	0.30%	1.88	0.09	1.00	0.79	1.79
068776	10	5	10.02	2.98%	18.83	0.91	10.02	7.90	17.92
068838	11	4	42.31	12.60%	79.52	3.86	42.31	33.35	75.66
068839	11	4	23.19	6.91%	43.58	2.11	23.19	18.28	41.47
068840	11	4	28.15	8.39%	52.90	2.57	28.15	22.19	50.34
068846	11	4	101.38	30.20%	190.53	9.24	101.38	79.91	181.29
060490	12	3	53.29	15.87%	100.15	4.86	53.29	42.00	95.29
060491	12	3	21.06	6.27%	39.58	1.92	21.06	16.60	37.66
060942	12	3	12.10	3.60%	22.74	1.10	12.10	9.54	21.64
060497	12	3	35.19	10.48%	66.14	3.21	35.19	27.74	62.93
068843	12	3	4.02	1.20%	7.56	0.37	4.02	3.17	7.19
Totals:			335.71	100.00%	630.92	30.60	335.71	264.61	600.32
Jacks									
060605	13	2	21.23	47.93%	35.83	0.00	21.23	14.60	35.83
060606	13	2	13.04	29.44%	22.01	0.00	13.04	8.97	22.01
060607	13	2	8.02	18.11%	13.53	0.00	8.02	5.51	13.53
060612	13	2	1.00	2.26%	1.69	0.00	1.00	0.69	1.69
068848	13	2	1.00	2.26%	1.69	0.00	1.00	0.69	1.69
Totals:			44.29	100.00%	74.74	0.00	44.29	30.45	74.74
Spring Totals:			380.00		705.66	30.60	380.00	295.06	675.06

2010 Brood Year

The 2015 spawning season was the last year for returns of the 2010 BY. Total contribution of the four (three fingerling and one yearling) 2010 tag code release groups that returned to the Trinity River ranged from 0.37% (the yearling group) to 0.80% (a fingerling group (Appendix 6). Percent return of the 2010 BY fingerlings release type was 0.59%, and 0.37% for the yearling, with a combined final total return rate for all 2010 BY spring Chinook release groups of approximately 0.51%, falling short of the mean return rate of 0.70% since 1986 (Appendix 7).

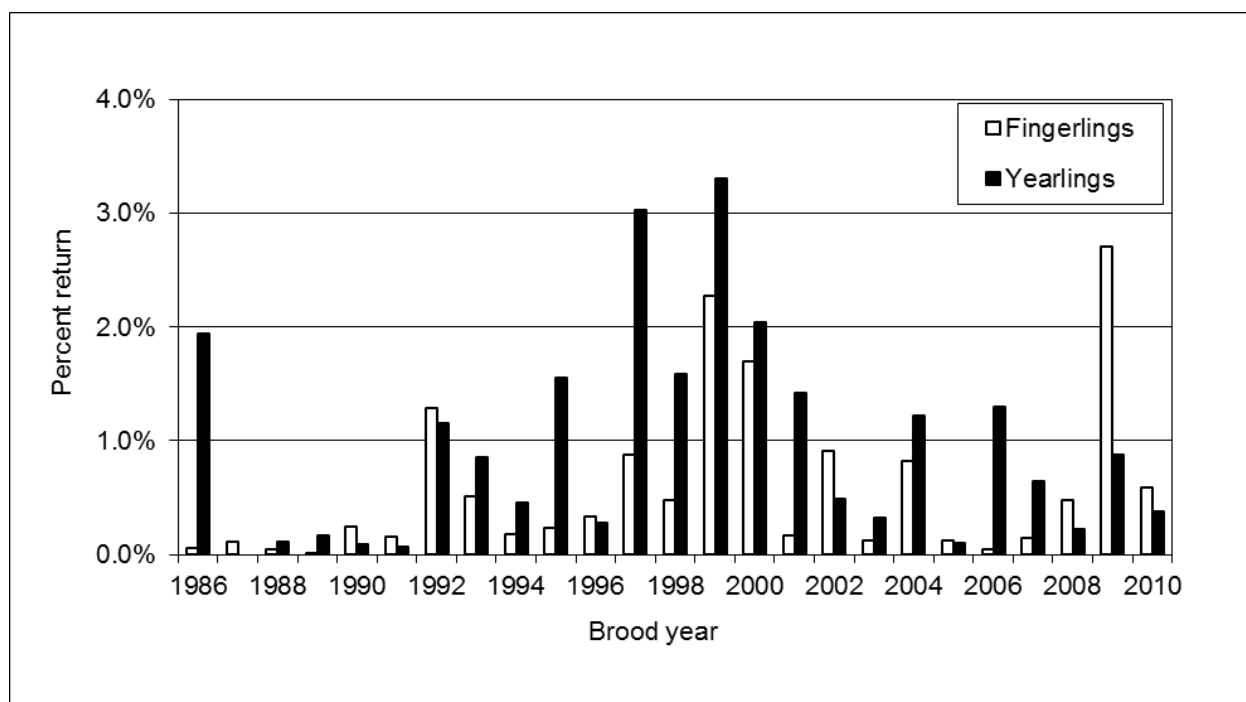


Figure 8. Percent return of Trinity River Hatchery produced, coded-wire tagged, spring Chinook salmon, brood years 1986-2010.

Table 4. Estimated run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery-produced, spring Chinook salmon expanded for unmarked releases (hatchery multiplier) returning to the Trinity River during the 2015-16 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	River	Expanded River	Escapement Total	Expanded total
Spring Chinook													
Adults													
068774	10	5	4.16	7.52	31.27	0.36	1.50	4.00	16.64	3.16	13.13	7.16	29.77
068775	10	5	4.49	1.88	8.44	0.09	0.40	1.00	4.49	0.79	3.54	1.79	8.03
068776	10	5	4.16	18.83	78.34	0.91	3.79	10.02	41.68	7.90	32.87	17.92	74.55
Total 5 year olds				28.23	118.05	1.36	5.69	15.02	62.81	11.85	49.55	26.87	112.36
068838	11	4	4.76	79.52	378.50	3.86	18.37	42.31	201.40	33.35	158.73	75.66	360.12
068839	11	4	4.42	43.58	192.64	2.11	9.33	23.19	102.50	18.28	80.81	41.47	183.31
068840	11	4	4.31	52.90	228.02	2.57	11.08	28.15	121.33	22.18	95.61	50.33	216.94
068846	11	4	4.51	190.53	859.29	9.24	41.67	101.38	457.22	79.91	360.40	181.29	817.62
Total 4 year olds				366.53	1,658.44	17.78	80.45	195.03	882.45	153.72	695.55	348.75	1,578.00
060490	12	3	4.18	100.15	418.63	4.86	20.31	53.29	222.75	42.00	175.57	95.29	398.32
060491	12	3	4.17	39.58	165.05	1.92	8.01	21.06	87.82	16.60	69.22	37.66	157.04
090492	12	3	4.21	22.74	95.74	1.10	4.63	12.10	50.94	9.54	40.17	21.64	91.11
090497	12	3	4.31	66.14	285.04	3.21	13.84	35.19	151.67	27.74	119.54	62.93	271.21
068843	12	3	4.15	7.56	31.35	0.37	1.54	4.02	16.68	3.17	13.14	7.19	29.82
Total 3 year olds				236.16	995.81	11.46	48.32	125.66	529.87	99.04	417.63	224.70	947.49
TOTAL ADULT				630.92	2,772.31	30.60	134.46	335.71	1,475.12	264.61	1,162.72	600.32	2,637.85
Jacks													
60605	13	2	4.22	35.83	151.2	0.00	0.00	21.23	89.59	14.60	61.60	35.83	151.19
60606	13	2	4.15	22.01	91.3	0.00	0.00	13.04	54.12	8.97	37.21	22.01	91.32
60607	13	2	4.15	13.53	56.2	0.00	0.00	8.02	33.28	5.51	22.88	13.53	56.17
60612	13	2	4.22	1.69	7.1	0.00	0.00	1.00	4.22	0.69	2.90	1.69	7.12
68848	13	2	4.18	1.69	7.1	0.00	0.00	1.00	4.18	0.69	2.87	1.69	7.05
TOTAL JACK				74.74	312.85	0.00	0.00	44.29	185.39	30.45	127.46	74.74	312.85
TOTAL SPRING CHINOOK				705.66	3,085.15	30.60	134.46	380.00	1,660.51	295.06	1,290.18	675.06	2,950.70

a/ Estimate is for upstream of Junction City weir.

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.

Contribution of Hatchery-Produced Spring Chinook to Total Estimated Run-Size

Estimated contribution of TRH-origin spring Chinook to the total Trinity River run-size estimate upstream of JCW was 3,085 fish. This represents 63.8% (313/490) of the jacks, 70.8% (2,772/3,918) of the adult run, and 70.0% (3,085/4,408) overall (Table 4). Of the 2,772 TRH-origin adult spring Chinook in the run-size estimate, 1,475 escaped to TRH, while 1,163 escaped to areas outside of the hatchery and 134 were estimated as harvested. The contribution of TRH-produced spring Chinook (at 70.0%) to the total run-size is above the 25 year mean of 59.0% (Table 5 and Figure 9).

Spring Chinook Run-size, Angler Harvest and Spawner Escapement Estimates

An estimated run-size of 4,408 (95% CI 3,752 – 5,119) spring Chinook, composed of 490 jacks and 3,918 adults, migrated into the Trinity River basin upstream of JCW in 2015 (Appendix 8). Based on expansion of the tags returned by anglers, we estimate anglers harvested 0 jacks, and 190 adult spring Chinook during the 2015 season. Spawning escapement above JCW was an estimated 4,218 fish, including the 1,988 spring Chinook that entered TRH and 2,230 natural area spawners (Appendix 9). The escapement of 1,090 naturally-produced adult spring Chinook was 18.2% of the TRRP goal of 6,000 spring Chinook (Appendix 10). This year's run-size estimate is approximately 26% of the 36 year average spring Chinook run-size of 16,751. Estimated spring Chinook run-size has ranged from 2,381 fish in 1991 to 62,692 fish in 1988 (Appendix 11- 13).

Table 5. Estimated contributions of Trinity River Hatchery (TRH)-produced spring Chinook to total estimated run-size above Junction City weir, 1991-2015 seasons.

Year	Run-size	TRH component	Natural component	% TRH composition
1991	2,381	1,016	1,365	42.7%
1992	4,030	1,794	2,236	44.5%
1993	5,232	3,206	2,026	61.3%
1994	6,788	2,659	4,129	39.2%
1995	No estimate	No estimate	No estimate	No estimate
1996	23,416	12,524	10,892	53.5%
1997	20,039	8,303	11,736	41.4%
1998	16,167	8,774	7,393	54.3%
1999	11,293	7,616	3,677	67.4%
2000	26,083	19,730	6,353	75.6%
2001	19,622	12,051	7,571	61.4%
2002	38,485	24,599	13,886	63.9%
2003	47,795	33,546	14,249	70.2%
2004	16,147	11,324	4,823	70.1%
2005	13,984	10,966	3,018	78.4%
2006	7,483	3,649	3,834	48.8%
2007	14,835	12,099	2,736	81.6%
2008	10,283	4,577	5,706	44.5%
2009	7,426	3,973	3,453	53.5%
2010	11,285	4,505	6,780	39.9%
2011	19,219	9,846	9,373	51.2%
2012	25,617	16,306	9,311	63.7%
2013	8,961	6,146	2,815	68.6%
2014	6,959	4,828	2,131	69.4%
2015	4,408	3,085	1,323	70.0%
Means:	15,331	9,463	5,867	59.0%

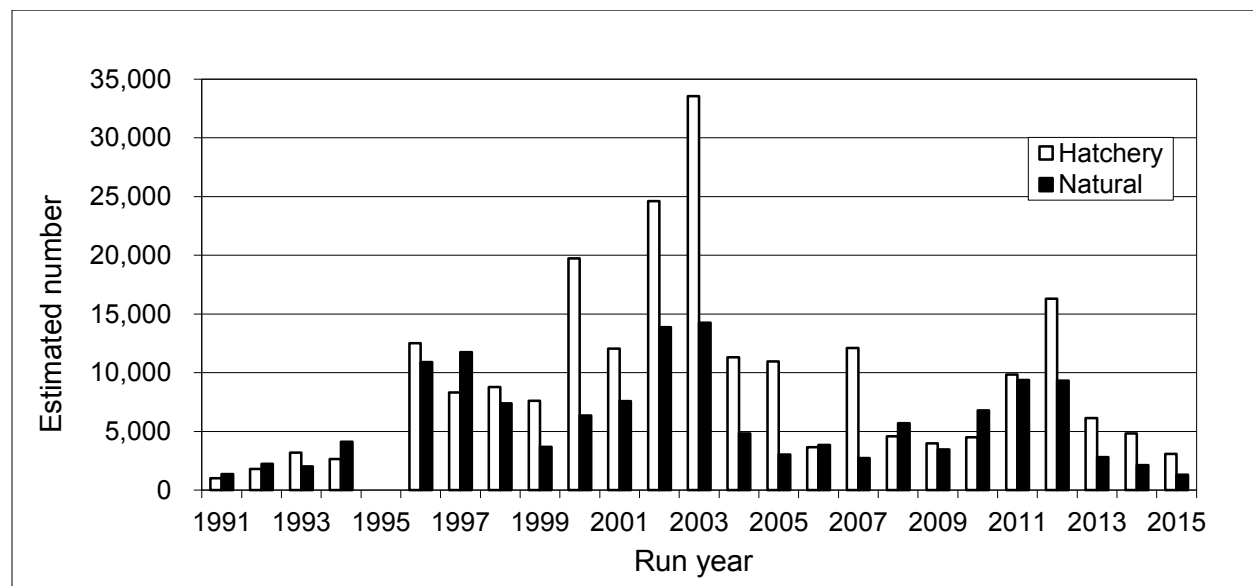


Figure 9. Hatchery and natural contributions to total spring Chinook run-size, upstream of Junction City weir, 1991 – 2015.

Fall Chinook Trapping and Tagging

Willow Creek weir was installed on 26 August (JW 34), and fished that night. The number of fall Chinook trapped peaked during JW 39, with 30.0 fish per night (Table 6, Figure 10). Trinity River Project personnel pulled conduit 09 September to accommodate emergency augmentation flows for the lower Klamath River, but were able to reinstall after missing only two days trapping during JW 37. Trapping continued as normally scheduled (Sunday through Thursday nights) until 02 December (JW 48), when a large storm on the horizon signaled the close of the season and we removed the weir.

A total of 875 fall Chinook were trapped at WCW, of which 855 (187 jack and 668 adult) were effectively tagged (Appendix 14). There were no observed tagging mortalities and five fish reported as caught and released (their tags removed) by anglers. Ad-clipped fish comprised 10.5% of the fall Chinook captured (92 of 875) at WCW. All fall Chinook trapped and tagged at WCW in 2015 were determined to be fall Chinook.

Size and Age of Trapped Fish

Fall Chinook trapped at WCW and TRH averaged 66.0 and 66.5 cm FL, respectively, with a combined average 66.4 cm FL (Figure 11). Using fork length distribution analysis, the nadir separating jack from adult fall Chinook was between 53 and 54 cm FL. Data from known age, hatchery-marked fall Chinook that entered TRH supported the minimum adult fork length of 54 cm. As with spring Chinook, there was some overlap between sizes of age 2 and age 3 fish (Appendix 15), but, again, the mean FL of those CWT brood years (BY) was distinctly different. We used scales collected at WCW and TRH and aged by HVTF to estimate proportions of jacks at 26.5% and 6.7% at WCW and TRH, respectively.

Table 6. Weekly summary of Chinook trapped in the Trinity River at Willow Creek weir during 2015.^a

Julian week	Inclusive dates	Nights trapped	Number trapped					Ad-clip total	Fish/night
			Jacks ^b	Ad-clip ^c Jacks	Adults	Ad-clip Adults	Total		
35	27-Aug - 2-Sep	5	7		17	1	24	1	4.8
36	3-Sep - 9-Sep	5	9		16	1	25	1	5.0
37	10-Sep - 16-Sep	3	1		2		3	0	1.0
38	17-Sep - 23-Sep	5	39	1	59	6	98	7	19.6
39	24-Sep - 30-Sep	5	65	7	85	14	150	21	30.0
40	1-Oct - 7-Oct	5	25		89	12	114	12	22.8
41	8-Oct - 14-Oct	5	16	1	49	6	65	7	13.0
42	15-Oct - 21-Oct	5	9	3	39	9	48	12	9.6
43	22-Oct - 28-Oct	5	18	2	70	3	88	5	17.6
44	29-Oct - 4-Nov	5	17	1	66	11	83	12	16.6
45	5-Nov - 11-Nov	5	10		36	5	46	5	9.2
46	12-Nov - 18-Nov	5	14		73	7	87	7	17.4
47	19-Nov - 25-Nov	5	4		38	3	42	3	8.4
48	26-Nov - 2-Dec	4	1		1		2	0	0.5
Total:		67	235	15	640	78	875	93	
Mean:									13.1

a/ Trapping at Willow Creek weir took place August 27 - December 01, 2015 (Julian weeks 35-48).

b/ Fall Chinook <54 cm FL were considered jacks in 2015.

c/ Adipose fin-clipped Chinook. Number shown is a subset of weekly jack and adult Chinook totals.

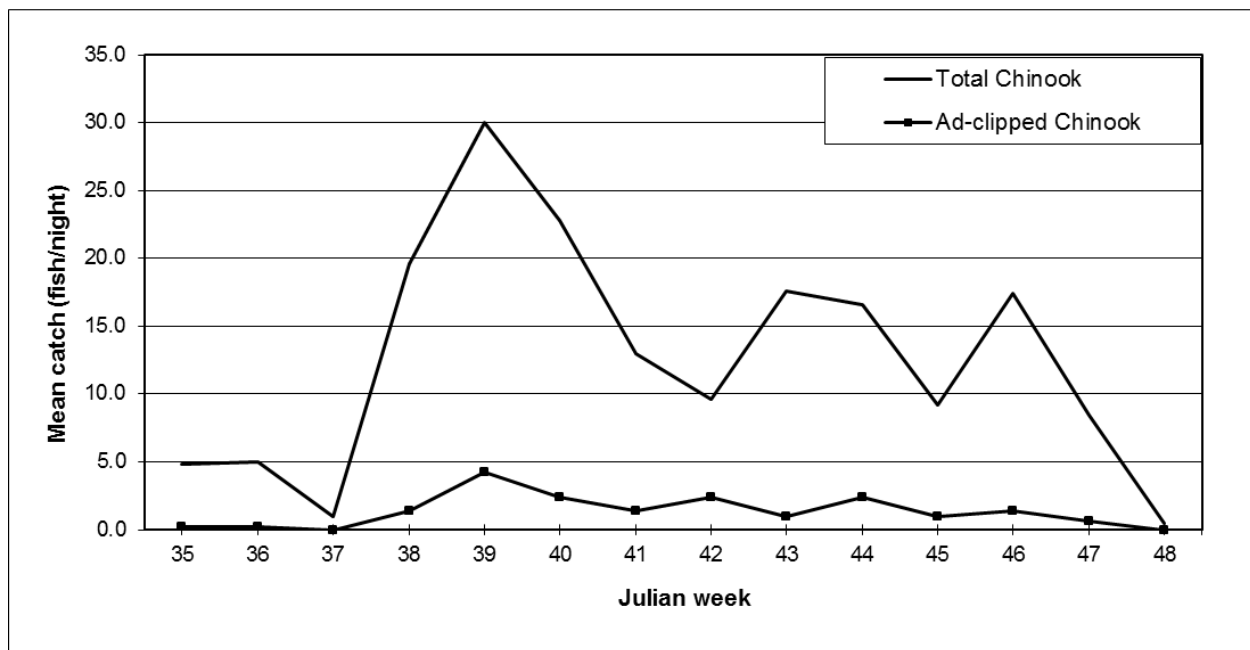


Figure 10. Mean catch of fall Chinook in the Trinity River at Willow Creek weir, 2015.

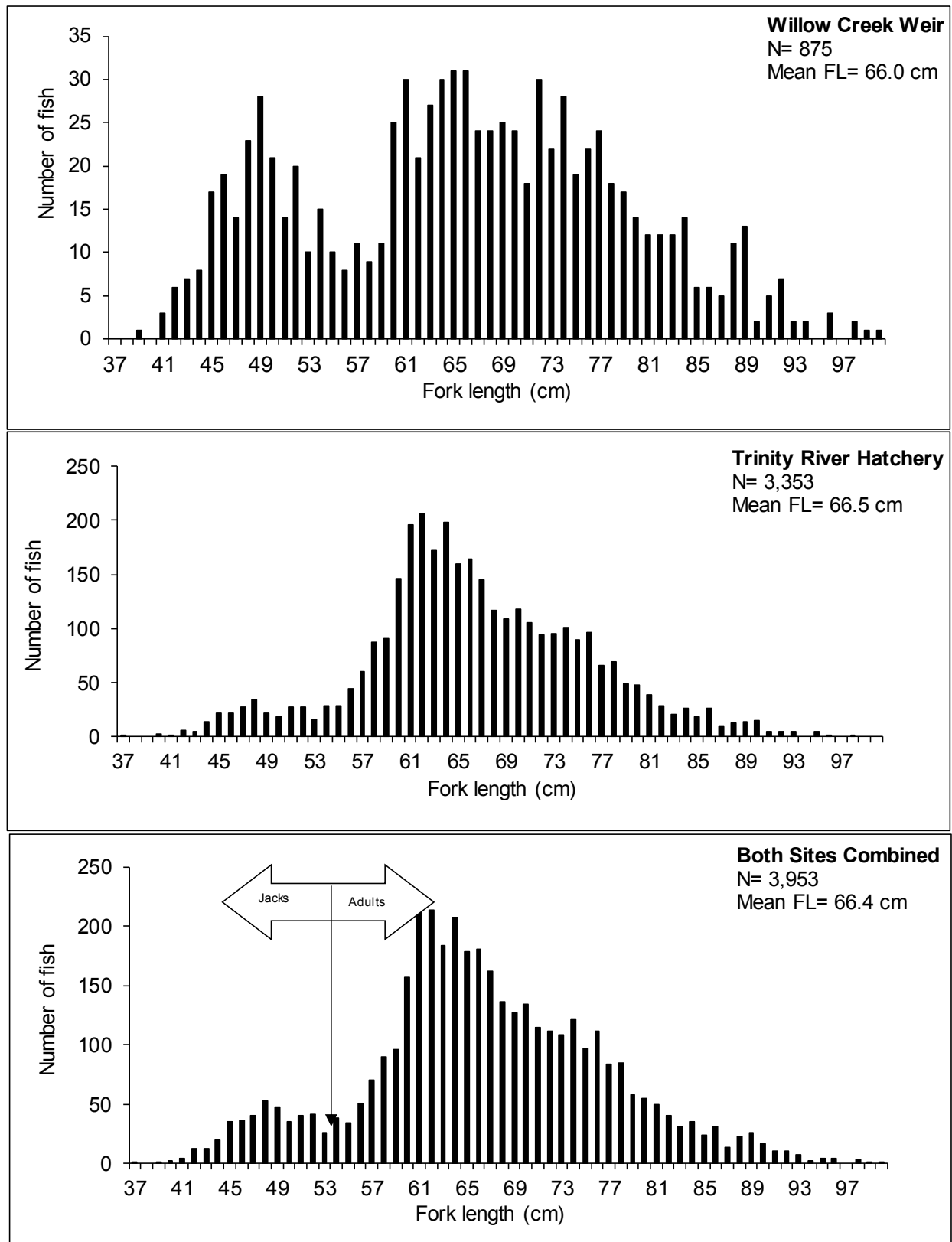


Figure 11. Fork length frequency distribution of fall Chinook at Willow Creek weir and Trinity River Hatchery, 2015.

Fall Chinook Recovery

Angler Tag Recovery

One Project-tagged jack fall Chinook was reported harvested in 2015 (Appendix 14), for an estimated harvest of 17 jacks. The reported harvest of three Project-tagged adult fall Chinook represents an estimated harvest of 37 adults. The total harvest rate of Project-tagged fall Chinook upstream of WCW was 0.76% for jacks, 0.46% for adults. There were five tag returns from fall Chinook in the catch and release fishery, and two tags found and returned by anglers or other river users.

Spawner Survey Recovery

During 2015 spawner surveys 12 Project-tagged fall Chinook were recovered.

Tagging Mortalities

There were no observed fall Chinook tagging mortalities at WCW in 2015.

Trinity River Hatchery Recovery

Coded wire tagged fall Chinook entered TRH from JW 39 through JW 49 (Table 7). Recovery of fall Chinook peaked in JWs 44 and 46 when 900 and 773 fish entered (Appendix 5), whereas the highest number of fall CWT Chinook arrived to TRH JW 43. Of the 855 fall Chinook effectively tagged at WCW, 276 (32.3%) were recovered at TRH. Based on run-timing (from CWT analysis) an estimated 3,353 (224 jack and 3,129 adult) fall Chinook were recovered at TRH, from which 750 readable CWTs were recovered.

Run size, Angler Harvest and Escapement of Coded-wire Tagged Fall Chinook

Based on estimated total fall Chinook run-size above WCW, the ad-clip rate at WCW, estimated angler harvest rate, and recovery of fall-run CWT fish at TRH, we estimate 1,037 (127 jack and 910 adult) CWT fall Chinook returned to the Trinity River above WCW during the 2015 season, and one jack and four adult CWT fall fish were harvested by anglers. Escapement of CWT fall Chinook was divided between 751 fish recovered at TRH and 281 estimated available to spawn in natural areas. Known age composition of the 2015 CWT fall Chinook run was composed of 128 (12.3%) age 2; 509 (49.1%) age 3; 376 (36.3%) age 4; and 25 (2.4%) age 5 fish.

Table 7. Recoveries at Trinity River Hatchery, by Julian week, of TRH-origin coded-wire tagged fall Chinook during the 2015-16 season.

CWT number and release type ^c	Brood year	Number of fall Chinook entering TRH, by Julian week ^{ab}												
		39	40	41	42 ^d	43	44	45	46	47	48	49	50	Totals
068777-f	2010						1							1
068778-f	2010					1	1							2
068779-f	2010					1	1				1			3
068792-f ^e	2010	1												
068781-y	2010					3		1	4	1	1	2		12
068830-f	2011					1	2							3
068841-f	2011					3	1	2						6
068842-f	2011					6	2	2	1	2				13
068844-f	2011						2	2	2	1				7
068845-f	2011						1		5	1	1			8
060422-f ^e	2011	1												1
068847-y	2011	2	6	2		71	59	46	37	14	14	3		254
060493-f	2012					6	2	3	2	2				15
060494-f	2012					7	5	1						13
060495-f	2012							2	2					4
060496-f	2012							2						2
060499-f	2012							1						1
060504-y	2012	2	1	4		83	102	85	60	10	10	3		360
060608-f	2013					4	2		3					9
060609-f	2013					3	2	1						6
060610-f	2013					1		1	1					3
060611-f	2013						2	1						3
060613-y	2013		1			6	4	8	2			1		22
068850-f	2013					1								1
No CWT ^f						4	3	1	4					12
Weekly totals:		6	8	6	0	201	192	159	123	31	27	9	0	

a/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 8, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

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

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

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

e/ These fish are Iron Gate Hatchery-origin fish that strayed to TRH.

f/ No CWTs were recovered from these ad-clipped fish. Chinook with shed or lost tags recovered after Julian week 41 were considered fall Chinook.

2010 Brood Year

The 2015 spawning season was the last year for returns of the 2010 BY. Total contribution of the six (five fingerling and one yearling) 2010 BY tag code release groups that returned to the Trinity River ranged from 0.13% (a fingerling group) to 0.96% (the yearling group) (Appendix 16). Percent return of the 2010 BY fingerlings release type was 0.18%, and 0.96% for the yearlings, with a combined final total return rate for all 2010 BY fall Chinook release groups of approximately 0.436%, which is below the mean return rate of 0.845% since 1986 (Appendix 17).

Table 8. Run-size, angler harvest and spawner escapement estimates for Trinity River Hatchery-produced coded-wire tagged fall Chinook returning to the Trinity River during the 2015-16 season.

			Run-size estimate		Harvest rates		TRH	Percentage of		Ad+CWT		
							Ad-clips	ad clips at weir		run-size estimates		
Run-size estimates			Jacks	Adults	Jacks	Adults	CWTs	Jacks	Adults	Jacks	Adults	Total
Fall Chinook (WCW)			2,750	7,615	0.76%	0.46%	98.4%	4.71%	12.14%	128	910	1,037
CWT			TRH		% of		Angler	Spawning escapement				
code	BY	Age	Total No.		total	Run-size	harvest	TRH	Natural	Total		
Fall Chinook salmon												
Adults												
068777	10	5	1.01		0.14%	1.3	0.01	1.01	0.28	1.29		
068778	10	5	2.03		0.29%	2.6	0.01	2.03	0.57	2.60		
068779	10	5	3.03		0.43%	3.9	0.02	3.03	0.85	3.88		
068781	10	5	12.07		1.71%	15.5	0.07	12.07	3.39	15.46		
068792	10	5	1.00		0.14%	1.3	0.01	1.00	0.28	1.28		
060422	11	4	1.00		0.14%	1.3	0.01	1.00	0.28	1.28		
068830	11	4	3.04		0.43%	3.9	0.02	3.04	0.85	3.89		
068841	11	4	6.08		0.86%	7.8	0.04	6.08	1.71	7.79		
068842	11	4	13.16		1.86%	16.9	0.08	13.16	3.70	16.86		
068844	11	4	7.03		0.99%	9.0	0.04	7.03	1.98	9.01		
068845	11	4	8.01		1.13%	10.3	0.05	8.01	2.25	10.26		
068847	11	4	254.00		35.93%	326.9	1.49	254.00	71.39	325.39		
060493	12	3	15.16		2.14%	19.5	0.09	15.16	4.26	19.42		
060494	12	3	13.20		1.87%	17.0	0.08	13.20	3.71	16.91		
060495	12	3	4.01		0.57%	5.2	0.02	4.01	1.13	5.14		
060496	12	3	2.01		0.28%	2.6	0.01	2.01	0.56	2.57		
060499	12	3	1.01		0.14%	1.3	0.01	1.01	0.28	1.29		
060504	12	3	360.00		50.93%	463.3	2.12	360.00	101.18	461.18		
Totals:			706.85		100.0%	909.7	4.16	706.85	198.66	905.51		
Jacks												
060608	13	2	9.10		20.46%	26.1	0.20	9.10	16.80	25.90		
060609	13	2	6.09		13.69%	17.5	0.13	6.09	11.24	17.33		
060610	13	2	3.03		6.81%	8.7	0.07	3.03	5.59	8.62		
060611	13	2	3.03		6.81%	8.7	0.07	3.03	5.59	8.62		
060613	13	2	22.21		49.93%	63.7	0.48	22.21	41.00	63.21		
068850	13	2	1.02		2.29%	2.9	0.02	1.02	1.88	2.90		
Totals:			44.48		100.0%	127.6	0.97	44.48	82.11	126.59		
Fall Totals:			751.33			1,037.2	5.12	751.33	280.77	1,032.10		

Contribution of Hatchery-Produced Fall Chinook to Total Estimated Run-Size

Estimated contribution of hatchery-origin fall Chinook to the total Trinity River run-size estimate upstream of WCW was 4,531 fish. This represents 23.2% (524/2,262) of the jacks, 49.4% (4,006/8,102) of the adult run, and 43.7% (4,531/10,365) overall (Table 9).

Of the 4,006 TRH adult fall Chinook in the run-size estimate 3,113 escaped to TRH, whereas 875 escaped to natural areas and 18 were estimated as harvested.

The contribution of TRH-produced fall Chinook (at 43.7%) to the total run-size is below the 25 year mean of 50.5% (Table 10 and Figure 13).

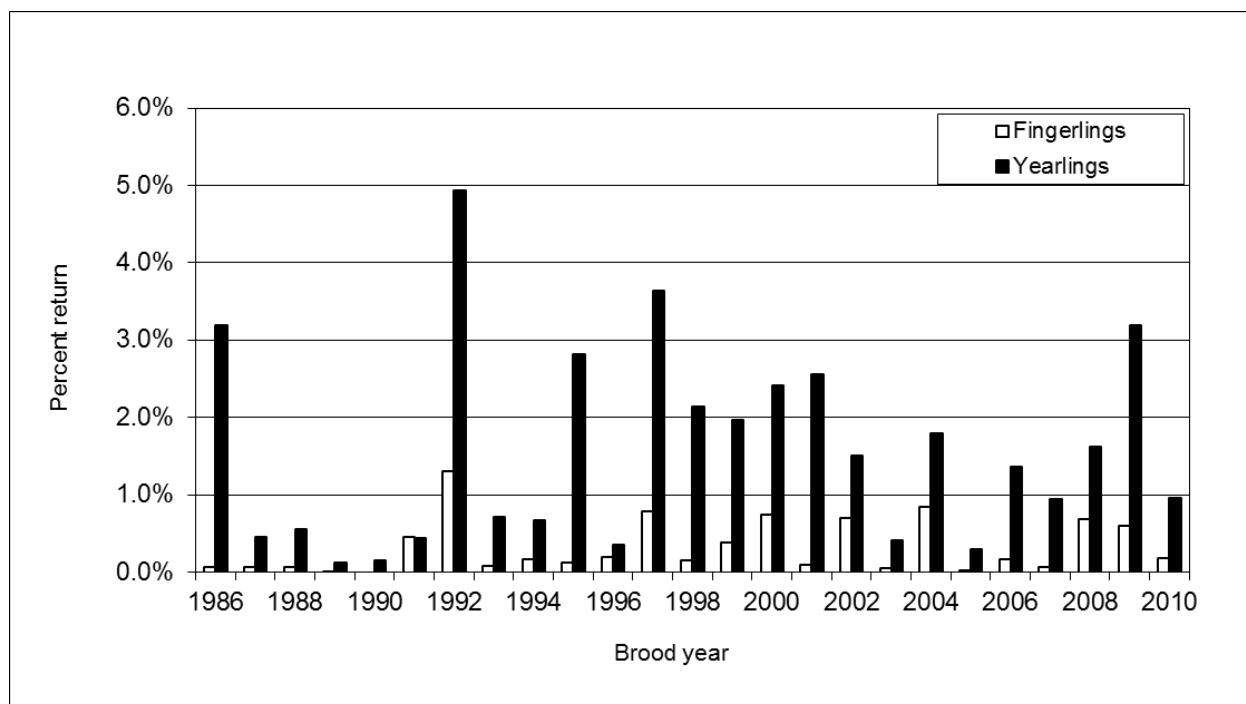


Figure 12. Percent return of Trinity River Hatchery produced, coded-wire tagged, fall Chinook salmon, brood years 1986-2010.

Table 9. Estimated run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery-produced fall Chinook salmon expanded for unmarked releases (hatchery multiplier) returning to the Trinity River during the 2015-16 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	River	Expanded River	Escapement Total	Expanded total
Fall Chinook													
Adults													
068777	10	5	4.20	1.30	5.47	0.01	0.04	1.01	4.25	0.28	1.18	1.29	5.42
068778	10	5	4.08	2.61	10.65	0.01	0.04	2.03	8.28	0.57	2.33	2.60	10.61
068779	10	5	4.07	3.90	15.86	0.02	0.08	3.03	12.32	0.85	3.46	3.88	15.78
068781	10	5	4.08	15.53	63.42	0.07	0.29	12.07	49.29	3.39	13.84	15.46	63.13
068792	10	5	4.04	1.29	5.22	0.01	0.04	1.00	4.04	0.28	1.13	1.28	5.18
Total 5 year olds				24.63	100.61	0.12	0.49	19.14	78.18	5.37	21.93	24.51	100.12
060422	11	4	4.00	1.29	5.17	0.01	0.04	1.00	4.00	0.28	1.12	1.28	5.13
068830	11	4	6.06	3.91	23.70	0.02	0.12	3.04	18.43	0.85	5.15	3.89	23.58
068841	11	4	4.99	7.82	38.99	0.04	0.20	6.08	30.32	1.70	8.48	7.78	38.79
068842	11	4	4.74	16.94	80.33	0.08	0.38	13.16	62.40	3.70	17.55	16.86	79.95
068844	11	4	4.30	9.05	38.95	0.04	0.17	7.03	30.25	1.98	8.52	9.01	38.77
068845	11	4	4.48	10.31	46.17	0.05	0.22	8.01	35.87	2.25	10.08	10.26	45.94
068847	11	4	4.32	326.88	1,411.84	1.49	6.44	254.00	1,097.06	71.39	308.34	325.39	1,405.40
Total 4 year olds				376.20	1,645.14	1.73	7.57	292.32	1,278.33	82.15	359.23	374.47	1,637.57
060493	12	3	4.43	19.51	86.43	0.09	0.40	15.16	67.16	4.26	18.87	19.42	86.04
060494	12	3	4.39	16.99	74.54	0.08	0.35	13.20	57.91	3.71	16.28	16.91	74.19
060495	12	3	4.49	5.16	23.15	0.02	0.09	4.01	17.99	1.13	5.07	5.14	23.06
060496	12	3	4.53	2.59	11.73	0.01	0.05	2.01	9.10	0.57	2.58	2.58	11.68
060499	12	3	4.94	1.30	6.43	0.01	0.05	1.01	4.99	0.28	1.38	1.29	6.38
060504	12	3	4.44	463.29	2,058.33	2.12	9.42	360.00	1,599.43	101.17	449.48	461.17	2,048.91
Total 3 year olds				508.84	2,260.60	2.33	10.35	395.39	1,756.58	111.12	493.67	506.51	2,250.25
TOTAL ADULT				909.67	4,006.35	4.18	18.42	706.85	3,113.10	198.64	874.84	905.49	3,987.94
Jacks													
060608	13	2	4.10	26.10	107.1	0.20	0.82	9.10	37.34	16.80	68.93	25.90	106.27
060609	13	2	4.12	17.46	72.0	0.13	0.54	6.09	25.11	11.24	46.34	17.33	71.45
060610	13	2	4.08	8.69	35.5	0.07	0.29	3.03	12.36	5.59	22.81	8.62	35.17
060611	13	2	4.08	8.69	35.4	0.07	0.29	3.03	12.35	5.59	22.78	8.62	35.14
060613	13	2	4.12	63.69	262.4	0.48	1.98	22.21	91.51	41.00	168.92	63.21	260.43
068850	13	2	4.10	2.93	12.0	0.02	0.08	1.02	4.18	1.89	7.75	2.91	11.93
TOTAL JACK				127.56	524.37	0.97	3.99	44.48	182.85	82.11	337.53	126.59	520.38
TOTAL FALL CHINOOK				1,037.23	4,530.72	5.12	22.40	751.33	3,295.95	280.75	1,212.37	1,032.08	4,508.32

a/ Estimate is for upstream of Willow Creek weir.

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.

Table 10. Estimated contributions of Trinity River Hatchery (TRH)-produced fall Chinook to total estimated run-size above Willow Creek weir, 1991-2015.

Year	Run-size	TRH component	Natural component	% TRH composition
1991	9,207	5,597	3,610	60.8%
1992	14,164	4,651	9,513	32.8%
1993	10,485	1,499	8,986	14.3%
1994	21,924	11,880	10,044	54.2%
1995	105,725	53,263	52,462	50.4%
1996	55,646	20,824	34,822	37.4%
1997	21,347	9,977	11,370	46.7%
1998	43,189	23,536	19,653	54.5%
1999	18,516	13,081	5,435	70.6%
2000	55,473	38,881	16,592	70.1%
2001	57,109	33,984	23,125	59.5%
2002	18,156	6,884	11,272	37.9%
2003	64,362	52,944	11,418	82.3%
2004	29,534	25,956	3,578	87.9%
2005	28,231	19,674	8,557	69.7%
2006	34,912	21,768	13,144	62.4%
2007	58,873	24,633	34,240	41.8%
2008	22,997	8,585	14,412	37.3%
2009	29,593	10,072	19,521	34.0%
2010	40,792	15,853	24,939	38.9%
2011	80,818	32,875	47,943	40.7%
2012	73,666	32,735	40,931	44.4%
2013	36,989	13,371	23,618	36.1%
2014	37,829	20,481	17,348	54.1%
2015	10,365	4,531	5,834	43.7%
Means:	39,196	20,301	18,895	50.5%

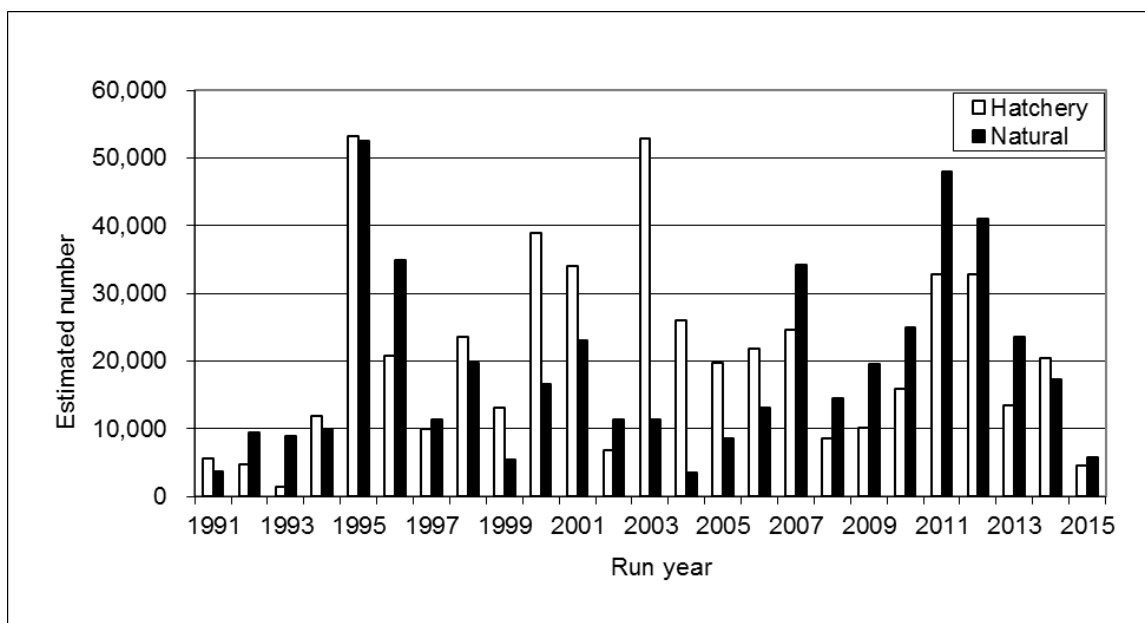


Figure 13. Hatchery and natural contributions to total fall Chinook run-size, upstream of Willow Creek weir, 1991 - 2015.

Fall Chinook Run-size, Angler Harvest and Spawner Escapement Estimates

An estimated run-size of 10,365 (95% CI 9,230 – 11,569) fall Chinook, composed of 2,262 jacks and 7,615 adults, migrated into the Trinity River basin upstream of WCW in 2015 (Appendix 8). Trinity River fall Chinook spawner escapement was estimated at 10,309 (2,729 jack and 7,580 adult) fish, including 3,353 fall Chinook that entered TRH and 6,956 natural area spawners (Appendix 9). Harvest rates generated from tags applied at WCW were used to estimate 21 jack and 35 adult fall Chinook harvested by anglers. The estimated total fall Chinook run-size, upstream of WCW, has ranged from 9,207 fish in 1991 to 147,888 fish in 1986 (Appendix 18, Appendix 19 and Appendix 20). This year's fall Chinook estimated run-size of 10,365 is approximately 24.2% of the 42,753 mean run-size for the years since 1977. The 3,592 naturally-produced adult fall Chinook component of the spawning escapement was 5.8% of the 62,000 TRRP goal (Appendix 10).

Coho Salmon Trapping and Tagging

A total of 494 coho were trapped at WCW during the 2015 season. We applied tags to 479 (96 jacks and 383 adult) of the trapped fish (Appendix 21). We chose not to tag 15 fish to minimize stress that may lead to tagging mortality. Coho were trapped most weeks of the sampling season at WCW, except JWs 35 and 37. The number of trapped coho peaked in JW 41 with 31.8/night (Table 11, Figure 14), which coincided with the peak of right-maxillary clipped [RM (TRH-origin)] coho, when 27.0/night were trapped. Hatchery-origin fish comprised 82.4% (407 of 494) of the total coho captured at WCW.

Size and Age of Trapped Fish

Coho trapped at WCW and TRH averaged 57.4 and 60.7 cm FL, respectively, with a combined average of 60.6 cm FL (Figure 15). Using FL distribution analysis, the nadir separating jack from adult coho salmon was between 50 and 51 cm FL. Based on the nadir, jacks comprised 20.2% of the coho sampled at WCW, and 8.3% at TRH.

Table 11. Weekly summary of coho trapped in the Trinity River at Willow Creek weir during 2015.^a

Julian week	Inclusive dates	Nights trapped	Number trapped						Fish / night
			Jacks ^b	RM clip ^c Jacks	Adults	RM clip Adults	Total trapped	Total RM clips	
35	27-Aug - 2-Sep	5	0	0	0	0	0	0	0.0
36	3-Sep - 9-Sep	5	1	0	0	0	1	0	0.2
37	10-Sep - 16-Sep	3	0	0	0	0	0	0	0.0
38	17-Sep - 23-Sep	5	5	5	6	5	11	10	2.2
39	24-Sep - 30-Sep	5	7	6	19	16	26	22	5.2
40	1-Oct - 7-Oct	5	9	9	40	30	49	39	9.8
41	8-Oct - 14-Oct	5	41	40	118	95	159	135	31.8
42	15-Oct - 21-Oct	5	26	23	119	96	145	119	29.0
43	22-Oct - 28-Oct	5	7	6	26	20	33	26	6.6
44	29-Oct - 4-Nov	5	2	2	28	22	30	24	6.0
45	5-Nov - 11-Nov	5	1	1	16	12	17	13	3.4
46	12-Nov - 18-Nov	5	0	0	12	10	12	10	2.4
47	19-Nov - 25-Nov	5	1	1	8	6	9	7	1.8
48	26-Nov - 2-Dec	4	0	0	2	2	2	2	0.5
Total:		67	100	93	394	314	494	407	
Mean:									7.4

a/ Trapping at Willow Creek weir took place August 27 -December 01, 2015 (Julian weeks 35-48).

b/ Coho <51cm FL were considered jacks in 2015.

c/ Right maxillary clipped coho. Number shown is a subset of weekly jack and adult coho totals.

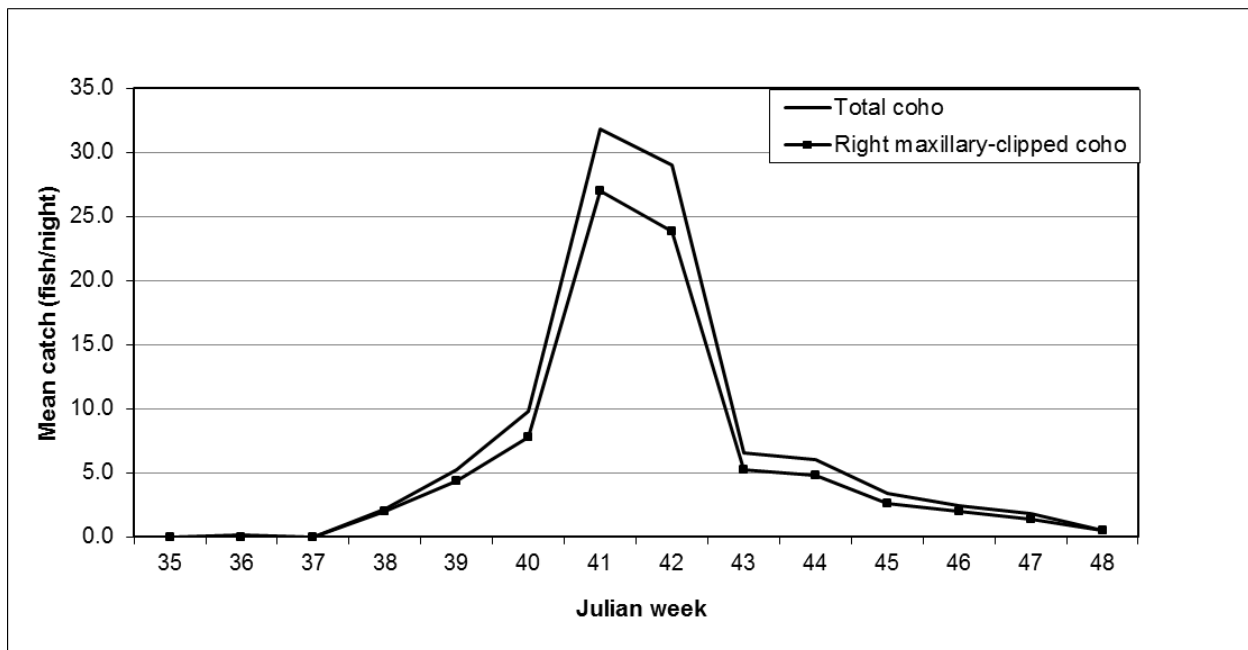


Figure 14. Mean catch of coho trapped in the Trinity River at Willow Creek weir, 2015.

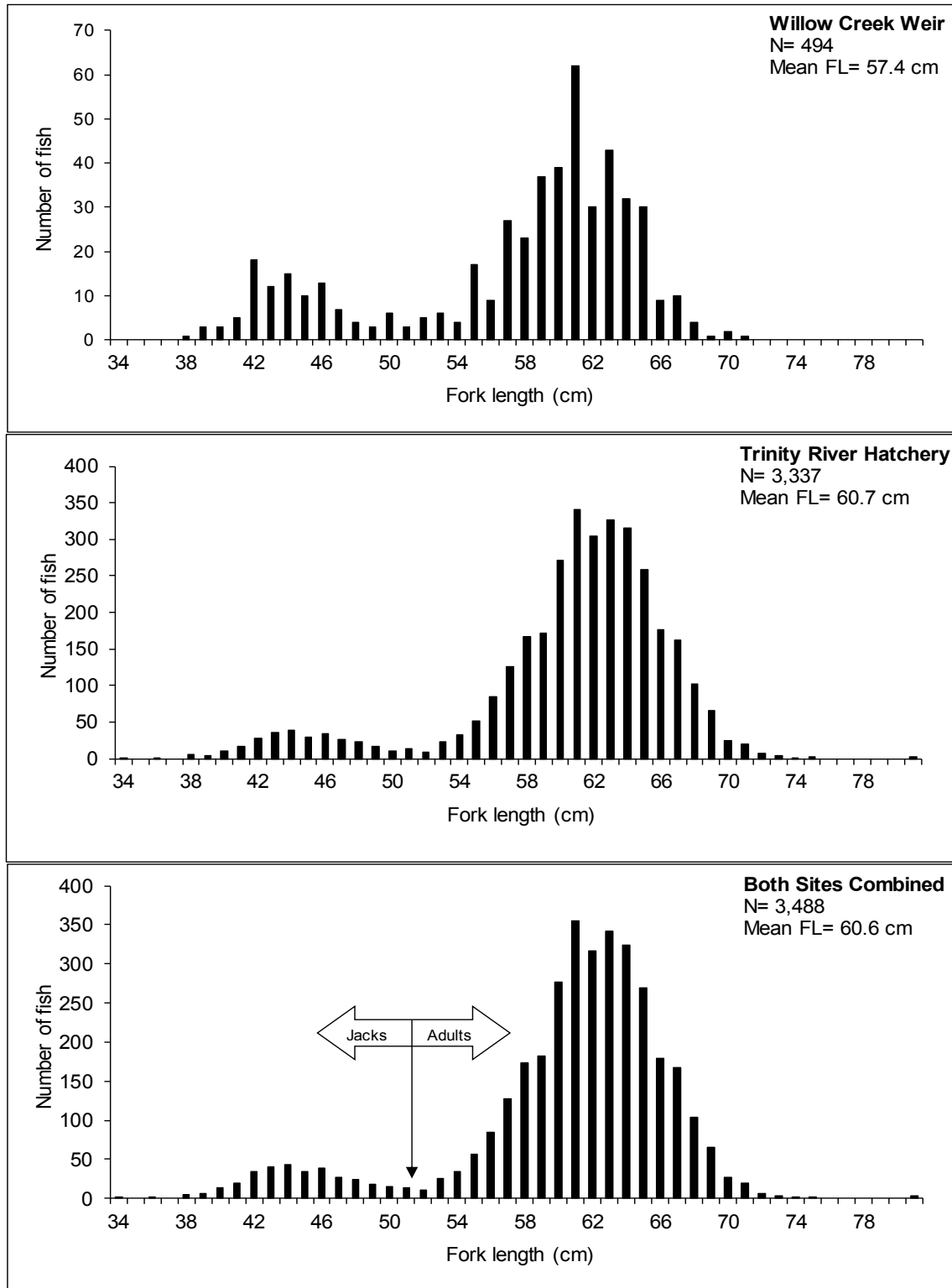


Figure 15. Coho salmon fork lengths (cm) observed at Willow Creek weir, Trinity River Hatchery and both sites combined during the 2015-16 season. The arrow denotes the size used to separate jacks and adults for analysis.

Coho Salmon Recovery

Angler Tag Recovery

There was no reported harvest of Project-tagged coho in 2015 (Appendix 21). There were four tags returned from the catch and release fishery.

Spawner Survey Recovery

During the spawner surveys two adult Project-tagged coho were recovered.

Tagging Mortalities

We observed no coho mortalities at WCW in 2015.

Trinity River Hatchery Recovery

The first coho entered TRH during JW 39 and coho continued returning through JW 52 of 2015 (Appendix 5). The run peaked in JW 47 when 1,203 coho entered TRH. A total of 3,337 coho (278 jack and 3,059 adults) were recovered at TRH during the season. Of the 475 coho effectively tagged at WCW, 343 were recaptured at TRH.

Of the 3,337 coho that entered TRH in 2015, we observed 3,040 (91.1%) with right-maxillary (RM) clips, indicating TRH-origin; 297 (8.9%) had no clip. Unclipped fish are assumed to be naturally-produced coho salmon.

Based on length frequency analysis, TRH-produced RM-clipped coho salmon were assigned into two brood years (Table 12). The 270 coho measuring less than 51 cm FL were considered jacks (age 2, from the 2013 BY), and the 2,770 greater than 50 cm FL were considered adults (age 3, from the 2012 BY). The 297 coho without RM clips that entered the hatchery were also considered jacks or adults based on those lengths.

Table 12. Release and recovery data for right maxillary-clipped coho recovered at Trinity River Hatchery (TRH) during the 2015-16 season.

	Release data					TRH Recovery data					Number recovered	
	Egg source	Brood year	Date	Number	Site	Males		Females		Total No.	Tagging site	
						No.	FL ^a	No.	FL ^a		WCW	JCW
RM ^b	TRH	2012	03/15-18/14	528,029	TRH	1,128	62.4	1,642	61.8	2,770	285	--
RM ^b	TRH	2013	03/15-23/15	287,720	TRH	225	44.5	45	45.5	270	58	--
Total coho:						1,353		1,687		3,040	343	0

a/ FL = Mean fork length in cm.

b/ Since 1996, all coho produced at TRH have received a right maxillary clip (RM). Coho <51 cm FL were classified as brood year 2013 and coho >50 cm FL were classified as brood year 2012. Age cutoff based on fork length distribution.

Coho Salmon Run-size, Angler Harvest and Spawner Escapement Estimates

An estimated run-size of 4,619 coho (95% CI 4,169 – 5,094) composed of 935 jacks and 3,684 adults, migrated into the Trinity River basin upstream of the WCW in 2015 (Appendix 8). A count of 3,337 entered TRH (Appendix 9) and we estimate 1,282 were natural area spawners. The 2015 coho escapement was comprised of an estimated 748 adult and 65 jack naturally-produced coho in addition to 2,936 hatchery-produced adults and 870 hatchery-produced jacks (Appendix 22 and Appendix 23). There were no project tags returned by anglers who reported harvest, therefore we assume no coho harvest for 2015. Escapement of 748 naturally-produced coho adults was 53.4% the TRRP goal of 1,400 fish (Appendix 10). Estimated coho run-size, upstream of WCW, has ranged from 852 fish in 1994 to 59,079 fish in 1987 (

Appendix 24 and Appendix 25). This year's run-size of 4,619 is ranked 35th of the 39 years on record, and is 27.6% of the 16,747 fish average.

Coho Brood Year Performance

Coho salmon of the Trinity River typically have a three year life-cycle with juveniles rearing in freshwater during their first year, then migrating to the ocean. After approximately one year at sea, jacks (mostly males) return to the river as two year olds and a year later as three year-old adults. Coho salmon jacks (age 2) returning during 2015 were of BY 2013 brood stock; coho adults (age 3) returning to the Trinity River in 2015 were of BY 2012 brood stock. Total percent return for RM-clipped TRH-produced coho from BY 2012 was 1.21% (Table 13). Since 1994 the BY total return rate has ranged from 0.99 to 6.60 % (Appendix 26 and Appendix 27). The 2015 adult escapement of TRH BY 2012 was estimated at 2,936 fish. These consisted of 2,770 that entered TRH and an estimated 166 that spawned in natural areas. Total adult run-size estimate (3,684) for 2015 consisted of 79.7% TRH-produced fish. The TRH-produced jack escapement in 2015 from BY 2013 was estimated at 870 fish or 0.17% of the TRH total coho release, and contributed 93% of the total jack Trinity River coho run.

Table 13. Run-size, percent return, in-river angler harvest and spawner escapement estimates for Trinity River Hatchery (TRH) coho salmon returning to the Trinity River upstream of WCW during the 2015-16 season.

Release data				Return data						
Brood year	Date	Effective Number	Site	Age	Run-size	% of release	In-river harvest	Spawner Escapement		
2012	3/15-18/14	528,016	TRH	2	3,239	0.63%	0	932	2,307	3,239
				3	2,936	0.57%	0	2,770	166	2,936
				Totals	6,175	1.21%	0	3,702	2,473	6,175
2013	3/15-23/15	287,720	TRH	2	870	0.17%	0	270	600	870

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

b/ Number of marked (RM) coho estimated released.

c/ Age classes are determined using length frequency analysis.

d/ TRH= Trinity River Hatchery, actual count.

Juvenile Coho Marking at Trinity River Hatchery

The RM clipping of all BY 2014 coho salmon (age 1) at TRH was completed by 08 February 2016. Approximately 2% of these individuals (4,701) were sampled for RM clip quality and FL prior to the start of their volitional release. We estimate 230,476 of the 230,834 yearling coho released from TRH were effectively marked with a RM clip (Table 14).

The pre-release FL measurements of BY 2014 production ranged from 60 mm to 221 mm with a mean across all raceways of 130.8 mm.

Based on the quality control sampling, an estimated 99.85% of the BY 2014 production was effectively RM clipped.

Table 14. Production, marking totals, and quality control data for BY 2014 TRH coho salmon volitionally released beginning 15 March, 2016.

Raceway	Net marked	2% check	Estimated % unmarked	Effectively marked	Estimated unmarked releases	Marked releases	Total released
M3-M4	41,849	837	0.20%	41,850	85	41,776	41,861
M1-M2	23,576	472	0.12%	23,577	28	23,542	23,570
N3-N4	40,938	819	0.24%	40,940	98	40,883	40,981
N1-N2	42,952	859	0.11%	42,953	48	42,908	42,956
O3-O4	39,253	785	0.13%	39,254	50	39,196	39,246
O1-O2	42,233	845	0.12%	42,234	50	42,170	42,220
Total	230,801	4,616	0.15%	230,808	358	230,476	230,834

a/ Effectively marked = Net marked + QC re-clipped

Fall Adult Steelhead Trapping and Tagging

Fifty-four adult steelhead were trapped at JCW in 2015; five of which were ad-clipped, indicating TRH-origin; most were trapped during JWs 27 and 29. Ad-clipped fish were tagged, but because the run-size estimate for steelhead is above WCW, results of this tagging are purely qualitative in nature and not included in run-size estimates.

We trapped 1,280 fall-run steelhead at WCW in 2015 (Table 15, Figure 16); 65 half-pounders (<42 cm FL) and 1,215 adults. Steelhead run peaked in JW 41 when we averaged 66.2 steelhead per night. There was a conspicuous lack of steelhead trapped in JW 43, but very similar average per unit effort of ad-clipped (hatchery-origin) steelhead and non-ad clipped (natural-origin) steelhead throughout the season.

Of the 1,215 adult steelhead trapped during the season, 1,206 were tagged (Appendix 28). There was no observed tagging mortality, and 238 fish reported as caught and released (their tags removed) by anglers, leaving 968 effective tags. Hatchery-origin adult fish comprised 78.0% (948 of 1,215) of the steelhead captured at WCW, and 98.9% of the adult steelhead at TRH.

Size of Trapped Fish

Steelhead trapped at WCW and TRH averaged 56.6 and 55.9 cm FL, respectively, with a combined average of 56.0 cm FL (Figure 17). Adult steelhead (>41 cm FL) made up 94.9% and 93.9% of the steelhead trapped at WCW and TRH respectively.

Table 15. Weekly summary of fall-run steelhead trapped in the Trinity River at Willow Creek weir during 2015.^a

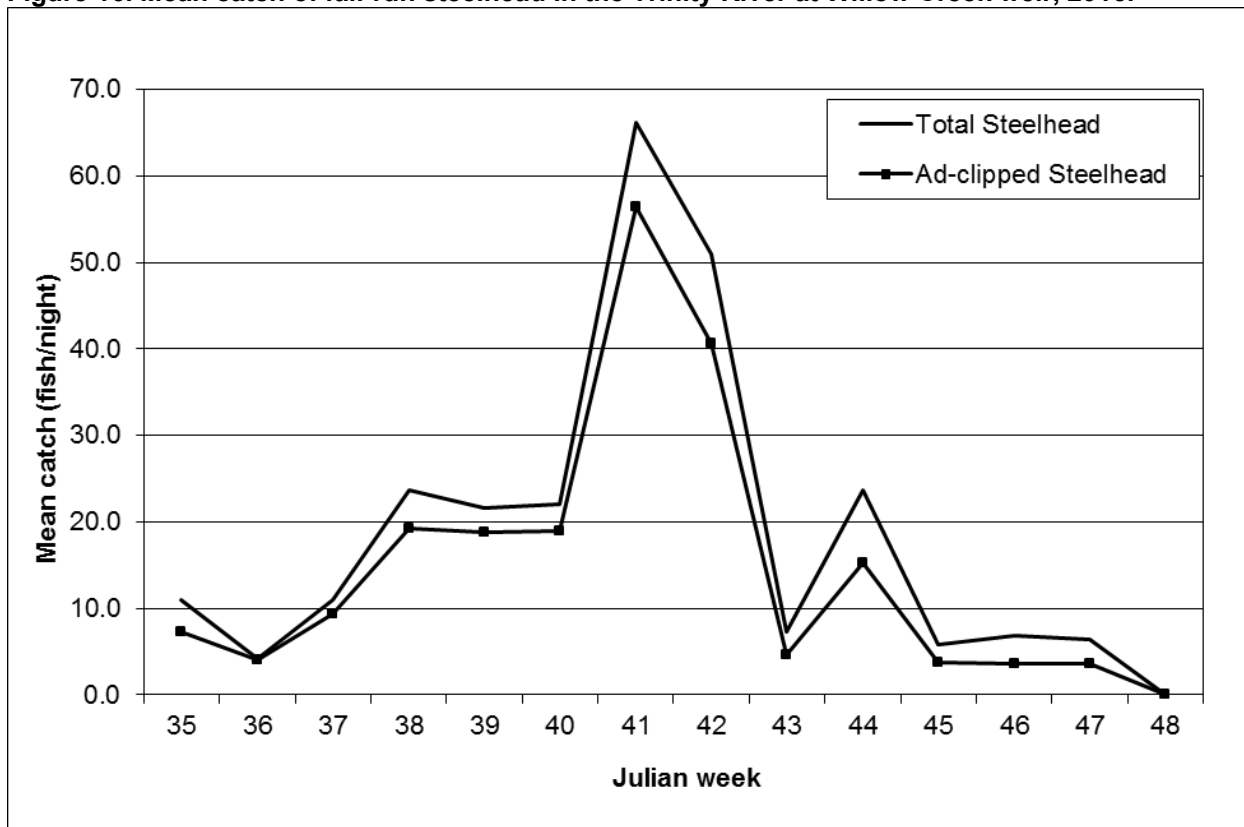
Julian week	Inclusive dates	Nights trapped	Number trapped						Fish/night
			1/2 lbers	Ad-clipped 1/2 lbers ^c	Ad-clipped Adults	Adults	Total	Ad-clip total	
35	27-Aug - 2-Sep	5	3	2	52	34	55	36	11.0
36	3-Sep - 9-Sep	5	2	2	19	18	21	20	4.2
37	10-Sep - 16-Sep	3	2	1	31	27	33	28	11.0
38	17-Sep - 23-Sep	5	8	8	110	88	118	96	23.6
39	24-Sep - 30-Sep	5	8	8	100	86	108	94	21.6
40	1-Oct - 7-Oct	5	7	6	103	89	110	95	22.0
41	8-Oct - 14-Oct	5	20	19	311	263	331	282	66.2
42	15-Oct - 21-Oct	5	9	8	246	195	255	203	51.0
43	22-Oct - 28-Oct	5	2	2	34	21	36	23	7.2
44	29-Oct - 4-Nov	5	2	2	116	74	118	76	23.6
45	5-Nov - 11-Nov	5	1	1	28	18	29	19	5.8
46	12-Nov - 18-Nov	5	1	1	33	17	34	18	6.8
47	19-Nov - 25-Nov	5	0	0	32	18	32	18	6.4
48	26-Nov - 2-Dec	4	0	0	0	0	0	0	0.0
Total:			67	65	60	1,215	948	1,280	1,008
Mean:									19.1

a/ Trapping at Willow Creek weir took place August 27 -December 01, 2015 (Julian weeks 35-48).

b/ Steelhead <42 cm FL were considered 1/2 lbers (half-pounders).

c/ Adipose fin-clipped steelhead. Number shown is a subset of weekly half-pounder and adult steelhead totals.

Figure 16. Mean catch of fall-run steelhead in the Trinity River at Willow Creek weir, 2015.



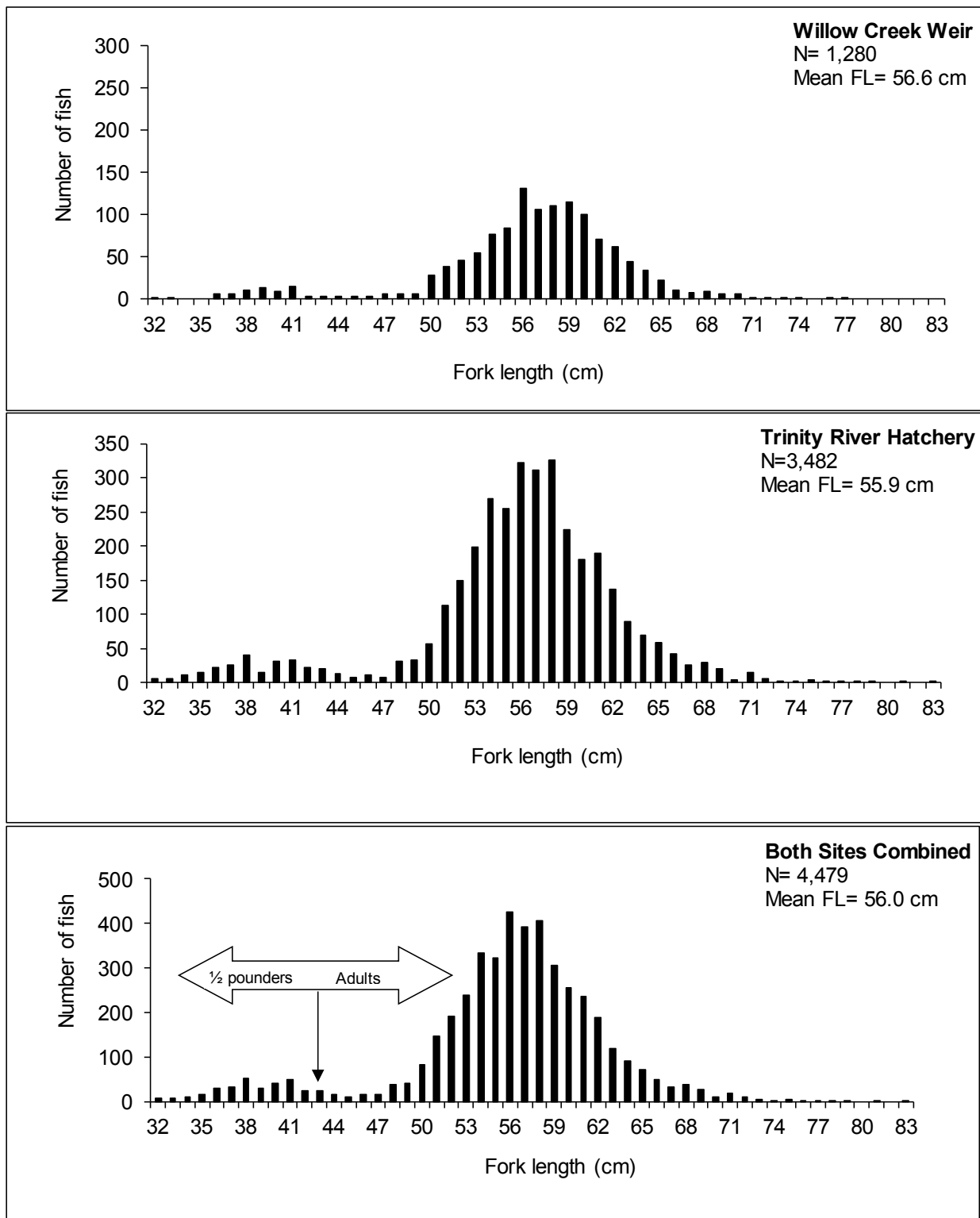


Figure 17. Steelhead fork lengths (cm) observed at Willow Creek weir, Trinity River Hatchery and both sites combined during the 2015-16 season. Arrow denotes the size used to separate ½ pounders (sub-adults) and adults for analysis.

Fall Steelhead Recovery

Angler Tag Recovery

There were 33 Project-tagged steelhead reported as harvested in 2015 (Appendix 28), and five tags found on the riverbank and returned by anglers or other river users. There were 238 tags returned from the catch and release fishery.

Spawner Survey Recovery

There were no Project-tagged steelhead recovered during the spawner surveys in 2015.

Tagging Mortalities

There were no steelhead mortalities identified as a result of tagging stress at WCW in 2015.

Trinity River Hatchery Recovery

Steelhead entered TRH during every week the fish ladder was open (Appendix 29.). JW 50 was the peak of the run, when 709 steelhead entered TRH. A total of 3,272 adult steelhead (plus 210 half pounders) were recovered at TRH during the season. Of the 968 steelhead effectively tagged at WCW, 283 (29.2%) were recaptured at TRH.

Adult Fall Steelhead Run-size, Angler Harvest and Spawner Escapement Estimates

An estimated run-size of 11,167 adult fall steelhead (95% CI 9,962 – 12,445) migrated upstream of WCW this season (Appendix 8). All 436 steelhead harvested by anglers above WCW (Appendix 9) were TRH-origin fish. Of the estimated 10,732 adult fish left as potential spawners, 3,272 (37 natural-origin and 3,235 hatchery-origin) entered TRH, and 7,459 were potentially natural area spawners, 2,417 of natural origin, and 5,043 of hatchery origin.

In the 32 years for which we have data since 1980, run-size estimates have ranged from 2,972 in 1998 to 53,885 in 2007 (Appendix 30 and Appendix 31). Mean estimated run-size for fall adult steelhead in the Trinity River above WCW across the period of record is 15,019 fish. This year's run was 74.4% of the average. Natural origin spawner escapement above WCW of 2,454 is 6.1% of the TRRP goal of 40,000 natural-origin steelhead (Appendix 10).

DISCUSSION

Spring Chinook

Results from the 2015 mark-recapture study indicate the total run-size of 4,408 (95% CI 3,752 – 5,119) spring Chinook is a decline of approximately 2,500 fish (36%) from the 2014 estimate (Appendix 11). The estimate of 1,090 naturally-produced adults is the lowest contribution to the adult spawner escapement at any time since 2002, and is well below the TRRP annual escapement goal of 6,000 naturally-produced adult spring Chinook (Figure 18). Approximately 29% of the total adult spring Chinook escapement (escapement to TRH and to natural areas) was composed of naturally-produced fish; an estimated 41% of the spring Chinook available to spawn in-river was of natural origin.

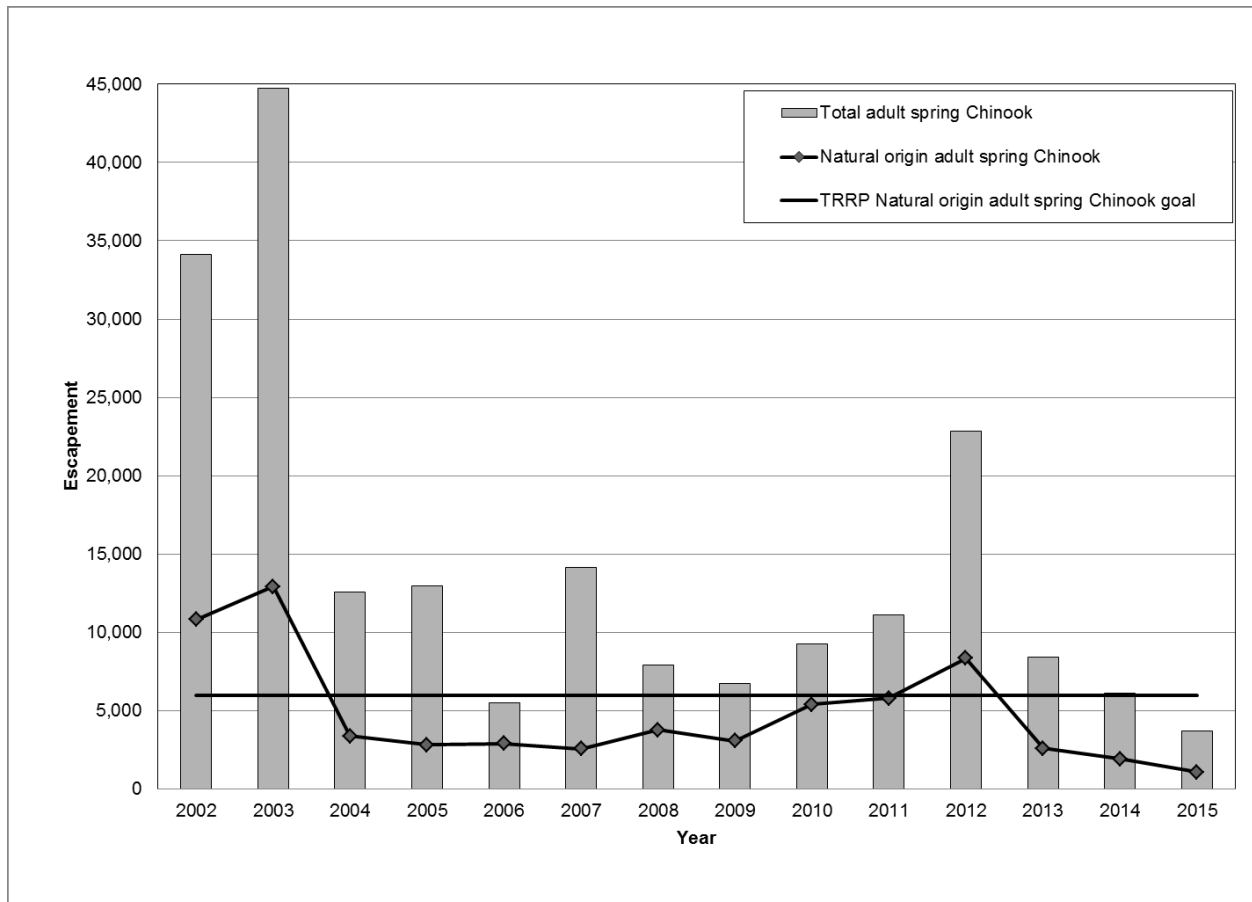


Figure 18. Total adult escapement, and escapement of natural origin (naturally-produced) spring Chinook to the Trinity River above Junction City weir, 2002-2015.

While unsure what factor is responsible for maintaining spring- and fall-run Chinook salmon as distinct in the Trinity River, Kinziger (2016, pers. comm) says the spawning hiatus employed at TRH may play a role in maintaining those stocks. Competition for spawning area and interbreeding in the upper river continues to contribute to mixing of these two Chinook races which used to be separated both temporally and spatially (Kinziger, et.al. 2008).

Fall Chinook

The 2015 total run-size estimate for Fall Chinook of 10,365 (95% CI 9,230 – 11,569), is less than a third of the 2014 estimate of 37,830 fish (Appendix 18), and the third lowest estimate in the 39 year period of record. The jack (22%) to adult (78%) ratio at WCW was similar to the 2014 estimate. The 2015 escapement of 3,592 naturally-produced adult fall Chinook returning to the Trinity basin is well below the 62,000 TRRP goal, a decline of approximately 68% from the 2014 estimate (Figure 19), and comprises 34% of the total fall Chinook run-size in Trinity basin in 2015.

We only had conduit on the WCW pulled for two days due to the fall augmentation flows so we do not believe we missed a huge portion of the run. Numbers of fall Chinook were down basin-wide, with extremely low redd counts (USFWS, 2015) and low numbers of both WCW tagged and CWT fish in the spawner survey (A. Hill, 2016, pers. comm.) an indication our estimate of the run-size was realistic.

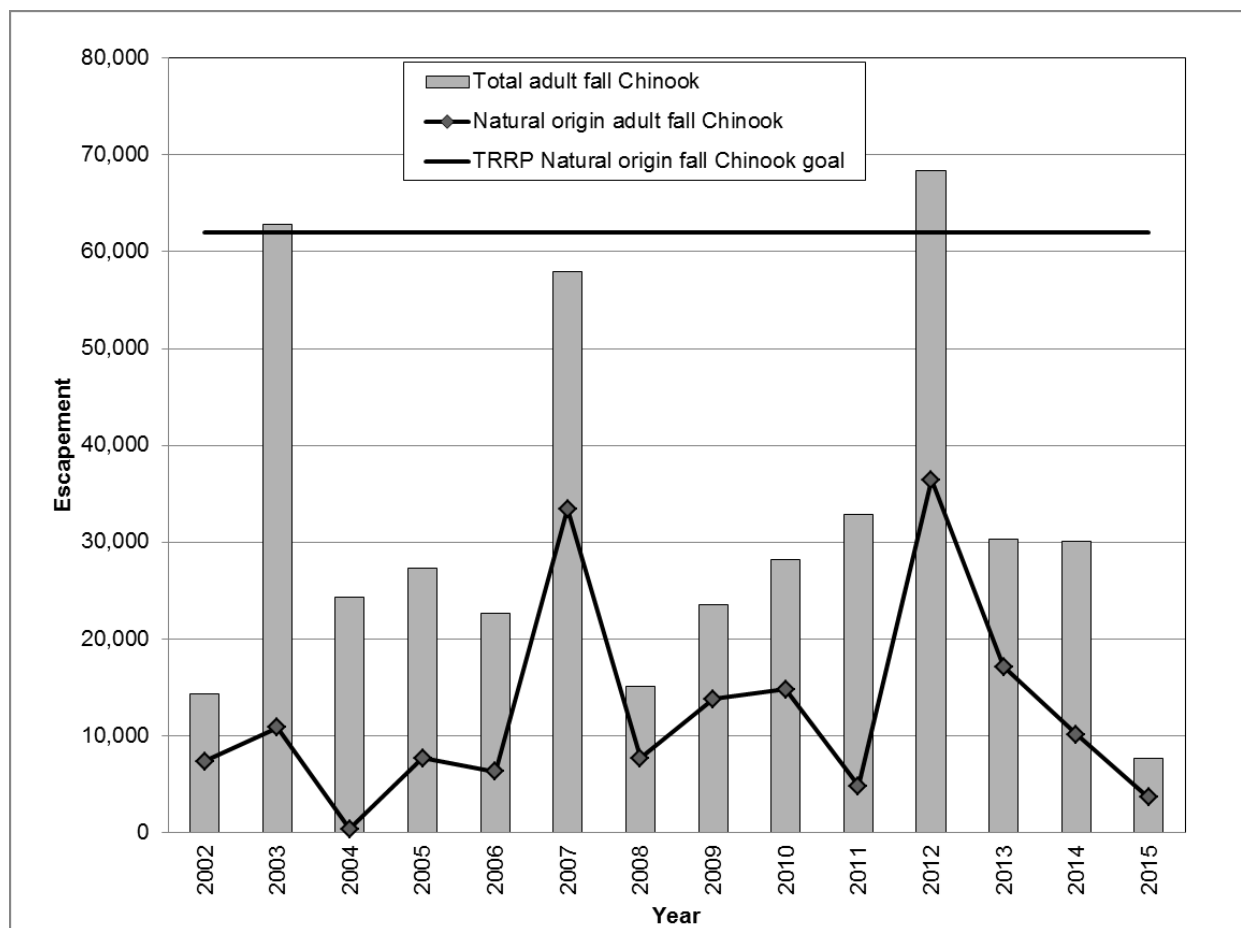


Figure 19. Total adult escapement, and escapement of natural origin fall Chinook to the Trinity River above Willow Creek weir, 2002-2015.

Coho Salmon

The 2015 estimated coho run-size of 4,619 (95% CI 4,169 – 5,094) is the 35th lowest run-size in 39 years, and is a 34% decrease from the 2014 estimate (

Appendix 24). Coho jacks again comprised 25% of the 2015 run, as it did in 2014. Escapement of 748 naturally-produced coho adults decreased the natural component of the total adult escapement to 20% (Figure 20). Natural origin coho accounted for 75% of the total adult in-river escapement, and 35% of the overall (jack and adult) natural-area escapement.

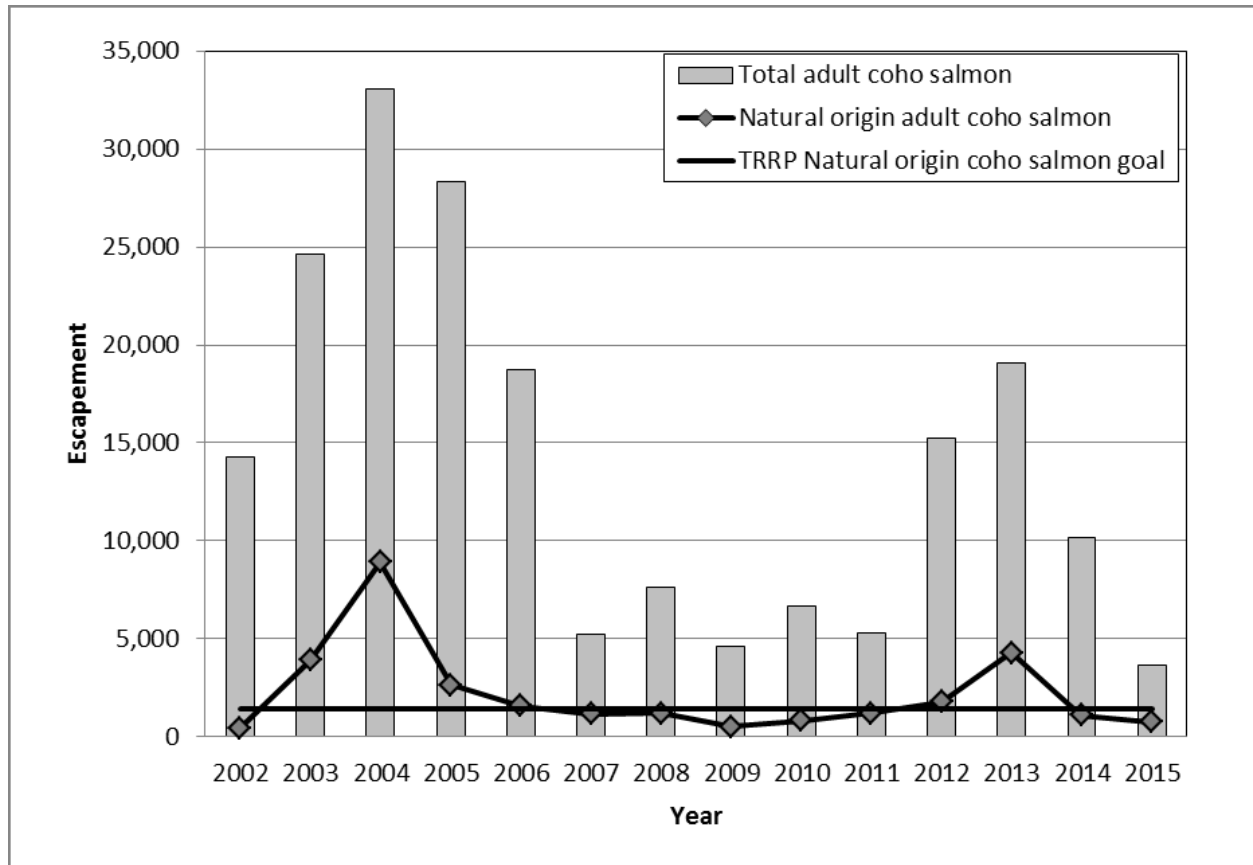


Figure 20. Total adult escapement, and escapement of natural origin coho salmon to the Trinity River above Willow Creek weir, 2002-2015.

Fall Steelhead

The 2015 run-size estimate for adult fall steelhead of 11,167 (95% CI 9,962 – 12,445) is 74.4% of the average run-size of 15,019 over the 32 year period of record (Appendix 30). The 2015 escapement of 2,454 naturally-produced adult steelhead is 42% of the 2014 estimate, and made the smallest contribution to the total escapement any time since 2002 (Figure 21). Naturally-produced adult fall steelhead comprised 32% of the natural area (in-river) adult steelhead escapement in 2015, in contrast to 75% in 2014.

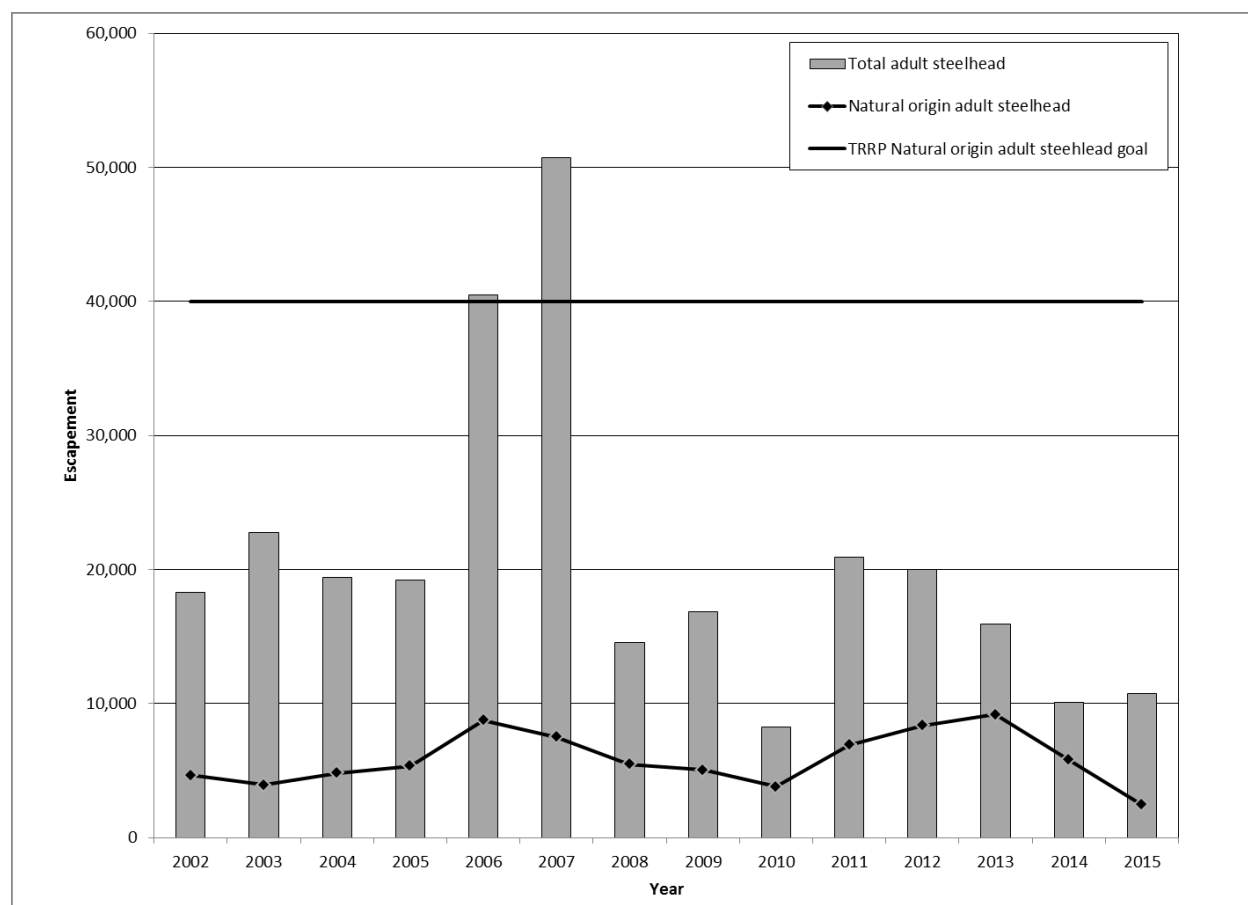


Figure 21. Total adult escapement, and escapement of natural origin steelhead to the Trinity River above Willow Creek weir, 2002-2015.

Factors Influencing Run-Size, Harvest and Escapement Estimates

Attaining salmonid production goals while providing dependent tribal and non-tribal harvests are fundamental objectives of the TRRP. Factors that directly affect salmonid run-size and, therefore, progress toward TRRP goals, include natural mortality and the amount of ocean and in-river harvest. Additionally, environmental conditions are a concern, including, ocean-atmospheric climate variability over the North Pacific basin which result in inter-annual and inter-decadal changes which affect Pacific salmon survival (Beamish, et. al). Below, however, we will briefly discuss and review the factors which could influence our run-size, harvest, and escapement estimates, over which we have some control.

The amount of sport and commercial ocean harvest, and in-river sport and tribal harvest, affect salmon and steelhead run-size and escapement. Ocean and in-river harvest quotas are determined by the Pacific Fisheries Management Council (PFMC) only for fall Chinook. Total annual harvest allocation of Klamath/Trinity Basin fall Chinook determined by the PFMC can range from no harvest up to two-thirds of the projected run-size to the basin, thus dependent fisheries may have a large impact on fall Chinook escapement to the basin and Trinity River. In 2015 approximately 45% of the Klamath-Trinity Basin fall Chinook run was reported harvested (CDFW 2016a). Harvest of spring Chinook also occurs in the ocean and in-river fisheries. Reported in-river harvests of spring Chinook for 2015 comprised 48% of the estimated Klamath/Trinity basin run-size (CDFW 2016b). Coho salmon are protected from sport harvest entirely, and only hatchery marked steelhead are allowed for sport harvest.

Accuracy and precision of mark-recapture field studies and data analyses also influence escapement estimates. Accuracy of the modified Peterson mark-recapture estimator relies on a set of assumptions described in this and previous Annual Reports (CDFW, 2014b). Estimator bias can occur if assumptions are violated. For example, unaccounted tagging mortality creates a positive bias in mark-recapture studies (Hankin, 2001). Hankin (2001) makes evident the magnitude of potential bias in the following scenario: If 90% of untagged fish passing WCW survive to arrive at TRH, but only 75% of WCW tagged fish survive to arrive at TRH, then the approximate positive proportional bias would be almost 30%.

We have taken steps to minimize tagging-associated mortality through our operational protocol at the weirs. In the past we observed most tagging mortalities when water temperatures were high (near 22° C), therefore all trapping is suspended if water temperatures exceed 21°C. In addition, fish are not tagged if deemed in poor condition or if they have already spawned. We account for tagging mortalities through recovery of tagged fish found dead during surveys conducted near the weir sites throughout the trapping season, as well as checking any Project-tagged carcasses washed back on the weir for signs of spawning. Reliance on experienced crew and adherence to protocol contributes to a relatively small number of tagging mortalities, though in 2015, with low flow conditions once again prevailing and the presence of *Ichthyophthirius multifiliis* (Ich) and other pathogens, our fourth year of drought, and an abnormally large number of spring Chinook with lamprey wounds, we observed proportionally more mortality than usual at JCW.

Our harvest estimates are based on Project tags returned by anglers and other river users. Unreported angler harvest of tagged fish results in an under-estimate of harvest rate and a corresponding over-estimate in escapement. Although the number of Project tags returned is sufficient to generate a harvest estimate, we are trying to increase the rate of tag return, especially from Chinook anglers. Even when we tag similar numbers of Chinook and steelhead we receive tag returns from the steelhead fishery at a greater rate than the salmon fishery. Some reasons for the disproportion likely are the longer steelhead season, and the fact that emigrating steelhead are typically more active

feeders than Chinook. We are working on coming up with a way to calculate confidence intervals around our harvests estimates. We hope to have that by next year.

Hankin and Bradford (2012) in the TRRP adult review recommend TRP use a high-value tag to increase tag returns and lay the groundwork to test the assumptions on which our harvest estimate is based. We are currently conducting a study [based on a similar one reported in Heubach et al (1992)], to collect information on tag return rates. The study involves increasing the reward on a portion of Project tags to determine the reward level at which 100% of the tags are returned (one of our harvest estimate assumptions). Early analysis seemed to show that anglers tend to return tags with greater rewards at higher rates than tags with lessor or no value, however, small sample size in the past few years has complicated drawing robust conclusions for the study overall. We intend to continue this study for at least an additional year.

This year's run-size and escapement estimates were affected by the Lewiston Dam flow release schedule's effect on weir operations. Water year designation in 2015 was "Dry" (TRRP, 2015); the Trinity River at a level TRP staff could build JCW on 09 June (Appendix 32). Record of Decision (Interior, 2000) release schedule dictates a late-summer release of 450 cfs, (favorable for trapping fall Chinook at WCW) but anticipating fish health implications due to overcrowding of fall-run Chinook near cold water refugia in the Klamath River, Reclamation once again released extra water from Lewiston Dam designed to maintain a target of 2,500 – 2,800 cfs in the lower Klamath River, causing higher-than-normal flows throughout much of the fall-run Chinook migration. During JW 36 an increase in ich-infected fish was observed in the Klamath, and a one day flush of 3,300 cfs was initiated down the Trinity, requiring we modify WCW (pull conduit) potentially allowing fish to pass the weir without being trapped and tagged. Interruption in trapping may have led to a violation of the assumption that fish trapped and released at the weir are a random sample representative of the population, but as it was only a two day interruption and fairly early in the fall Chinook run-timing, likely we did not miss many fish. Our goal is to trap between 5 – 10% of the run; in 2015 we sampled an estimated 8.5% of the Trinity fall Chinook run.

Hatchery- and naturally-produced fish passing by the weir at different rates during the season could be a source of bias. We tested the null hypothesis that there was no significant bias between proportions of hatchery- and natural-origin fish passing WCW during 2015 (using adult Chinook only). Mann-Whitney U test showed ($U=76.00$, $p = 0.311$, chi-square approximation = 1.027, d.f. = 1) no evidence that the assumption of random samples, representative of the population, was violated.

Too few spring or fall Chinook or coho salmon jacks were tagged to generate independent estimates for adults and jacks, therefore we used numbers of adults and jacks combined to generate the total tagged, total recaptured and total recovered fish when calculating spawning escapement and run-size estimates for each species or race. We applied the combined TRH/JCW proportion of jacks/adults to derive the proportion of jacks/adults in the spring Chinook run, and the proportion from WCW only (FL frequency distribution) for the coho split. The steelhead estimates above WCW are

for adults only, defined as those larger than the half-pounder cutoff of 41cm FL. Utilizing a hard point cutoff will have some fish assigned to the wrong age class, however the mixdist statistical procedure we used this year and for analyses of the 2013 and 2014 steelhead population as well provided evidence that bias associated with using the nadir appears insignificant (CDFW 2015).

Because CWT estimates are based, in part, on the overall run-size estimates for each race of Chinook, they are subject to the precision and potential biases associated with the mark-recapture estimates, as well as accuracy of reported CWT expansion factors. The impact of any bias would be most relevant to the number of naturally-produced fish estimated spawned in natural areas, due to the fact that hatchery recoveries are actual counts, while CWT fish estimated to spawn naturally are the estimated number of fish remaining after hatchery CWTs and estimated angler harvest are subtracted from the overall CWT estimate.

Run-size estimates have the potential for bias. This bias should not affect hatchery contribution rates, however, since total CWT run-sizes are based on ad-clip rates observed at either JCW or WCW times the estimated runs above these sites. Even if total run-size was adjusted lower, the ad-clip rate would remain the same, resulting in the same hatchery contribution rates. If, however, hatchery-produced fish are more vulnerable to capture, or their run-timing coincides more so than their natural counterparts with dates of weir operations (i.e. spring Chinook at JCW), the estimated contribution of hatchery fish could be biased. So, another source of potential bias is vulnerability of capture. As noted above, we found no evidence of potential bias due to vulnerability of capture at WCW in 2015.

The earliest returning fall CWT salmon arrived at TRH in JW 39, compared to 2014 when falls starting showing up as soon as TRH was open for the spring. Far fewer (20 vs 322) falls showed up before the ladder was closed for the spawning break this year than last. The 2015 augmentation flows released from Lewiston Dam increased river flows and reduced water temperatures in much of the river during the spawning migration and may have influenced migration behavior causing salmonids to arrive at the TRH earlier or later than a typical year. We did note, as in 2014, that some spring Chinook arrived at the hatchery with their eggs in an immature state, likely due to the cooler river temperatures.

We assume the CWT fish that enter the hatchery are representative of the entire CWT population, but if an age or release type of hatchery-produced Chinook is more likely to stray than others, the proportional CWT run estimate, based on fish recovered at TRH, will over- or under-estimate the true proportions of each CWT group. In addition, assumptions of the CWT analysis rely on accurate expansion factor estimates. If the assigned expansion factor is larger or less than actual, the result would be an under- or over-estimation of the escapement of the CWT group. Recoveries of TRH-produced Chinook during the 2015 carcass surveys appeared consistent with TRH recoveries, although our sample size of CWT fish that strayed to spawn in natural areas was so low as to be inconclusive.

RECOMMENDATIONS

- Run-size and escapement estimates of naturally- and hatchery-produced spring and fall Chinook, coho salmon, and adult fall steelhead in the Trinity River basin should be continued on an annual basis to maintain short and long term baselines which help assess objectives stated in the IAP and ROD and inform adaptive management decision making.
- We recommend spring Chinook managers should consider additional methods to reduce interbreeding with fall Chinook in the mainstem area below Lewiston Dam and at TRH.
- Continue educating the angling public and try to increase buy-in by the river guides to the angler tag return program. Continue to test assumption that higher tag rewards (incentives) will increase returns.
- Management and operations of TRRP and TRH should be coordinated to ensure that objectives for natural fish production and hatchery management goals are synchronized across restoration and mitigation programs.

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APPENDICES

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

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

* Eight day Julian week only during leap years

**Eight day Julian week every year

Appendix 2. Release and recovery data for adipose fin-clipped spring and fall Chinook recovered at Trinity River Hatchery (TRH) during the 2015-16 season.

Release data						TRH Recovery data					Number recovered	
CWT ^a code	Egg source	Brood year	Date	Number	Site	Males		Females		Total	Tagging site	
						No.	FL ^b	No.	FL ^b	No.	WCW	JCW
SPRING CHINOOK												
068774	TRH	2010	06/01-17/11	63,224	TRH	3	90.67	1	81.00	4		
068775	TRH	2010	06/01-17/11	71,842	TRH	--	--	1	81.00	1		
068776	TRH	2010	10/03-12/12	97,128	TRH	4	80.25	6	78.33	10		
068838	TRH	2011	06/01-15/12	59,877	TRH	15	78.13	27	72.81	42		5
068839	TRH	2011	06/01-15/12	35,222	TRH	11	77.82	12	71.00	23		3
068840	TRH	2011	06/01-15/12	72,106	TRH	10	78.90	18	71.33	28		4
068846	TRH	2011	10/01-17/12	97,771	TRH	45	75.24	56	67.88	101		3
060490	TRH	2012	06/01-15/13	94,284	TRH	28	64.36	25	60.84	53		4
060491	TRH	2012	06/01-15/13	67,661	TRH	13	64.46	8	58.88	21		3
060492	TRH	2012	06/01-15/13	88,310	TRH	9	65.00	3	62.33	12		1
060497	TRH	2012	10/01-14/13	101,471	TRH	16	60.81	19	57.47	35		7
068843 ^f	TRH	2012	03/15-06/06/13	9,850	River	4	66.25	--	--	4		
060605	TRH	2013	06/01-04/14	80,615	TRH	20	47.85	1	46.00	21		
060606	TRH	2013	06/01-04/14	69,846	TRH	12	48.17	1	50.00	13		
060607	TRH	2013	06/01-04/14	89,761	TRH	8	47.88	--	--	8		
060612	TRH	2013	10/01-22/14	103,872	TRH	1	47.00	--	--	1		
068848 ^f	TRH	2013	03/14-06/26/14	10,065	River	1	46.00	--	--	1		
Lost CWT ^{c e}						1	87.00	1	66.00	2		
No CWT ^{d e}						3	72.67	10	67.70	13		
Spring Chinook totals:						204		189		393	0	30
FALL CHINOOK												
068777	TRH	2010	06/01-17/11	114,941	TRH	1	73.00	--	--	1		
068778	TRH	2010	06/01-17/11	119,394	TRH	1	89.00	1	82.00	2		
068779	TRH	2010	06/01-17/11	119,945	TRH	3	87.00	--	--	3		
068781	TRH	2010	10/03-12/11	231,430	TRH	6	87.17	6	77.00	12	1	
068792	IGH	2010	6/23/2011	174,558	IGH	--	--	1	85.00	1		
060422	IGH	2011	11/07-13/12	249,474	IGH	1	67.00	--	--	1		
068830 ^f	TRH	2011	05/24-08/27/12	9,706	River	1	88.00	2	75.00	3		
068841	TRH	2011	06/01-15/12	86,357	TRH	2	73.00	4	74.25	6		
068842	TRH	2011	06/01-15/12	95,355	TRH	3	76.00	10	72.10	13		
068844	TRH	2011	06/06-15/12	112,093	TRH	4	74.50	3	72.00	7	1	
068845	TRH	2011	06/07-15/12	102,907	TRH	5	79.80	3	74.00	8	2	
068847	TRH	2011	10/01-17/12	200,337	TRH	105	77.73	149	72.45	254	13	
060493	TRH	2012	06/01-15/13	105,581	TRH	7	64.86	8	64.38	15	2	
060494	TRH	2012	06/01-15/13	102,559	TRH	8	64.13	5	63.70	13		
060495	TRH	2012	06/01-15/13	67,315	TRH	2	60.00	2	66.00	4		
060496	TRH	2012	06/01-15/13	103,825	TRH	2	61.50	--	--	2		
060499 ^f	TRH	2012	05/29-0/29/13	13,752	River	--	--	1	64.00	1		
060504	TRH	2012	10/01-14/13	221,247	TRH	223	63.30	137	62.58	360	30	
060608	TRH	2013	06/01-04/14	128,061	TRH	8	51.88	1	47.00	9	1	
060609	TRH	2013	06/01-04/14	124,107	TRH	6	49.50	--	--	6	2	
060610	TRH	2013	06/01-04/14	127,893	TRH	3	49.67	--	--	3		
060611	TRH	2013	06/01-04/14	128,022	TRH	3	47.33	--	--	3	1	
060613	TRH	2013	10/01-22/14	239,886	TRH	22	47.00	--	--	22	2	
068850 ^f	TRH	2013	05/16-8/28/14	9,372	River	1	46.00	--	--	1	1	
Lost CWT ^{c e}						3	69.67	4	62.50	7		
No CWT ^{d e}						7	65.14	5	68.60	12		
Fall Chinook totals:						427		342		769	56	0

a/ CWT = Coded-wire tag.

b/ FL = Mean fork length in cm.

c/ CWT lost or un-readable during recovery (CWT CODES 200,000 - 400,000).

d/ No CWT was detected (CWT CODE = 100,000).

e/ Assigned as either spring or fall Chinook based on entry date into Trinity River Hatchery.

f/ Experimental release groups; fish used in screw trap efficiency studies on main stem Trinity River.

Appendix 3. Fork length (FL) distribution of spring Chinook trapped and tagged at Junction City weir (JCW), and subsequently recovered during the 2015-16 season.^a

FL (cm)	JCW		RECOVERIES						Total Recoveries	% Recoveries
	Total Trapped and Tagged ^b	Ad-clips ^c	Tag Morts ^d	Angler Harvest ^e	TRH ^f Recoveries	Carcass ^g Recoveries	Found Tags ^h	Angler Released ⁱ		
40	3								0	0.0
41	1		1						1	100.0
42	3	1				1			1	33.3
43	4	1			2				2	50.0
44	2								0	0.0
45	5				4				4	80.0
46	7	1			2				2	28.6
47	5	1			4				4	80.0
48	4	3			2				2	50.0
49	6	2			3				3	50.0
50	6	1			4				4	66.7
51	12	1		1	3			1	5	41.7
52	3	2			2				2	66.7
53	8				6				6	75.0
54	6	1			3				3	50.0
55	7	1			5				5	71.4
56	8	1		1	5				6	75.0
57	8				6				6	75.0
58	18	3		1	6			1	8	44.4
59	16	2			10	1			11	68.8
60	36	7		1	23	1			25	69.4
61	28	4		1	16	1		1	19	67.9
62	41	5	1	2	26		1		30	73.2
63	29	5		1	15	2			18	62.1
64	20	5			12	1			13	65.0
65	43	3		2	19	2			23	53.5
66	32	2		1	16				17	53.1
67	30	3	1	1	14	1		1	18	60.0
68	29	7		2	14	1			17	58.6
69	44	11	1		27	1			29	65.9
70	43	7		2	24	2			28	65.1
71	46	8		2	22	1			25	54.3
72	45	8		2	29	2			33	73.3
73	46	13	1	2	26	1			30	65.2
74	43	9	2	2	20	1			25	58.1
75	37	5			21	1			22	59.5
76	48	7		5	26	2	1		34	70.8
77	38	4			16	3			19	50.0
78	38	7	1		16	1			18	47.4
79	20	3			12	2			14	70.0
80	22	4		1	9	2		1	13	59.1
81	23	3			9		1	1	11	47.8
82	14	1			9				9	64.3
83	23	4			13	1			14	60.9
84	9	1		1	4				5	55.6
85	12	3		1	5				6	50.0
86	6	1			3				3	50.0
87	4	1	1						1	25.0
88	8	1			3				3	37.5
89	4				1				1	25.0
90	3	1			1				1	33.3
91	4				1				1	25.0
92	1				1				1	100.0
93									0	--
94	2								0	0.0
Totals:	1,003	164	9	32	520	31	3	6	601	59.9
Mean FL:	69.4	69.3	69.4	69.4	69.0	70.5	73.0	66.3	69.1	
Total jacks: ^j	75	14	1	1	35	1	0	1	39	771.904762
Total adults:	928	150	8	31	485	30	3	5	562	2,211

a/ Trapping at JCW took place June 10 - September 15, 2014 (Julian weeks 23-37). Chinook trapped at JCW prior to JW 37 were considered spring Chinook in 2014.

b/ One spring Chinook trapped at Junction City weir in 2014 was not tagged.

c/ Ad-clip = Adipose fin clipped fish.

d/ Tagged fish found dead and unspawed within 30 days of tagging are considered tagging mortalities.

e/ Fish reported as harvested by anglers.

f/ Trapping occurred at Trinity River Hatchery September 2, 2014 - March 10, 2015 (JWs 35-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys.

h/ Fish tags found loose or on dead fish and returned by anglers or other river enthusiasts.

i/ Fish caught and released by anglers, their tag removed.

j/ Spring Chinook <55 cm FL were considered jacks in 2014.

Appendix 4. Fork length distribution of coded-wire tagged Trinity Rivery Hatchery-produced spring Chinook recovered at TRH during the 2015-16 season.^a

FL	2010			2011				2012					2013					Total
(cm)	068774-f	068775-f	068776-y	068838-f	068839-f	068840-f	068846-y	060490-f	060491-f	060492-f	068843-f	060497-y	060605-f	060606-f	060607-f	068848-f	060612-y	
38															1			1
39																		0
40																		0
41													1	1				2
42																		0
43																		0
44													1	1				2
45													3	1				4
46													3	2		1		6
47													2		3		1	6
48												1	3	2				6
49													1	1	1			3
50													3	1	1			5
51								2					2	1				5
52								1						1	1			3
53													2	1	1			4
54												3						3
55								1						1				4
56																		4
57						1		5	2									12
58								4	2	1								9
59								3	1	1								9
60								5	1	2								12
61							2	5	4		1							16
62							4	8	1	1								14
63							6	3	2	1								14
64					1		5	2										10
65					1		8	3		1	1							14
66				1	1	1	3	5		1								13
67						3	5	2	1									11
68				2	2	3	3	3		1								15
69				2	2	2	3			1	1	1						12
70				6		1	11	1	1	1	1							22
71				4	2		8											14
72				4	1	2	3			1								11
73				4	2	5	4	1										16
74			1	2	1	3	5	1										13
75				2	1		8			1								12
76			3		1		1	1	1									7
77				4	3		3											10
78				1		1	6											8
79			1	2		1	1											5
80			1		1		1											3
81	1	1		2	1	1	1											7
82			1	3		1	3											8
83				1			2											3
84						1	1											2
85					1		1											2
86			1	1		1			1									4
87				1			1											2
88					1	1	2											4
89	1				1		1											4
90																		0
91	1																	1
92	1																	1
Totals:	4	1	10	42	23	28	101	53	21	12	4	35	21	13	8	1	1	378
Mean	88.25	81.00	79.10	74.71	74.26	74.04	71.16	62.70	62.33	64.33	66.25	59.00	47.76	48.31	47.88	46.00	47.00	

a/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

b/ Age at release: f = fingerlings, y = yearlings.

Appendix 5. Total number and numbers of Junction City weir (JCW) and Willow Creek weir (WCW) tagged Chinook and coho that entered Trinity River Hatchery (TRH) during the 2015-16 season.^a

Julian week ^b	Inclusive dates	Chinook					Coho		
		Total entering	Spring run tagging site		Fall run tagging site		Total entering	Tagging site	
		TRH	JCW	WCW	JCW	WCW	TRH	JCW	WCW
36	3-Sep - 9-Sep	301	56						
37	10-Sep - 16-Sep	323	50						
38	17-Sep - 23-Sep	693	27						
39	24-Sep - 30-Sep	393	12				1		
40	1-Oct - 7-Oct	184	2			1	10		
41	8-Oct - 14-Oct	94					3		
42	15-Oct - 21-Oct								
43	22-Oct - 28-Oct	524				108	354		42
44	29-Oct - 4-Nov	900				65	237		83
45	5-Nov - 11-Nov	429				49	337		85
46	12-Nov - 18-Nov	773				27	700		62
47	19-Nov - 25-Nov	517				15	1,203		38
48	26-Nov - 2-Dec	144				9	158		13
49	3-Dec - 9-Dec	62				1	261		17
50	10-Dec - 16-Dec	4				1	55		3
51	17-Dec - 23-Dec						11		
52	24-Dec - 31-Dec						7		
1	1-Jan - 7-Jan								
2	8-Jan - 14-Jan								
3	15-Jan - 21-Jan								
4	22-Jan - 28-Jan								
5	29-Jan - 4-Feb								
6	5-Feb - 11-Feb								
7	12-Feb - 18-Feb								
8	19-Feb - 25-Feb								
9	26-Feb - 4-Mar								
10	5-Mar - 11-Mar								
Totals:		5,341	147	0	0	276	3,337	0	343

a/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

b/ Julian week of spawning or death; the fish may have actually entered the hatchery during a previous week.

Appendix 6. Run-size, percent return, in-river sport catch and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, spring Chinook returning to the Trinity River basin upstream of Junction City weir during the period 2012 through 2015.

Release data					Estimated returns						
CWT a/	Brood					Run-	% of	River	Spawning escapement		
code	year	Date b/	Number	Site	Age	size	release	harvest	TRH c/	Natural	Total ^f
068773	2010	06/01-17/11	33,636	TRH	2	7	0.02	1.5	1	5	6
068773	2010				3	100	0.30	2.9	39	58	97
068773	2010				4	95	0.28	3.2	64	28	92
068773	2010				5	0	0.00	0.0	0	0	0
Totals: d/						203	0.60	8	104	91	195
Total adults: e/						196	0.58	6	103	86	189
068774	2010	06/01-17/11	63,224	TRH	2	73	0.12	14.6	10	48	58
068774	2010				3	226	0.36	6.6	89	130	219
068774	2010				4	199	0.32	6.7	134	59	193
068774	2010				5	8	0.01	0.4	4	3	7
Totals: d/						505	0.80	28	237	241	477
Total adults: e/						432	0.68	14	226	192	419
068775	2010	06/01-17/11	71,842	TRH	2	44	0.06	8.8	6	29	35
068775	2010				3	113	0.16	3.3	45	65	110
068775	2010				4	127	0.18	4.2	85	38	123
068775	2010				5	2	0.00	0.1	1	1	2
Totals: d/						286	0.40	16	137	133	269
Total adults: e/						242	0.34	8	131	104	234
068776	2010	10/3-12/11	97,128	TRH	2	7	0.01	1.5	1	5	6
068776	2010				3	62	0.06	1.8	24	36	60
068776	2010				4	273	0.28	9.1	183	81	264
068776	2010				5	19	0.02	0.9	10	8	18
Totals: d/						361	0.37	13	218	129	347
Total adults: e/						353	0.36	12	217	124	342
068838	2011	06/01-15/12	59,877	TRH	2	7	0.01	0.0	4	3	7
068838	2011				3	107	0.18	3.6	72	32	104
068838	2011				4	80	0.13	3.9	42	33	76
068839	2011	06/01-15/12	35,222	TRH	2	4	0.01	0.0	2	2	4
068839	2011				3	33	0.09	1.1	22	10	32
068839	2011				4	44	0.12	2.1	23	18	41
068840	2011	06/01-15/12	72,106	TRH	2	11	0.01	0.0	6	5	11
068840	2011				3	63	0.09	2.1	43	19	61
068840	2011				4	53	0.07	2.6	28	22	50
068846	2011	10/01-17/12	97,771	TRH	2	9	0.01	0.0	5	4	9
068846	2011				3	79	0.08	2.6	53	23	76
068846	2011				4	191	0.19	9.2	101	80	181
060490	2012	06/01-15/13	94,284	TRH	2	55	0.06	1.3	29	24	54
060490	2012				3	100	0.11	4.9	53	42	95
060491	2012	06/01-15/13	67,661	TRH	2	29	0.04	0.7	15	13	28
060491	2012				3	40	0.06	1.9	21	17	38
060492	2012	06/01-15/13	88,310	TRH	2	13	0.01	0.3	7	6	13
060492	2012				3	23	0.03	1.1	12	10	22
060497	2012	10/01-14/13	101,471	TRH	2	28	0.03	0.7	15	12	28
060497	2012				3	66	0.07	3.2	35	28	63
060605	2013	06/01-04/14	80,615	TRH	2	36	0.04	0.0	21	15	36
060606	2013	06/01-04/14	69,846	TRH	2	22	0.03	0.0	13	9	22
060607	2013	06/01-04/14	89,761	TRH	2	14	0.02	0.0	8	6	14
060612	2013	10/01-22/14	103,872	TRH	2	2	0.00	0.0	1	1	2
068848	2013	03/14-6/26/14	10,065	TRH	2	2	0.02	0.0	1	1	2

a/ CWT = coded-wire tag.

b/ Chinook salmon released during June were fingerlings, those released in October were yearlings.

c/ TRH = Trinity River Hatchery.

d/ Totals are presented only for brood year 2010. 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.

f/ Rounding sometimes makes for seeming addition errors in this column.

Appendix 7. Percent return of Trinity River Hatchery produced, coded-wire tagged, spring Chinook salmon, brood years 1986-2010.^a

Brood year	Fingerling releases			Yearling releases		
	Number released	Number of returns	Percent return	Number released	Number of returns	Percent return
1986	197,113	103	0.05%	101,030	1,960	1.94%
1987	185,718	208	0.11%	0	0	---
1988	181,698	84	0.05%	98,820	112	0.11%
1989	186,413	7	0.00%	102,555	176	0.17%
1990	196,908	479	0.24%	94,639	82	0.09%
1991	198,277	297	0.15%	110,797	68	0.06%
1992	215,038	2,766	1.29%	109,856	1,272	1.16%
1993	222,056	1,125	0.51%	111,525	958	0.86%
1994	113,236	202	0.18%	113,491	513	0.45%
1995 ^a	196,211	450	0.23%	101,934	1,581	1.55%
1996	222,950	743	0.33%	112,464	312	0.28%
1997	209,155	1,834	0.88%	147,507	4,471	3.03%
1998	176,968	845	0.48%	137,602	2,186	1.59%
1999	148,380	3,372	2.27%	129,919	4,288	3.30%
2000	261,193	4,422	1.69%	99,304	2,029	2.04%
2001	253,248	412	0.16%	104,627	1,480	1.41%
2002	244,754	2,217	0.91%	106,139	514	0.48%
2003	265,556	310	0.12%	104,974	339	0.32%
2004	253,830	2,095	0.83%	104,478	1,269	1.21%
2005	263,108	317	0.12%	107,607	111	0.10%
2006	486,833	229	0.05%	104,019	1,354	1.30%
2007	180,083	252	0.14%	96,803	626	0.65%
2008	229,956	1,107	0.48%	104,078	231	0.22%
2009	161,053	4,364	2.71%	108,824	959	0.88%
2010	168,702	994	0.59%	97,128	361	0.37%
Means:	216,737	1,169	0.58%	104,405	1,090	0.98%

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

Appendix 8. Run-size estimates and 95% confidence limits for Trinity River basin spring and fall Chinook and coho salmon and adult fall steelhead during the 2015-16 season.

Species/ race	Area of Trinity River basin for run-size estimate	Stratum ^a	Number effectively tagged ^b	Trinity River Hatchery recoveries		Run-size estimate ^d	Confidence limits 1-p= 0.95	Confidence limit estimator
				Number examined for tags ^c	Number of tags in sample			
Spring Chinook	Upstream of Junction City weir	Jacks	18	240	7	490	3,752 - 5,119	Normal Approximation
		Adults	309	1,748	140	3,918		
		Total	327	1,988	147	4,408		
Fall Chinook	Upstream of Willow Creek weir	Jacks	187	243	28	2,750	9,230 - 11,569	Normal Approximation
		Adults	668	3,110	248	7,615		
		Total	855	3,353	276	10,365		
Coho	Upstream of Willow Creek weir	Jacks	93	278	58	935	4,169 - 5,094	Normal Approximation
		Adults	382	3,059	285	3,684		
		Total	475	3,337	343	4,619		
Fall-run steelhead	Upstream of Willow Creek weir	Adults	968	3,272	283	11,167	9,962 - 12,445	Normal Approx

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

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

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

d/ Run-size estimates for fall Chinook were based on scale ageing proportions, coho were based on the proportion of jacks to adults observed at Willow Creek weir only; while the spring Chinook was based on the Junction City weir and Trinity River Hatchery combined jack/adult ratio.

Appendix 9. Estimates of Trinity River basin spring and fall Chinook and coho salmon, and adult fall-run steelhead run-size, angler harvest, and spawner escapement during the 2015-16 season.

Species/ race	Area of Trinity River basin for run-size estimate	Stratum ^a	Run-size estimate	Angler Harvest		Spawner Escapement		
				Harvest rate ^b	Number of fish ^c	Natural area spawners ^d	Trinity River Hatchery	Total
Spring Chinook	Upstream of Junction City weir	Jacks	490	0.0%	0	250	240	490
		Adults	3,918	4.9%	190	1,980	1,748	3,728
		Total	4,408		190	2,230	1,988	4,218
Fall Chinook	Upstream of Willow Creek weir	Jacks	2,750	0.8%	21	2,505	224	2,729
		Adults	7,615	0.5%	35	4,451	3,129	7,580
		Total	10,365		56	6,956	3,353	10,309
Coho	Upstream of Willow Creek weir	Jacks	935	0.0%	0	657	278	935
		Adults	3,684	0.0%	0	625	3,059	3,684
		Total	4,619		0	1,282	3,337	4,619
Fall-run adult steelhead	Upstream of Willow Creek weir	Natural	2,454	0.0%	0	2,417	37	2,454
		Hatchery	8,713	5.0%	436	5,043	3,235	8,278
		Total	11,167		436	7,459	3,272	10,732

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

b/ Harvest rates were based on the return of reward tags for fall Chinook and steelhead, and a combination of reward and no reward tags for spring Chinook. There was no coho harvest.

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

d/ Calculated as run-size minus angler harvest minus hatchery escapement. Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery. Any difference between these numbers and others throughout this report are due to rounding.

Appendix 10. Estimates of contribution of naturally-produced and hatchery-produced adult spring and fall Chinook and coho salmon, and adult fall-run steelhead to the Trinity River basin spawner escapement during the 2015-16 season.

Species/ race	Area of Trinity River	Produced	Total Spawner Escapement			Naturally-produced contribution to escapement	
			Natural area spawners ^a	Trinity River Hatchery	Total	TRRP Goal	% of Goal
Spring Chinook	Upstream of Junction City weir	Naturally	817	273	1,090	6,000	18.2%
		Hatchery	1,163	1,475	2,638		
		Total	1,980	1,748	3,728		
Fall Chinook	Upstream of Willow Creek weir	Naturally	3,576	16	3,592	62,000	5.8%
		Hatchery	875	3,113	3,988		
		Total	4,451	3,129	7,580		
Coho	Upstream of Willow Creek weir	Naturally	459	289	748	1,400	53.4%
		Hatchery	166	2,770	2,936		
		Total	625	3,059	3,684		
Fall-run steelhead	Upstream of Willow Creek weir	Naturally	2,417	37	2,454	40,000	6.1%
		Hatchery	5,043	3,235	8,278		
		Total	7,460	3,272	10,732		

a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery. Any difference between these numbers and others throughout this report is due to rounding.

Appendix 11. Spring Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Junction City weir, 1977 - 2015.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Jacks ^d		Adults		Total	Natural Area Spawners ^a			Trinity River Hatchery			Jacks	Adults	Total
						Jacks	Adults	Total	Jacks	Adults	Total			
Year	Number	Percent	Number	Percent										
1977			no estimates				no estimates			385	1,124	1,509	no estimates	
1978	190	1.0	18,816	99.0	19,006	29	14,384	14,413	153	3,680	3,833	8	752	b/ 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	c/ 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	c/ 298
1993	68	1.3	5,164	98.7	5,232	37	2,111	2,148	31	2,630	2,661	0	423	c/ 423
1994	1,793	26.4	4,995	73.6	6,788	550	2,897	3,447	944	1,943	2,887	299	155	c/ 454
1995			no estimates				no estimates			385	8,722	9,107	no estimates	
1996	489	2.1	22,927	97.9	23,416	370	16,283	16,653	119	5,131	5,250	0	1,513	c/ 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	c/ 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	c/ 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	c/ 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	c/ 1,807
2001	2,065	10.5	17,556	89.5	19,621	1,178	10,284	11,462	629	6,366	6,995	258	906	1,164

Appendix 11 (continued). Spring Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Junction City weir, 1977 - 2015.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Jacks ^d		Adults		Total	Natural Area Spawners ^a			Trinity River Hatchery			Jacks	Adults	Total
	Number	Percent	Number	Percent		Jacks	Adults	Total	Jacks	Adults	Total			
2002 NATURAL	1,238	10%	11,398	90%	12,636	1,109	10,097	11,206	87	722	809	41	579	620
2002 TRH	1,337	5%	24,512	95%	25,849	774	13,577	14,351	530	9,718	10,248	34	1,217	1,251
2002 TOTAL	2,575	7%	35,910	93%	38,485	1,883	23,674	25,557	617	10,440	11,057	75	1,796	1,871
2003 NATURAL	740	5%	13,509	95%	14,249	729	11,490	12,219	11	1,432	1,443	0	587	587
2003 TRH	299	1%	33,247	99%	33,546	180	18,721	18,901	119	13,080	13,199	0	1,446	1,446
2003 TOTAL	1,039	2%	46,756	98%	47,795	909	30,211	31,120	130	14,512	14,642	0	2,033	2,033
2004 NATURAL	1,266	26%	3,556	74%	4,822	1,009	2,966	3,975	154	410	564	103	180	283
2004 TRH	1,663	15%	9,662	85%	11,325	699	4,348	5,047	831	4,841	5,672	133	473	606
2004 TOTAL	2,929	18%	13,218	82%	16,147	1,708	7,314	9,022	985	5,251	6,236	236	653	889
2005 NATURAL	-14	0%	3,032	100%	3,018	-2	2,028	2,026	-11	799	788	0	206	206
2005 TRH	69	1%	10,897	99%	10,966	32	3,975	4,007	36	6,167	6,203	0	755	755
2005 TOTAL	55	0%	13,929	100%	13,984	30	6,003	6,033	25	6,966	6,991	0	961	961
2006 NATURAL	914	24%	2,911	76%	3,825	792	2,418	3,210	114	494	608	8	0	8
2006 TRH	1,049	29%	2,609	71%	3,658	335	537	872	705	2,071	2,776	9	0	9
2006 TOTAL	1,963	26%	5,520	74%	7,483	1,127	2,955	4,082	819	2,565	3,384	17	0	17
2007 NATURAL	56	2%	2,680	98%	2,736	67	1,705	1,772	-11	862	851	0	113	113
2007 TRH	79	1%	12,020	99%	12,099	13	6,449	6,462	66	5,119	5,185	0	452	452
2007 TOTAL	135	1%	14,700	99%	14,835	80	8,154	8,234	55	5,981	6,036	0	565	565
2008 NATURAL	1,846	32%	3,860	68%	5,706	1,614	3,210	4,824	108	571	679	123	79	202
2008 TRH	372	8%	4,205	92%	4,577	127	1,260	1,387	221	2,866	3,087	25	79	104
2008 TOTAL	2,218	22%	8,065	78%	10,283	1,741	4,470	6,211	329	3,437	3,766	148	158	306
2009 NATURAL	175	5%	3,278	95%	3,453	155	2,672	2,827	20	404	424	0	202	202
2009 TRH	85	2%	3,888	98%	3,973	36	1,052	1,088	49	2,596	2,645	0	240	240
2009 TOTAL	260	4%	7,166	96%	7,426	191	3,724	3,915	69	3,000	3,069	0	442	442
2010 NATURAL	1,020	15%	5,756	85%	6,776	959	5,066	6,025	61	321	382	0	368	368
2010 TRH	534	12%	3,975	88%	4,509	350	1,744	2,094	184	2,136	2,320	0	95	95
2010 TOTAL	1,554	14%	9,731	86%	11,285	1,309	6,810	8,119	245	2,457	2,702	0	463	463
2011 NATURAL	3,592	38%	5,781	62%	9,373	3,350	5,577	8,927	193	204	397	50	0	50
2011 TRH	4,495	46%	5,351	54%	9,846	1,867	1,732	3,599	2,565	3,619	6,184	62	0	62
2011 TOTAL	8,087	42%	11,132	58%	19,219	5,217	7,309	12,526	2,758	3,823	6,581	112	0	112
2012 NATURAL	251	3%	9,060	97%	9,311	116	7,569	7,685	31	788	819	105	703	808
2012 TRH	562	3%	15,744	97%	16,306	426	8,548	8,974	78	5,924	6,002	58	1,273	1,331
2012 TOTAL	813	3%	24,804	97%	25,617	542	16,117	16,659	109	6,712	6,821	163	1,976	2,139
2013 NATURAL	146	5%	2,669	95%	2,815	127	2,487	2,614	19	116	135	0	67	67
2013 TRH	135	2%	6,011	98%	6,146	58	3,469	3,527	77	2,366	2,443	0	176	176
2013 TOTAL	281	3%	8,680	97%	8,961	185	5,956	6,141	96	2,482	2,578	0	243	243
2014 NATURAL	132	6%	1,998	94%	2,130	49	1,559	1,608	80	372	452	3	66	211
2014 TRH	528	11%	4,300	89%	4,828	233	1,274	1,507	282	2,883	3,165	13	144	15
2014 TOTAL	660	9%	6,298	91%	6,958	282	2,833	3,115	362	3,255	3,617	16	210	226
2015 NATURAL	177	13%	1,146	87%	1,323	123	817	940	55	273	327	0	56	56
2015 TRH	313	10%	2,772	90%	3,085	127	1,163	1,290	185	1,475	1,661	0	134	134
2015 TOTAL	490	11%	3,918	89%	4,408	250	1,980	2,230	240	1,748	1,988	0	190	190

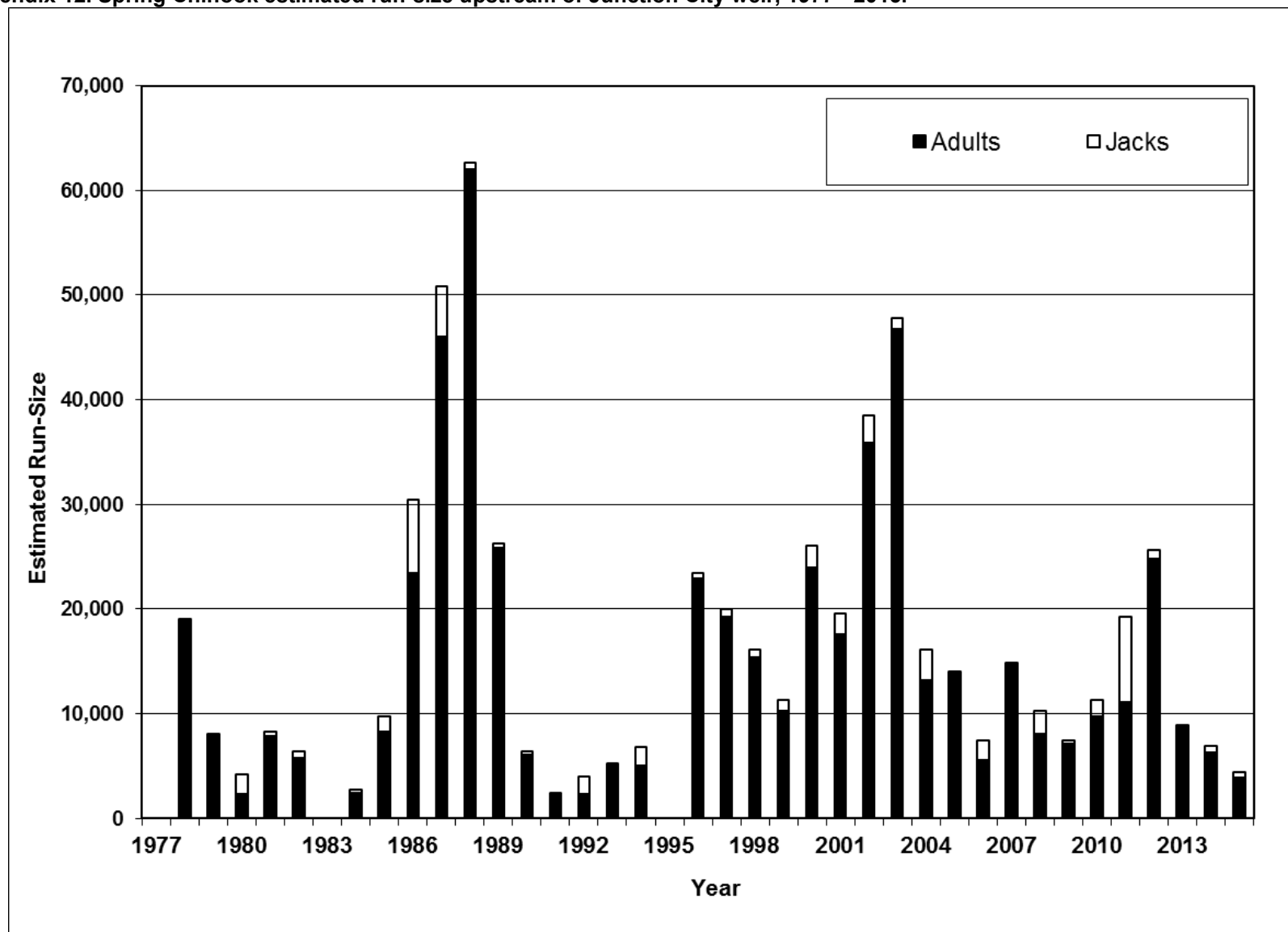
a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

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

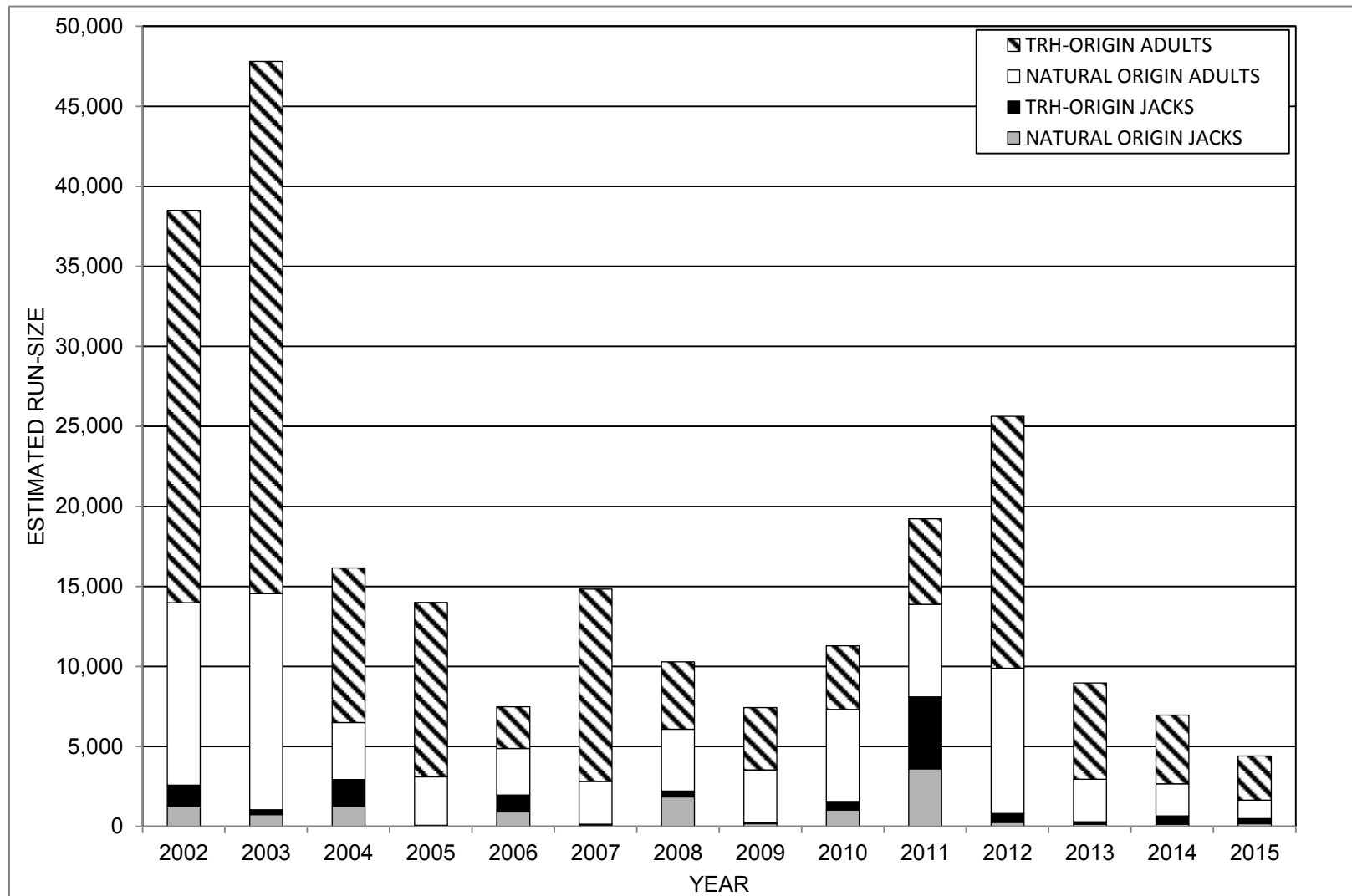
c/ The sport harvest of adult spring Chinook was subject to seasonal and size limit restrictions.

d/ Jacks are two year old salmon, adults are three years old or older.

Appendix 12. Spring Chinook estimated run-size upstream of Junction City weir, 1977 - 2015.



Appendix 13. Spring Chinook estimated run-size for the Trinity River upstream of Junction City weir, 2002 – 2015, showing natural- and TRH-origin composition.



Appendix 14. Fork length (FL) distribution of fall Chinook trapped and tagged at Willow Creek (WCW) weir, and subsequently recovered during the 2015-16 season.^a

FL (cm)	WCW			RECOVERIES							
	Total Trapped	Total Tagged ^b	Ad-clips ^c	Tag Morts ^d	Angler Harvest ^e	TRH ^f Recoveries	Carcass ^g Recoveries	Found Tags ^h	Angler Released ⁱ	Total Recoveries	% Recoveries
39	1									0	--
40										0	--
41	3	3								0	0.0
42	6	6								0	0.0
43	7	7								0	0.0
44	8	8				2				2	25.0
45	17	17	1			4				4	23.5
46	19	18	2		1	4				5	27.8
47	14	14				1				1	7.1
48	23	23	3			4	1			5	21.7
49	28	27				2				2	7.4
50	21	21	1			4				4	19.0
51	14	14				1				1	7.1
52	20	20	2			6			1	7	35.0
53	10	10								0	0.0
54	15	15	2			5				5	33.3
55	10	8	1			4				4	50.0
56	8	8	1			1				1	12.5
57	11	10	1			1				1	10.0
58	9	9	2			6				6	66.7
59	11	11				6				6	54.5
60	25	25	2			14				14	56.0
61	30	29	4			15				15	51.7
62	21	21	5			14				14	66.7
63	27	27	4			15		1		16	59.3
64	30	30	6			22				22	73.3
65	31	29	4			13				13	44.8
66	31	31	5		1	15				16	51.6
67	24	24	3			7			2	9	37.5
68	24	23	6			5	1			6	26.1
69	25	25	2			7			1	8	32.0
70	24	24	6			8	2			10	41.7
71	18	18				8	1			9	50.0
72	30	29	5			13				13	44.8
73	22	22	3			9	1			10	45.5
74	28	28	1			7	2		1	10	35.7
75	19	19	2			12				12	63.2
76	22	22	2			7				7	31.8
77	24	24	1			6				6	25.0
78	18	18	1			2		1		3	16.7
79	17	17	2			8				8	47.1
80	14	13	3			7				7	53.8
81	12	11				1	1			2	18.2
82	12	12	1		1					1	8.3
83	12	12	1			1	1			2	16.7
84	14	14	1			5				5	35.7
85	6	6								0	0.0
86	6	6				1				1	16.7
87	5	5								0	0.0
88	11	11	3			1	1			2	18.2
89	13	12	2		1	1	1			3	25.0
90	2	2								0	0.0
91	5	5								0	0.0
92	7	7	1			1				1	14.3
93	2	2								0	0.0
94	2	2								0	0.0
95										0	--
96	3	3								0	0.0
97										0	--
98	2	2								0	0.0
99	1									0	--
100	1	1								0	0.0
Totals:	875	860	92	0	4	276	12	2	5	299	34.8
Mean FL:	66.0	66.0	67.2	--	70.8	65.9	74.1	70.5	65.8	66.3	
Total jacks: ^j	191	188	9	0	1	28	1	0	1	31	16.5
Total adults:	684	672	83	0	3	248	11	2	4	268	39.9

a/ Trapping at Willow Creek weir took place August 27 - December 1, 2015 (Julian weeks 35-48). All Chinook trapped were considered fall Chinook.

b/ Fifteen (3 jack and 12 adult) fall Chinook were not tagged due to poor condition.

c/ Ad-clip = Adipose fin clipped fish.

d/ Tagged fish found dead and unspawned within 30 days of tagging are considered tagging mortalities.

e/ Fish reported as harvested by angler

f/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys.

h/ Fish tags found loose or on dead fish and returned by anglers or other river enthusiasts.

i/ Fish caught and released by anglers, their tag removed.

j/ Fall Chinook <54 cm FL were considered jacks in 2015.

Appendix 15. Fork length distribution of coded-wire tagged, Trinity River Hatchery-produced fall Chinook recovered at TRH during the 2015-16 season.^a

FL (cm)	2010				Brood Year					
	068777-f	068778-f	068779-f	068781-y	2011					
	068830-f	068841-f	068842-f	068844-f	068845-f	068847-y				
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58				1						
59										
60										1
61										1
62										
63										1
64										5
65										7
66							2			9
67						1				9
68						1				6
69					1	1			1	13
70					1					15
71					2	3				16
72										17
73	1								2	14
74						1	1			13
75						1	3			16
76				1		1	2	1		23
77				1				2		13
78			1					1	1	13
79									1	10
80				1	1				2	14
81				2		1				7
82		1		1						4
83										4
84										3
85										4
86				1						6
87										1
88			1		1					4
89		1		1					1	1
90				2						1
91										1
92										1
93										1
94										
95			1	1						
Totals:	1	2	3	12	3	6	13	7	8	254
Mean	73.0	85.5	87.0	82.1	79.3	73.8	73.0	73.4	77.6	74.6

a/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

b/ Age at release: f = fingerlings, y = yearlings.

Appendix 15 (continued). Fork length distribution of coded-wire tagged, Trinity River Hatchery-produced fall Chinook recovered at TRH during the 2015-16 season. ^a

FL (cm)	2012						2013						TOTALS
	060493-f	060494-f	060495-f	060496-f	060499-f	060504-y	060608-f	060609-f	060610-f	060611-f	060613-y	068850-f	
40						1							1
41													0
42											1		1
43											1		1
44											2		2
45											5		5
46											3	1	4
47							1			2	2		5
48							1	2	1	1	1		6
49								2	1		1		4
50											2		2
51							2	1			2		5
52						2	4	1	1		1		9
53						3					1		4
54	1					3							4
55													0
56				1		9							10
57						10	1						11
58	1	1				14							17
59		1	1			18							20
60	2	3				22							28
61	1		1			42							45
62		1				44							45
63	2					33							36
64	1	1			1	32							40
65		1	1			27							36
66	1					35							47
67	2	3	1	1		21							38
68	1	1				13							22
69						9							25
70	1					9							26
71						6							27
72						4							21
73	1					2							20
74						1							16
75	1	1											22
76													28
77													16
78													16
79													11
80													18
81													11
82													6
83													4
84													3
85													4
86													7
87													1
88													6
89													4
90													3
91													1
92													1
93													1
94													0
95													2
Totals:	15	13	4	2	1	360	9	6	3	3	22	1	338
Mean	64.6	64.0	63.0	61.5	64.0	63.0	51.3	49.5	49.7	47.3	47.0	46.0	

a/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

b/ Age at release: f = fingerlings, y = yearlings.

Appendix 16. Run-size, percent return, in-river sport catch, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, fall Chinook returning to the Trinity River upstream of Willow Creek weir during the period 2011 through 2015.

Release data						Estimated returns					
CWT ^a	Brood					Run-	% of	River	Spawning escapement		
code	year	Date ^b	Number	Site	Age	size	release	harvest	TRH ^c	Natural	Total ^d
068777	2010	06/1-17/11	114,941	TRH	2	33	0.03	0.2	6	27	33
068777	2010				3	88	0.08	2.6	25	60	85
068777	2010				4	108	0.09	3.1	38	67	105
068777	2010				5	1	0.00	0.0	1	0	1
Totals: ^d						230	0.20	6	70	154	224
Total adults: ^e						197	0.17	6	64	127	191
068778	2010	06/1-17/11	119,394	TRH	2	39	0.03	0.2	7	31	38
068778	2010				3	91	0.08	2.7	26	62	89
068778	2010				4	108	0.09	3.8	46	82	128
068778	2010				5	3	0.00	0.0	2	1	3
Totals: ^d						240	0.20	7	82	176	257
Total adults: ^e						202	0.17	6	74	144	219
068779	2010	06/1-17/11	119,945	TRH	2	22	0.02	0.1	4	18	22
068779	2010				3	67	0.06	1.9	19	45	65
068779	2010				4	107	0.09	3.1	38	67	104
068779	2010				5	4	0.00	0.0	3	1	4
Totals: ^d						200	0.17	5	64	131	195
Total adults: ^e						178	0.15	5	60	113	173
068780	2010	06/1-17/11	112,828	TRH	2	27	0.02	0.2	5	22	27
068780	2010				3	42	0.04	1.2	12	29	41
068780	2010				4	81	0.07	2.3	29	51	79
068780	2010				5	0	0.00	0.0	0	0	0
Totals: ^d						151	0.13	4	46	102	147
Total adults: ^e						124	0.11	4	41	79	120
068781	2010	10/3-12/11	231,430	TRH	2	44	0.02	0.3	8	36	44
068781	2010				3	520	0.22	15.1	150	355	505
068781	2010				4	1,641	0.71	47.3	575	1019	1,593
068781	2010				5	16	0.01	0.1	12	3	15
Totals: ^d						2,221	0.96	63	745	1,413	2,158
Total adults: ^e						2,177	0.94	62	737	1,377	2,114
068835 ^f	2010	06/2-8/13/11	7,954	River	2	11	0.14	0.1	2	9	11
068835 ^f	2010				3	4	0.04	0.1	1	2	3
068835 ^f	2010				4	20	0.26	0.6	7	13	20
068835 ^f	2010				5	0	0.00	0.0	0	0	0
Totals: ^d						35	0.44	1	10	24	34
Total adults: ^e						24	0.30	1	8	15	23

Appendix 16 (continued). Run-size, percent return, in-river sport catch, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, fall Chinook returning to the Trinity River upstream of Willow Creek weir during the period 2011 through 2015.

Release data					Estimated returns						
068830 ^f	2011	5/24-8/27/12	9,706	River	2	0	0.00	0.0	0	0	0
068830 ^f	2011				3	17	0.18	0.5	6	11	17
068830 ^f	2011				4	4	0.04	0.0	3	1	4
068841	2011	06/1-15/12	86,357	TRH	2	7	0.01	0.2	5	2	7
068841	2011				3	91	0.10	2.6	32	56	88
068841	2011				4	8	0.01	0.0	6	2	8
068842	2011	06/1-15/12	95,355	TRH	2	4	0.00	0.1	3	1	4
068842	2011				3	96	0.10	2.8	34	60	93
068842	2011				4	17	0.02	0.1	13	4	17
068844	2011	06/6-15/12	112,093	TRH	2	9	0.01	0.3	6	3	9
068844	2011				3	119	0.11	3.4	42	74	116
068844	2011				4	9	0.01	0.0	7	2	9
068845	2011	06/7-15/12	102,907	TRH	2	3	0.00	0.1	2	1	3
068845	2011				3	64	0.06	1.8	22	40	62
068845	2011				4	10	0.01	0.1	8	2	10
068847	2011	10/1-17/12	200,337	TRH	2	21	0.01	0.6	14	6	21
068847	2011				3	2,140	1.07	61.6	750	1,328	2,078
068847	2011				4	327	0.16	1.5	254	71	325
060493	2012	06/01-15/13	105,581	TRH	2	10	0.01	0.2	4	6	10
060493	2012				3	20	0.02	0.1	15	4	19
060494	2012	06/01-15/13	102,559	TRH	2	18	0.02	0.4	7	11	18
060494	2012				3	17	0.02	0.1	13	4	17
060495	2012	06/01-15/13	67,315	TRH	2	0	0.00	--	--	--	0
060495	2012				3	5	0.01	0	4	1	5
060496	2012	06/01-15/13	103,825	TRH	2	0	0.00	--	--	--	0
060496	2012				3	3	0.00	0	2	1	3
060499 ^f	2012	5/29-8/29/13	13,752	River	2	0	0.00	--	--	--	0
060499 ^f	2012				3	1	0.01	0	1	0	1
060504	2012	10/01-14/13	221,247	TRH	2	108	0.05	2.1	43	63	106
060504	2012				3	463	0.21	2.1	360	101	461
060608	2013	06/01-04/14	128,061	TRH	2	26	0.01	0.2	9	17	26
060609	2013	06/01-04/14	124,107	TRH	2	17	0.01	0.1	6	11	17
060610	2013	06/01-04/14	127,893	TRH	2	9	0.00	0.1	3	6	9
060611	2013	06/01-04/14	128,022	TRH	2	9	0.00	0.1	3	6	9
060613	2013	10/01-22/14	239,886	TRH	2	64	0.03	0.5	22	41	63
068850 ^f	2013	5/16-8/28/14	9,372	River	2	3	0.00	0.0	1	2	3

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 2010. These fish have reached five years of age and are considered to

e/ The term "adults" includes Chinook aged three through five.

f/ Experimental release group. Fish used in screw trap efficiency studies; released near North Fork Trinity River or

g/ Rounding sometimes makes for seeming addition errors in this column.

Appendix 17. Percent return of Trinity River Hatchery-produced, coded-wire tagged, fall Chinook salmon, brood years 1986-2010.

Brood year	Fingerling releases			Yearling releases		
	Number released	Number of returns	Percent return	Number released	Number of returns	Percent return
1986	393,955	292	0.07%	153,700	4,899	3.19%
1987	172,980	129	0.07%	92,300	418	0.45%
1988	194,197	138	0.07%	143,934	796	0.55%
1989	201,622	21	0.01%	143,978	174	0.12%
1990	0	0	---	103,040	166	0.16%
1991	206,416	937	0.45%	115,300	517	0.45%
1992	192,032	2,503	1.30%	108,894	5,369	4.93%
1993	201,032	158	0.08%	110,336	798	0.72%
1994	216,563	374	0.17%	113,124	756	0.67%
1995	216,051	285	0.13%	110,327	3,106	2.82%
1996	217,981	445	0.20%	112,746	394	0.35%
1997	216,772	1,707	0.79%	313,080	11,396	3.64%
1998	184,781	292	0.16%	334,726	7,173	2.14%
1999	181,301	693	0.38%	296,892	5,833	1.96%
2000	522,316	3,909	0.75%	216,593	5,245	2.42%
2001	499,919	476	0.10%	230,055	5,894	2.56%
2002	508,963	3,563	0.70%	236,319	3,561	1.51%
2003	534,219	289	0.05%	225,798	944	0.42%
2004	486,369	4,125	0.85%	218,386	3,909	1.79%
2005	488,466	157	0.03%	227,903	675	0.30%
2006	486,833	849	0.17%	238,156	3,240	1.36%
2007	446,316	324	0.07%	244,661	2,330	0.95%
2008	518,269	3,576	0.69%	259,330	4,211	1.62%
2009	496,761	2,988	0.60%	230,461	7,361	3.19%
2010	475,062	856	0.18%	231,430	2,221	0.96%
Means:	330,367	1,163	0.34%	192,459	3,255	1.57%

a/ Based on estimated returns upstream of Willow Creek weir. Does not include ocean harvest, in-river harvest, and escapement below Willow Creek weir.

Appendix 18. Fall Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Willow Creek weir, 1977 – 2015.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Jacks ^e		Adults		Total	Natural Area Spawners ^a			Trinity River Hatchery			Jacks	Adults	Total
						Jacks	Adults	Total	Jacks	Adults	Total			
	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		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	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	472
1993	3,381	32.2	7,104	67.8	10,485	2,473	5,898	8,371	736	815	1,551	172	391	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	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	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	1,862
1997	3,767	17.6	17,580	82.4	21,347	2,845	11,507	14,352	820	5,387	6,207	102	686	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	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	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	1,583
2001	1,214	2.1	55,895	97.9	57,109	914	36,152	37,066	204	17,971	18,175	96	1,772	1,868

a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

b/ The 1978 sport harvest of fall Chinook was restricted by a salmon fishing closure beginning August 25, 1978.

c/ The sport harvest of adult fall Chinook was subject to seasonal and size limit restrictions.

d/ The 1999-2013 sport harvest of Klamath Basin fall Chinook was managed with a quota system. The quota for adult fall Chinook was 957 in 1999; 693 in 2000; 9,834 in 2001; 6,926 in 2002; 10,800 in 2003; 4,700 in 2004; 1,262 in 2005, zero in 2006, 10,600 in 2007, 20,500 in 2008, 30,800 in 2009, 12,000 in 2010, 7,900 in 2011, 67,600 in 2012, and 40,006 in 2013.

e/ Jacks are two year old fish, adults are a minimum of three years old.

Appendix 18 (continued). Fall Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Willow Creek weir, 1977 – 2015.

Year	Run-size estimate					Spawner escapements						Angler harvest		
						Natural Area Spawners ^a			Trinity River Hatchery					
	Jacks ^e		Adults		Total	Jacks	Adults	Total	Jacks	Adults	Total	Jacks	Adults	Total
	Number	Percent	Number	Percent										
2002 NATURAL	1,314	15.1	7,367	84.9	8,681	1,231	6,549	9,019	26	523	549	57	295	352
2002 TRH	2,498	26.4	6,977	73.6	9,475	1,335	3,761	3,857	1,052	2,952	4,004	111	264	375
2002 TOTAL	3,812	21.0	14,344	79.0	18,156	2,566	10,310	12,876	1,078	3,475	4,553	168	559	d/ 727
2003 NATURAL	579	5.1	10,839	94.9	11,418	415	9,273	9,688	105	1,243	1,349	58	322	380
2003 TRH	968	1.8	51,976	98.2	52,944	343	21,922	22,265	529	28,509	29,037	97	1,545	1,642
2003 TOTAL	1,547	2.4	62,815	97.6	64,362	758	31,195	31,953	634	29,752	30,386	155	1,867	d/ 2,022
2004 NATURAL	3,210	90	369	10	3,578	2,941	-223	2,718	70	595	664	200	-3	197
2004 TRH	2,014	8	23,941	92	25,956	898	11,768	12,666	989	11,789	12,779	127	384	511
2004 TOTAL	5,224	17.7	24,310	82.3	29,534	3,839	11,545	15,384	1,059	12,384	13,443	327	381	d/ 708
2005 NATURAL	879	10.3	7,678	89.7	8,557	743	6,364	7,107	36	1,065	1,101	100	247	347
2005 TRH	20	0.1	19,654	99.9	19,674	8	6,353	6,361	12	12,693	12,705	0	609	609
2005 TOTAL	899	3.2	27,332	96.8	28,231	751	12,717	13,468	48	13,758	13,806	100	856	d/ 956
2006 NATURAL	6,845	52	6,299	48	13,144	6,358	5,114	11,472	421	1,185	1,606	66	0	66
2006 TRH	5,445	25	16,323	75	21,768	1,870	9,452	11,322	3,517	6,871	10,388	58	0	58
2006 TOTAL	12,290	35.2	22,622	64.8	34,912	8,228	14,566	22,794	3,938	8,056	11,994	124	0	d/ 124
2007 NATURAL	819	2.4	33,421	97.6	34,240	723	31,412	32,135	16	1,457	1,473	81	552	633
2007 TRH	67	0.3	24,566	99.7	24,633	42	7,555	7,597	17	16,624	16,641	8	387	395
2007 TOTAL	886	1.5	57,987	98.5	58,873	765	38,967	39,732	33	18,081	18,114	89	939	d/ 1,028
2008 NATURAL	6,723	46.6	7,689	53.4	14,412	6,373	6,951	13,324	185	599	784	165	138	303
2008 TRH	1,133	13.2	7,452	86.8	8,585	488	3,457	3,945	616	3,852	4,468	29	143	172
2008 TOTAL	7,856	34.2	15,141	65.8	22,997	6,861	10,408	17,269	801	4,451	5,252	194	281	d/ 475
2009 NATURAL	5,733	29.4	13,788	70.6	19,521	5,602	12,537	18,139	-9	921	912	141	330	471
2009 TRH	285	2.8	9,787	97.2	10,072	130	3,126	3,256	150	6,432	6,582	4	229	233
2009 TOTAL	6,018	20.3	23,575	79.7	29,593	5,732	15,663	21,395	141	7,353	7,494	145	559	d/ 704
2010 NATURAL	10,125	40.6	14,814	59.4	24,939	9,782	14,104	23,886	241	611	852	102	99	201
2010 TRH	2,429	15.3	13,424	84.7	15,853	1,187	6,197	7,384	1,217	7,138	8,355	25	89	114
2010 TOTAL	12,554	30.8	28,238	69.2	40,792	10,969	20,301	31,270	1,458	7,749	9,207	127	188	d/ 315
2011 NATURAL	30,462	63.5	17,482	36.5	47,944	29,530	15,470	45,000	146	1,688	1,834	786	327	1,113
2011 TRH	4,815	14.6	28,060	85.4	32,875	2,997	15,340	18,337	1,694	12,194	13,888	124	524	648
2011 TOTAL	35,277	43.6	45,542	56.4	80,819	32,527	30,810	63,337	1,840	13,882	15,722	910	851	d/ 1,761
2012 NATURAL	4,514	11.0	36,416	89.0	40,931	4,530	34,702	39,232	-42	838	796	31	1,644	1,675
2012 TRH	729	2.2	32,007	97.8	32,735	590	14,615	15,205	134	16,623	16,757	4	769	773
2012 TOTAL	5,243	7.1	68,423	92.9	73,666	5,120	49,317	54,437	92	17,461	17,553	31	1,644	d/ 2,448
2013 NATURAL	6,514	27.6	17,104	72.4	23,618	6,515	16,689	23,204	-1	-82	-83	0	498	498
2013 TRH	203	1.5	13,168	98.5	13,371	67	8,986	9,053	136	3,799	3,935	0	382	382
2013 TOTAL	6,717	18.2	30,272	81.8	36,989	6,582	25,675	32,257	135	3,717	3,852	0	880	d/ 880
2014 NATURAL	5,553	32.0	11,814	68.0	17,367	5,492	11,528	17,020	-19	10	-9	80	276	356
2014 TRH	1,385	6.8	19,078	93.2	20,463	1,111	11,577	12,688	240	6,965	7,205	34	536	570
2014 TOTAL	6,938	18.3	30,892	81.7	37,830	6,603	23,105	29,708	221	6,975	7,196	114	812	d/ 926
2015 NATURAL	2,226	38.1	3,609	61.9	5,834	2,167	3,576	5,744	41	16	57	17	17	34
2015 TRH	524	11.6	4,006	88.4	4,531	338	875	1,212	183	3,113	3,296	4	18	22
2015 TOTAL	2,750	26.5	7,615	73.5	10,365	2,505	4,451	6,956	224	3,129	3,353	21	35	d/ 56

a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

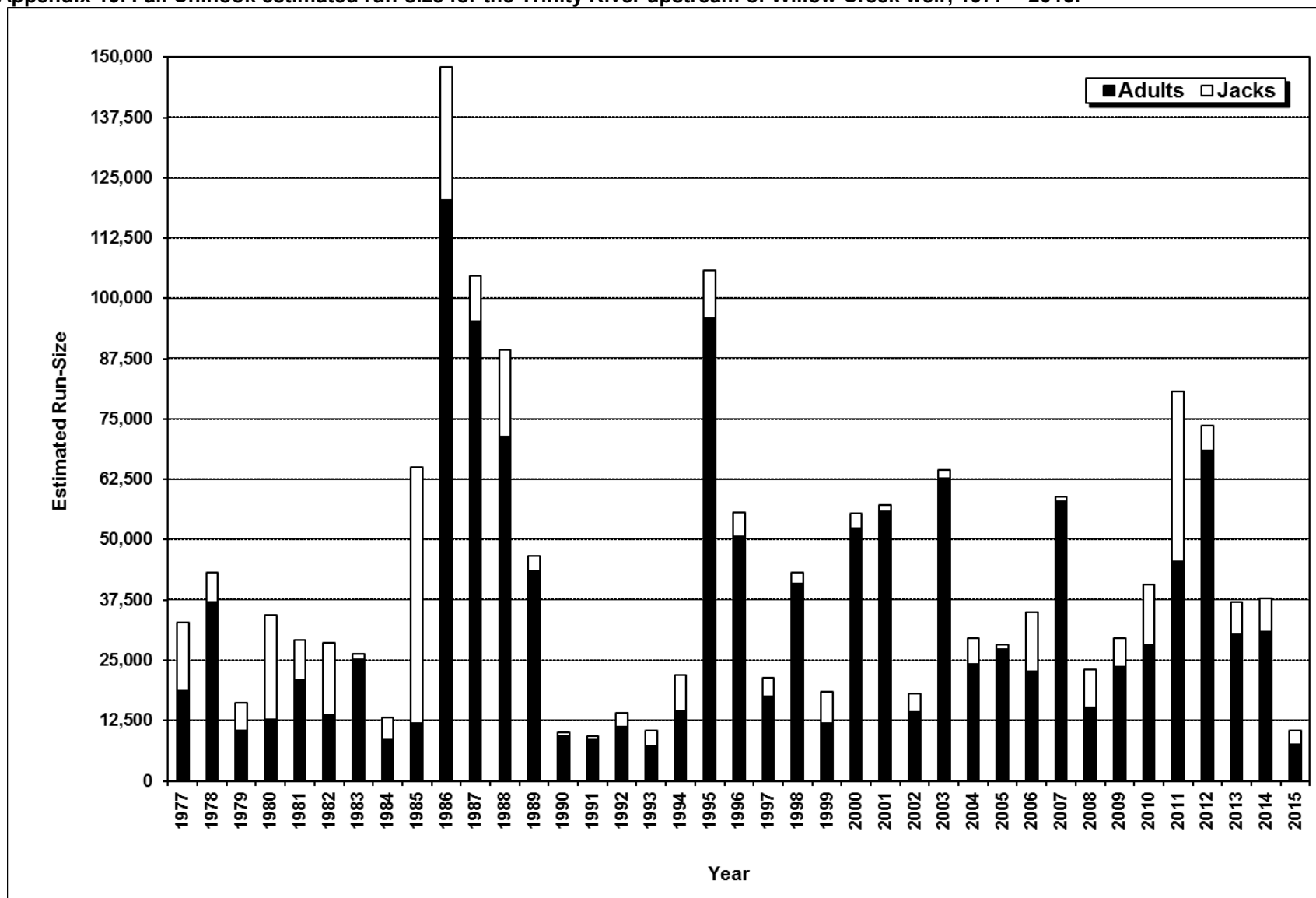
b/ The 1978 sport harvest of fall Chinook was restricted by a salmon fishing closure beginning August 25, 1978.

c/ The sport harvest of adult fall Chinook was subject to seasonal and size limit restrictions.

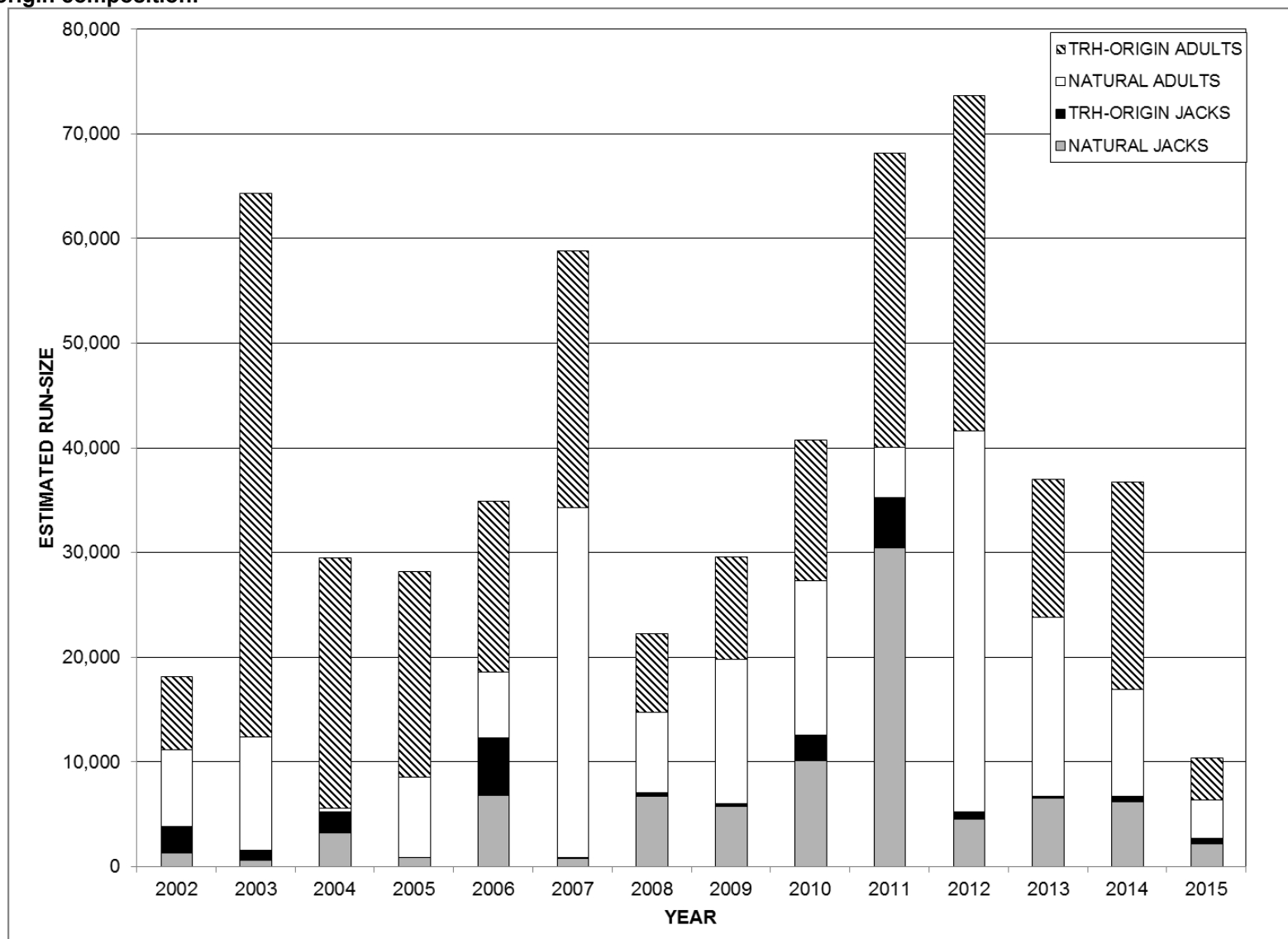
d/ The 1999-2013 sport harvest of Klamath Basin fall Chinook was managed with a quota system. The quota for adult fall Chinook was 957 in 1999; 693 in 2000; 9,834 in 2001; 6,926 in 2002; 10,800 in 2003; 4,700 in 2004; 1,262 in 2005, zero in 2006, 10,600 in 2007, 20,500 in 2008, 30,800 in 2009, 12,000 in 2010, 7,900 in 2011, 67,600 in 2012, 40,006 in 2013, 4,128 in 2014, and 14,133 in 2015.

e/ Jacks are two year old fish, adults are a minimum of three years old.

Appendix 19. Fall Chinook estimated run-size for the Trinity River upstream of Willow Creek weir, 1977 – 2015.



Appendix 20. Fall Chinook estimated run-size for the Trinity River upstream of Willow Creek weir, 2002 – 2015, showing natural- and TRH-origin composition.



Appendix 21. Fork length (FL) distribution of coho trapped and tagged at Willow Creek (WCW) weir, and subsequently recovered during the 2015-16 season.^a

FL (cm)	WCW			RECOVERIES							
	Total Trapped	Total Tagged ^b	RM-clips ^c	Tag Morts ^d	Angler Harvest ^e	TRH ^f Recoveries	Carcass ^g Recoveries	Found Tags ^h	Angler Released ⁱ	Total Recoveries	% Recoveries
38	1	1	1			1				1	100.0
39	3	2	2							0	0.0
40	3	3	3							0	0.0
41	5	5	2			2			1	3	60.0
42	18	17	17			11			1	12	70.6
43	12	12	12			7				7	58.3
44	15	15	15			11				11	73.3
45	10	10	9			6				6	60.0
46	13	12	13			8				8	66.7
47	7	6	6			6				6	100.0
48	4	4	4			3			1	4	100.0
49	3	3	3			2				2	66.7
50	6	6	6			1				1	16.7
51	3	3	2			2				2	66.7
52	5	5	3			3			1	4	80.0
53	6	6	4			4				4	66.7
54	4	3	4			2				2	66.7
55	17	14	15			12				12	85.7
56	9	9	9			9				9	100.0
57	27	27	26			26				26	96.3
58	23	21	21			17				17	81.0
59	37	37	30			26				26	70.3
60	39	38	33			33				33	86.8
61	62	61	53			48	1			49	80.3
62	30	29	16			18				18	62.1
63	43	43	32			29		1		30	69.8
64	32	32	27			23	1			24	75.0
65	30	29	23			20				20	69.0
66	9	9	6			6				6	66.7
67	10	10	6			5				5	50.0
68	4	4	3			2				2	50.0
69	1	1								0	0.0
70	2	1	1							0	0.0
71	1	1								0	0.0
Totals:	494	479	407	0	0	343	2	1	4	350	73.1
Mean FL:	57.4	57.5	56.8	--	--	57.8	62.5	63.0	45.8	57.7	
Total jacks: ^j	100	96	93	0	0	58	0	0	3	61	63.5
Total adults:	394	383	314	0	0	285	2	1	1	289	75.5

a/ Trapping at Willow Creek weir took place August 27 - December 1, 2015 (Julian weeks 35-48).

b/ Fifteen (4 jack and 11 adult) coho were not tagged due to poor condition.

c/ RM-clips = Right maxillary clipped fish of Trinity River Hatchery origin.

d/ Tagged fish found dead and unspawned within 30 days of tagging are considered tagging mortalities.

e/ Fish reported as harvested by anglers. There were zero reported as harvested by anglers in 2014.

f/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys.

h/ Fish tags found loose or on dead fish and returned by anglers or other river enthusiasts.

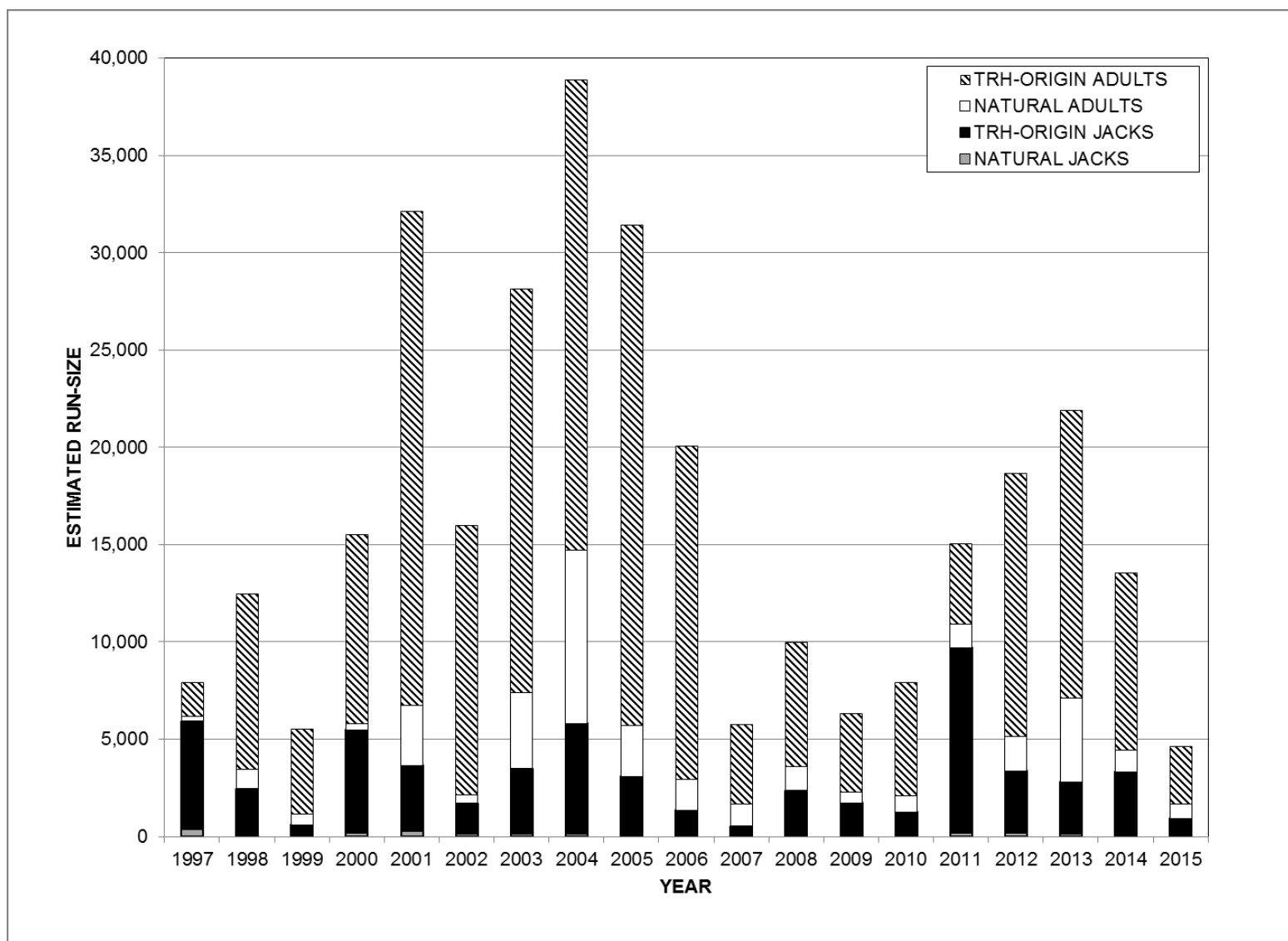
i/ Fish caught and released by anglers, their tag removed.

j/ Coho <51 cm FL were considered jacks in 2015.

Appendix 22. Estimated run-size, spawner escapement and harvest of naturally- and hatchery-produced coho salmon for the Trinity River upstream of Willow Creek weir, 1997- 2015.

YEAR	Strata Component	Run-size Estimate			Natural Area Escapement			TRH Escapement		
		Jacks	Adults	Total	Jacks	Adults	Total	Jacks	Adults	Total
1997	Natural	399	252	651	383	232	615	13	20	33
	TRH	5,552	1,732	7,284	4,655	865	5,520	858	867	1,725
	TOTAL	5,951	1,984	7,935	5,038	1,097	6,135	871	887	1,758
1998	Natural	131	1,001	1,132	123	886	1,009	8	115	123
	TRH	2,340	9,008	11,348	1,371	5,109	6,480	969	3,899	4,868
	TOTAL	2,471	10,009	12,480	1,494	5,995	7,489	977	4,014	4,991
1999	Natural	31	555	586	23	430	453	8	103	111
	TRH	592	4,357	4,949	211	1,266	1,477	381	3,015	3,396
	TOTAL	623	4,912	5,535	234	1,696	1,930	389	3,118	3,507
2000	Natural	197	342	539	187	288	475	10	54	64
	TRH	5,289	9,704	14,993	4,373	6,297	10,670	916	3,407	4,323
	TOTAL	5,486	10,046	15,532	4,560	6,585	11,145	926	3,461	4,387
2001	Natural	297	3,075	3,372	295	2,945	3,240	2	130	10,132
	TRH	3,373	25,395	28,768	2,349	15,770	18,119	1,024	9,625	10,649
	TOTAL	3,670	28,470	32,140	2,644	18,715	21,359	1,026	9,755	20,781
2002	Natural	138	458	596	123	372	495	15	86	101
	TRH	1,571	13,849	15,420	883	7,440	8,323	688	6,409	7,097
	TOTAL	1,709	14,307	16,016	1,006	7,812	8,818	703	6,495	7,198
2003	Natural	163	3,930	4,093	149	3,264	3,414	14	666	680
	TRH	3,338	20,721	24,059	1,889	10,991	12,880	1,449	9,730	11,179
	TOTAL	3,501	24,651	28,152	2,038	14,255	16,294	1,463	10,396	11,859
2004	Natural	154	8,901	9,055	145	7,830	7,975	9	1,071	1,080
	TRH	5,665	24,162	29,827	4,597	15,287	19,884	1,068	8,835	9,903
	TOTAL	5,819	33,063	38,882	4,742	23,117	27,859	1,077	9,906	10,983
2005	Natural	81	2,648	2,729	71	1,728	1,799	10	920	930
	TRH	3,012	25,678	28,690	1,270	9,974	11,244	1,721	15,704	17,425
	TOTAL	3,093	28,326	31,419	1,341	11,702	13,043	1,731	16,624	18,355
2006	Natural	38	1,586	1,624	34	1,416	1,450	4	170	174
	TRH	1,331	17,123	18,454	674	7,454	8,128	657	9,669	10,326
	TOTAL	1,369	18,709	20,078	708	8,870	9,578	661	9,839	10,500
2007	Natural	42	1,157	1,199	37	940	977	5	217	222
	TRH	503	4,048	4,551	233	1,612	1,845	270	2,436	2,706
	TOTAL	545	5,205	5,750	270	2,552	2,822	275	2,653	2,928
2008	Natural	89	1,223	1,312	83	861	944	6	362	368
	TRH	2,290	6,381	8,671	1,647	2,204	3,851	643	4,177	4,820
	TOTAL	2,379	7,604	9,983	1,730	3,065	4,795	649	4,539	5,188
2009	Natural	116	529	645	113	429	542	3	91	94
	TRH	1,630	4,067	5,697	758	1,681	2,439	872	2,386	3,258
	TOTAL	1,746	4,596	6,342	871	2,110	2,981	875	2,477	3,352
2010	Natural	44	817	861	34	624	658	10	193	203
	TRH	1,233	5,852	7,085	717	2,146	2,863	516	3,706	4,222
	TOTAL	1,277	6,669	7,946	751	2,770	3,521	526	3,899	4,425
2011	Natural	208	1,205	1,413	187	991	1,178	21	214	235
	TRH	9,514	4,113	13,627	6,606	2,403	9,009	2,865	1,710	4,575
	TOTAL	9,722	5,318	15,040	6,793	3,394	10,187	2,886	1,924	4,810
2012	Natural	192	1,774	1,966	184	1,577	1,761	8	197	205
	TRH	3,198	13,494	16,692	2,327	6,335	8,662	871	7,159	8,030
	TOTAL	3,390	15,268	18,658	2,511	7,912	10,423	879	7,356	8,235
2013	Natural	152	4,305	4,457	149	3,948	4,097	3	357	360
	TRH	2,667	14,782	17,448	2,243	8,935	11,177	424	5,847	6,271
	TOTAL	2,819	19,087	21,905	2,392	12,883	15,274	427	6,204	6,631
2014	Natural	99	902	1,001	94	823	917	5	79	84
	TRH	3,239	9,297	12,536	2,307	6,405	8,712	932	2,892	3,824
	TOTAL	3,338	10,199	13,537	2,401	7,228	9,629	937	2,971	3,908
2015	Natural	65	748	814	57	459	517	8	289	297
	TRH	870	2,936	3,805	600	166	765	270	2,770	3,040
	TOTAL	935	3,684	4,619	657	625	1,282	278	3,059	3,337

Appendix 23. Coho estimated run-size for the Trinity River upstream of Willow Creek weir, 2002 – 2015, showing natural- and TRH-origin composition.



Appendix 24. Coho estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Willow Creek weir, 1977 - 2015.

YEAR	Run-size estimate					Spawner escapements						Angler harvest		
	Number	Percent	Number	Percent	Total	Natural Area Spawners ^a			Trinity River Hatchery			Jacks	Adults	Total
	Jacks ^e		Adults			Jacks	Adults	Total	Jacks	Adults	Total			
1977	3,106	80.5	752	19.5	3,858	1,756	25	1,781	1,230	698	1,928	120	29	149
1978	6,685	73.2	2,447	26.8	9,132	4,309	1,168	5,477	2,376	1,279	3,655	Fishing closure ^b		
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	763 ^c
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 ^d
1997	5,951	75.0	1,984	25.0	7,935	5,038	1,097	6,135	871	887	1,758	42	0	42 ^d
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 ^d
1999	623	11.3	4,912	88.7	5,535	234	1,696	1,930	389	3,118	3,507	0	98	98 ^d
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 ^d
2001	3,670	11.4	28,470	88.6	32,140	2,644	18,715	21,359	1,026	9,755	10,781	0	0	0 ^d
2002	1,709	10.7	14,307	89.3	16,016	1,006	7,812	8,818	703	6,495	7,198	0	0	0 ^d
2003	3,501	12.4	24,651	87.6	28,152	2,038	14,255	16,293	1,463	10,396	11,859	0	0	0 ^d
2004	5,819	15.0	33,063	85.0	38,882	4,742	23,117	27,859	1,077	9,906	10,983	0	40	40 ^d
2005	3,093	9.8	28,326	90.2	31,419	1,341	11,702	13,043	1,731	16,624	18,355	21	0	21 ^d
2006	1,369	6.8	18,709	93.2	20,078	708	8,870	9,578	661	9,839	10,500	0	0	0 ^d
2007	545	9.5	5,205	90.5	5,750	270	2,552	2,822	275	2,653	2,928	0	0	0 ^d
2008	2,379	23.8	7,603	76.2	9,982	1,730	3,064	4,794	649	4,539	5,188	0	0	0 ^d
2009	1,762	27.5	4,634	72.5	6,396	888	2,157	3,045	874	2,477	3,351	0	0	0 ^d
2010	1,278	16.1	6,669	83.9	7,947	752	2,770	3,522	526	3,899	4,425	0	0	0 ^d
2011	9,722	64.6	5,318	35.4	15,040	6,792	3,394	10,186	2,886	1,924	4,810	44	0	44 ^d
2012	3,389	18.2	15,268	81.8	18,657	2,510	7,912	10,422	879	7,357	8,236	0	0	0 ^d
2013	2,819	12.9	19,087	87.1	21,906	2,392	12,883	15,275	427	6,204	6,631	0	0	0 ^d
2014	3,338	24.7	10,199	75.3	13,537	2,401	7,228	9,629	937	2,971	3,908	0	0	0 ^d
2015	935	20.2	3,684	79.8	4,619	657	625	1,282	278	3,059	3,337	0	0	0 ^d

a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

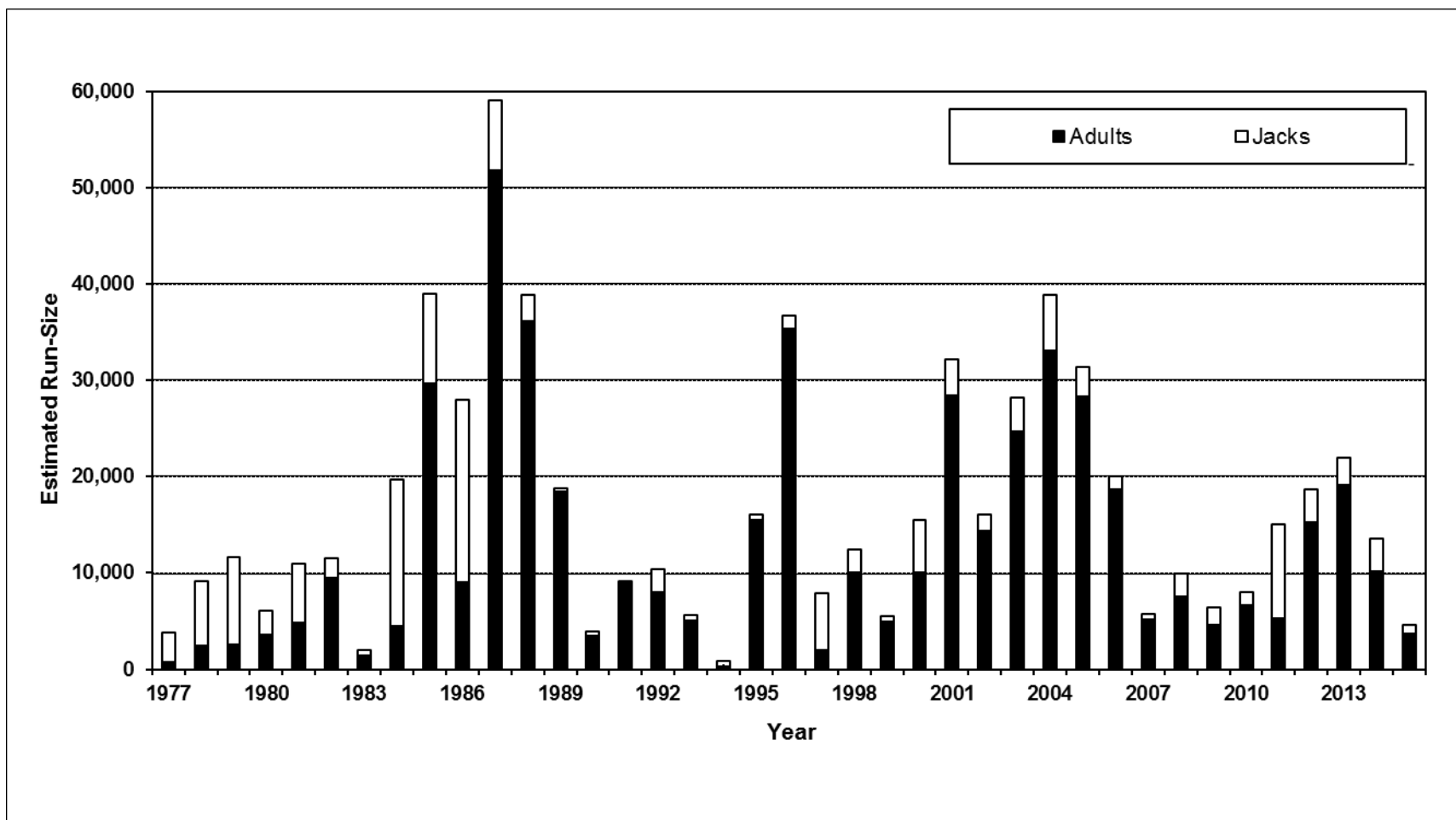
b/ The 1978 sport harvest of coho was essentially eliminated by a salmon fishing closure beginning August 25, 1978.

c/ The 1985 sport harvest of adult coho was limited by a closure for the taking of salmon > 55 cm total length beginning September 22, 1985.

d/ The 1996-2013 sport fishery was closed to the take of coho salmon.

e/ Jacks are two year old fish, adults are three years.

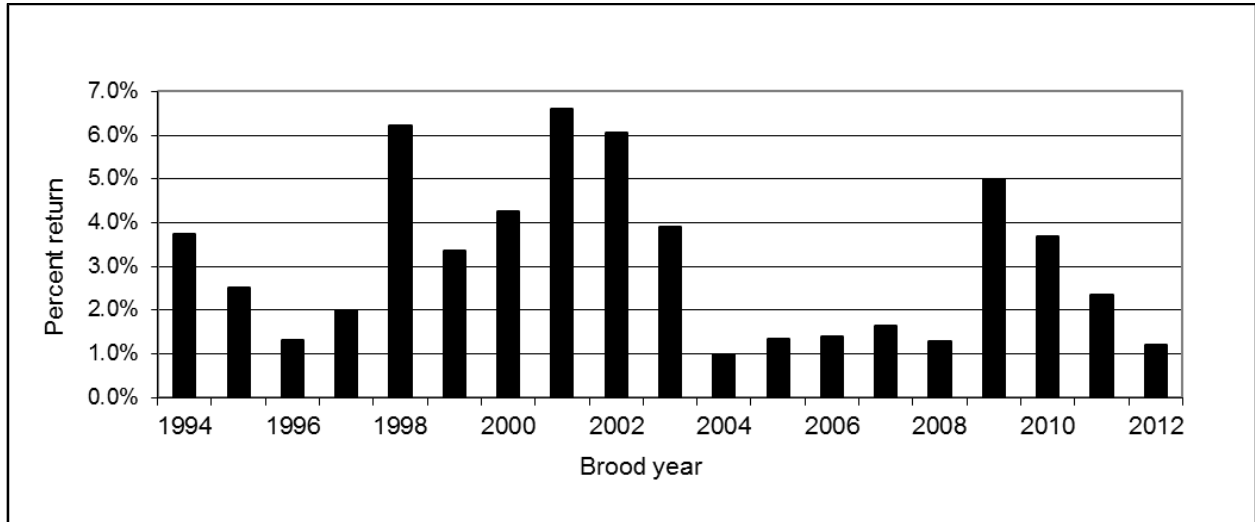
Appendix 25. Coho estimated run-size for the Trinity River upstream of Willow Creek weir, 1977 - 2015.



Appendix 26. Brood year performance and return data for Trinity River Hatchery coho salmon returning to Trinity River, upstream of Willow Creek weir, 1994 - 2012.

Release data				Return data						
Brood year	Date	Effective Number	Site	Age	Run-size	% of release	In-river harvest	Spawner Escapement		
								TRH	Natural	Total
1994	3/17-21/96	72,311	TRH	2	970	1.34%	0	105	865	970
				3	1,732	2.40%	0	867	865	1,732
				Totals:	2,702	3.74%	0	972	1,730	2,702
1995	3/17-21/97	580,880	TRH	2	5,552	0.96%	39	858	4,655	5,513
				3	9,008	1.55%	0	3,899	5,109	9,008
				Totals:	14,560	2.51%	39	4,757	9,764	14,521
1996	3/16-20/98	513,663	TRH	2	2,340	0.46%	0	969	1,371	2,340
				3	4,357	0.85%	86	3,015	1,256	4,271
				Totals:	6,697	1.30%	86	3,984	2,627	6,611
1997	3/15-22/99	517,196	TRH	2	592	0.11%	0	381	211	592
				3	9,704	1.88%	0	3,407	6,297	9,704
				Totals:	10,296	1.99%	0	3,788	6,508	10,296
1998	3/15-20/00	493,233	TRH	2	5,289	1.07%	0	916	4,373	5,289
				3	25,395	5.15%	0	9,625	15,770	25,395
				Totals:	30,684	6.22%	0	10,541	20,143	30,684
1999	3/15-22/01	512,986	TRH	2	3,373	0.66%	0	1,024	2,349	3,373
				3	13,849	2.70%	0	6,409	7,440	13,849
				Totals:	17,222	3.36%	0	7,433	9,789	17,222
2000	3/17-19/02	524,238	TRH	2	1,571	0.30%	0	688	883	1,571
				3	20,721	3.95%	0	9,730	10,991	20,721
				Totals:	22,292	4.25%	0	10,418	11,874	22,292
2001	3/17-19/03	416,201	TRH	2	3,338	0.80%	0	1,449	1,889	3,338
				3	24,162	5.81%	40	8,835	15,287	24,122
				Totals:	27,500	6.60%	40	10,284	17,176	27,460
2002	3/15-18/04	516,906	TRH	2	5,665	1.10%	0	1,068	4,597	5,665
				3	25,678	4.97%	0	15,704	9,974	25,678
				Totals:	31,343	6.06%	0	16,772	14,571	31,343
2003	3/14-18/05	520,847	TRH	2	3,012	0.58%	21	1,269	1,721	2,990
				3	17,123	3.29%	0	7,454	9,669	17,123
				Totals:	20,135	3.90%	21	8,723	11,390	20,113
2004	3/15-20/06	545,199	TRH	2	1,331	0.24%	0	657	674	1,331
				3	4,048	0.74%	0	2,436	1,612	4,048
				Totals:	5,379	0.99%	0	3,093	2,286	5,379
2005	3/15-20/07	511,961	TRH	2	503	0.10%	0	270	233	503
				3	6,381	1.25%	0	4,177	2,204	6,381
				Totals:	6,884	1.34%	0	4,447	2,437	6,884
2006	3/15-20/08	455,482	TRH	2	2,290	0.50%	0	643	1,647	2,290
				3	4,067	0.89%	0	2,386	1,681	4,067
				Totals:	6,357	1.40%	0	3,029	3,328	6,357
2007	3/16-20/09	457,478	TRH	2	1,645	0.36%	0	871	774	1,645
				3	5,852	1.28%	0	3,706	2,146	5,852
				Totals:	7,497	1.64%	0	4,577	2,920	7,497
2008	4/6-8/10	413,178	TRH	2	1,233	0.30%	0	516	707	1,233
				3	4,113	1.00%	0	1,710	2,403	4,113
				Totals:	5,346	1.29%	0	2,226	3,110	5,336
2009	3/15-28/11	490,998	TRH	2	10,982	2.24%	0	2,862	8,120	10,982
				3	13,494	2.75%	0	7,159	6,335	13,494
				Totals:	24,476	4.98%	0	10,021	14,455	24,476
2010	3/15-26/12	489,429	TRH	2	3,198	0.65%	0	871	2,327	3,198
				3	14,782	3.02%	0	5,847	8,935	14,782
				Totals:	17,980	3.67%	0	6,718	11,262	17,980
2011	3/15-20/13	511,618	TRH	2	2,667	0.52%	0	424	2,243	2,667
				3	9,297	1.82%	0	2,892	6,405	9,297
				Totals:	11,964	2.34%	0	3,316	8,648	11,964
2012	3/15-18/14	528,016	TRH	2	3,239	0.63%	0	932	2,307	3,239
				3	2,936	0.57%	0	2,770	166	2,936
				Totals:	6,175	1.21%	0	3,702	2,473	6,175
2013	3/15-23/15	287,720	TRH	2	870	0.17%	0	270	600	870
				3		0.00%	0			0
				Totals:	870	0.17%	0	270	600	870

Appendix 27. Percent return for Trinity River Hatchery-produced coho salmon, 1994 – 2012 brood years.



Appendix 28. Fork length (FL) distribution of fall run steelhead trapped and tagged at Willow Creek weir (WCW) , and subsequently recovered during the 2015-16 season.^a

FL (cm)	WCW			RECOVERIES							
	Total Trapped	Total Tagged ^b	Ad-clips ^c	Tag Morts ^d	Angler Harvest ^e	TRH ^f Recoveries	Carcass ^g Recoveries	Found Tags ^h	Angler Released ⁱ	Total Recoveries	% Recoveries
32	1									0	--
33	1									0	--
34										0	--
35										0	--
36	6		6							0	--
37	6		6							0	--
38	11		11							0	--
39	14		11							0	--
40	10		10							0	--
41	16		16							0	--
42	3	2	3						1	1	50.0
43	4	4	3			1			3	4	100.0
44	4	4	4			1				1	25.0
45	3	3	2			1				1	33.3
46	4	4							2	2	50.0
47	7	6	2						1	1	16.7
48	6	6								0	0.0
49	7	7	3			1				1	14.3
50	28	28	12		1	2		1	4	8	28.6
51	39	38	26		3	5		1	10	19	50.0
52	46	46	34		2	4			14	20	43.5
53	55	55	46		4	14			10	28	50.9
54	77	77	59			12			20	32	41.6
55	85	83	71		1	17			19	37	44.6
56	131	130	110		6	27			29	62	47.7
57	107	107	89		3	26		1	15	45	42.1
58	111	110	99		2	31		2	24	59	53.6
59	115	115	102		6	34			21	61	53.0
60	100	100	82		2	25			20	47	47.0
61	71	70	58			24			16	40	57.1
62	62	62	43			12			11	23	37.1
63	44	44	37		2	15			5	22	50.0
64	34	33	24		1	12			5	18	54.5
65	22	22	17			10			2	12	54.5
66	11	11	8			3			1	4	36.4
67	8	8	3			2				2	25.0
68	9	9	3						2	2	22.2
69	7	7	3			1			2	3	42.9
70	7	7	3			2			1	3	42.9
71	2	2								0	0.0
72	2	2								0	0.0
73	1	1								0	0.0
74	1	1								0	0.0
75										0	--
76	1	1	1							0	0.0
77	1	1	1			1				1	100.0
Totals:	1,280	1,206	1,008	0	33	283	0	5	238	559	46.4
Mean FL:	56.6	57.6	56.5	--	56.4	58.5	--	54.8	56.9	57.7	
Total 1/2lb ^{ers}	65	0	60	0	0	0	0	0	0	0	
Total adults ^j :	1,215	1,206	948	0	33	283	0	5	238	559	46.4

a/ Trapping at Willow Creek weir took place August 27 - December 1, 2015 (Julian weeks 35-48).

b/ Sixty five steelhead were trapped but not tagged at WCW in 2015; they were all half-pounders (too small).

c/ Ad-clip = Adipose fin clipped fish.

d/ Tagged fish found dead and unspawned within 30 days of tagging are considered tagging mortalities; of which we found none in 2015.

e/ Fish reported as harvested by anglers.

f/ Trapping occurred at Trinity River Hatchery September 7, 2015 - March 08, 2016 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys; of which we found none in 2015.

h/ Fish tags found loose or on dead fish and returned by anglers or other river enthusiasts.

i/ Fish caught and released by anglers, their tag removed.

j/ Adult steelhead are all those > 41 cm FL.

Appendix 29. Total number of adult steelhead^a (>41 cm FL) entering Trinity River Hatchery (TRH) and number recovered that were tagged at Willow Creek or Junction City weir (WCW) during the 2015-16 season.^b

Julian Week of Entry ^c	Inclusive Dates			Number Entering TRH	Recoveries from WCW JCW	
36	3-Sep	-	9-Sep	3		
37	10-Sep	-	16-Sep	30		
38	17-Sep	-	23-Sep	34		
39	24-Sep	-	30-Sep	22		
40	1-Oct	-	7-Oct	8		
41	8-Oct	-	14-Oct	--		
42	15-Oct	-	21-Oct	--		
43	22-Oct	-	28-Oct	57	2	
44	29-Oct	-	4-Nov	93	1	
45	5-Nov	-	11-Nov	53	1	
46	12-Nov	-	18-Nov	76	5	
47	19-Nov	-	25-Nov	91	5	
48	26-Nov	-	2-Dec	46	5	
49	3-Dec	-	9-Dec	92	9	
50	10-Dec	-	16-Dec	709	58	
51	17-Dec	-	23-Dec	194	17	
52	24-Dec	-	31-Dec	239	26	
1	1-Jan	-	7-Jan	96	7	
2	8-Jan	-	14-Jan	313	25	
3	15-Jan	-	21-Jan	344	29	
4	22-Jan	-	28-Jan	454	41	
5	29-Jan	-	4-Feb	238	24	
6	5-Feb	-	11-Feb	108	12	
7	12-Feb	-	18-Feb	79	8	
8	19-Feb	-	25-Feb	67	6	
9	26-Feb	-	4-Mar	20	1	
10	5-Mar	-	11-Mar	16	1	
Totals:				3,482	283	0

a/ Steelhead <42 cm FL are considered sub-adults and were not counted at TRH.

b/ Trapping occurred at TRH Sep 7, 2015 - March 8, 2016 (Julian weeks 36 -10; closed all or parts of JWs 41-43).

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

Appendix 30. Fall-run adult steelhead (>41cm FL) estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Willow Creek weir, 1977 - 2015.

Year	Run-size estimate					Spawner escapement						Angler harvest			
	Hatchery ^b		Wild ^c		Total	Natural Area Spawners ^a			Trinity River Hatchery			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 component				8,605			6,661			599			1,345	
1984			"					7,833			142			1,261	
1985			No estimates				No estimates					461		No estimates	
1986			"				"					3,780		"	
1987			"				"					3,007		"	
1988	No estimates for hatchery/wild component				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	681	24	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 component				5,212	No estimates			4,267	No estimates			429	No estimates	
1998			"			2,972		"	2,463		"	441		"	68 ^e
1999			"			5,470		"	3,817		"	1,571		"	82 ^e
2000			"			8,042		"	7,097		"	768		"	177 ^e
2001			"			12,638		"	9,938		"	2,333		"	367 ^e
2002	14,408	75.6	4,650	24.4	19,058	7,715	4,551	12,266	5,996	42	6,038	697	57	754 ^e	
2003	19,245	83.0	3,947	17.0	23,192	8,717	3,837	12,554	10,182	42	10,224	346	68	414 ^e	
2004	15,038	75.7	4,817	24.3	19,855	8,937	4,732	13,669	5,688	37	5,725	413	48	461 ^e	
2005	14,049	72.4	5,363	27.6	19,412	5,782	5,280	11,062	8,080	63	8,143	187	20	207 ^e	
2006	32,609	78.8	8,781	21.2	41,390	20,272	8,660	28,932	11,509	38	11,547	828	83	911 ^e	
2007	46,379	86	7,506	14	53,885	31,923	7,405	39,328	11,366	31	11,397	3,090	70	3,160 ^e	
2008	9,538	64	5,477	36	15,015	6,680	5,415	12,095	2,471	24	2,495	386	38	424 ^e	
2009	13,314	73	5,047	27	18,361	7,704	4,877	12,581	4,234	17	4,251	1,376	154	1,530 ^e	
2010	4,640	55	3,811	45	8,451	2,468	3,749	6,217	2,000	37	2,037	172	25	197 ^e	
2011	14,969	68	6,932	32	21,901	8,344	6,850	15,194	5,700	50	5,750	925	32	957 ^e	
2012	12,253	59	8,359	41	20,612	6,060	8,215	14,275	5,685	52	5,737	507	92	599 ^e	
2013	7,389	45	9,205	55	16,594	4,521	9,039	13,560	2,295	80	2,375	573	86	659 ^e	
2014	4,460	43	5,822	57	10,282	1,822	5,691	7,513	2,499	62	2,561	139	69	208 ^e	
2015	8,713	78	2,454	22	11,167	5,043	2,417	7,460	3,235	37	3,272	436	0	436 ^e	

a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

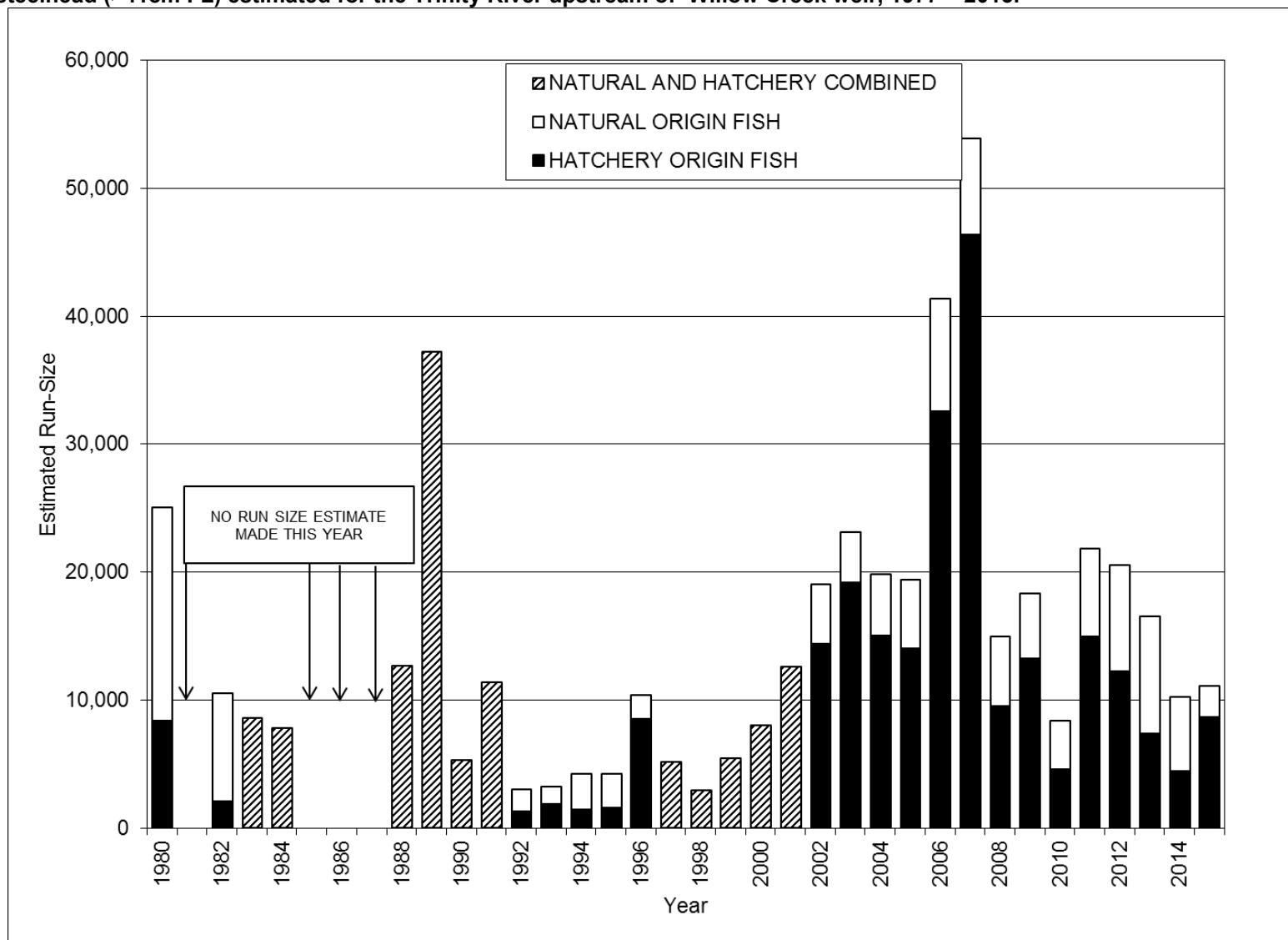
b/ Trinity River Hatchery-produced steelhead.

c/ Naturally produced steelhead.

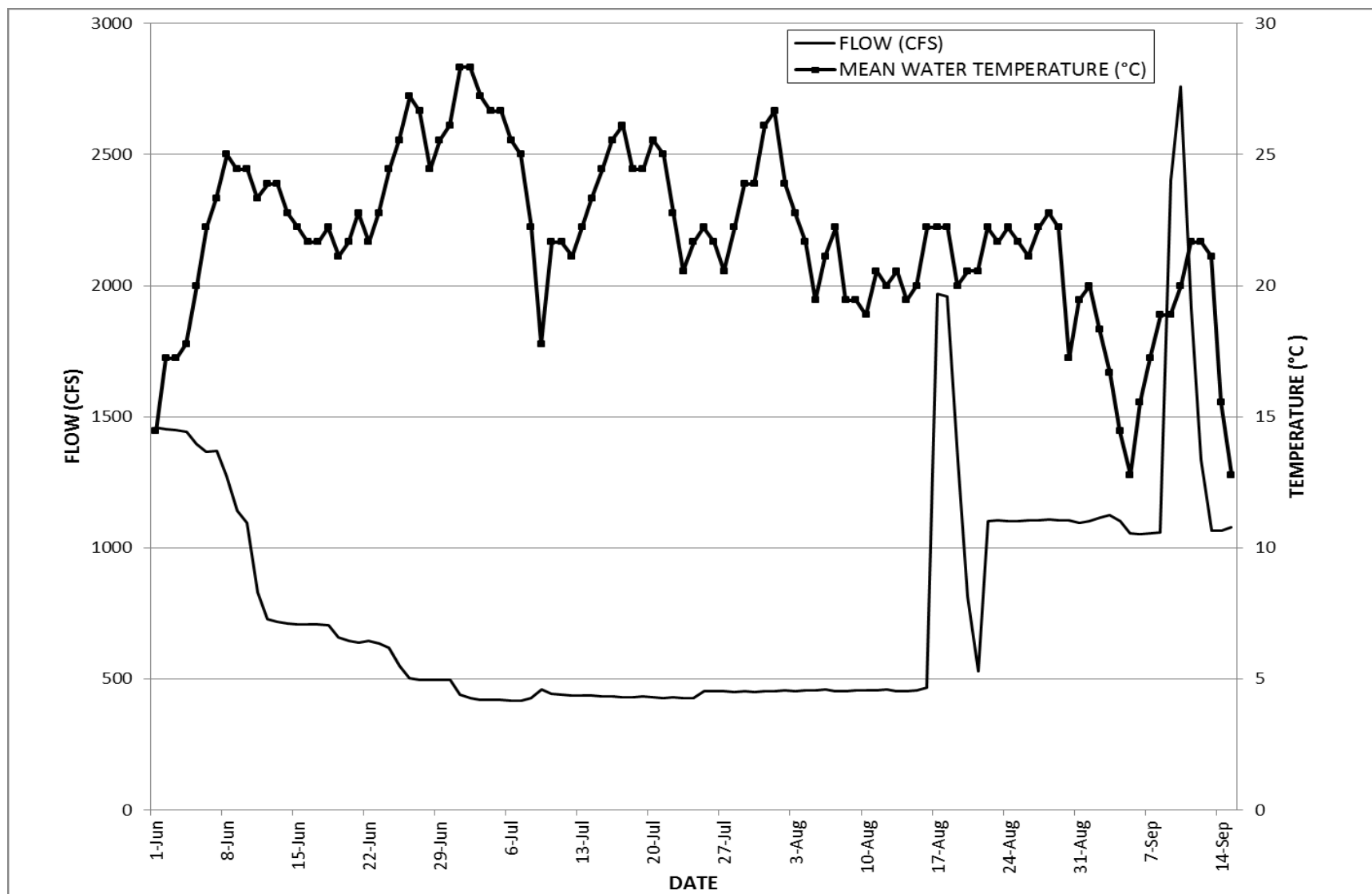
d/ The natural spawner escapement reflects an overestimate due to the unknown number of fish harvested by anglers upstream of Willow Creek Weir.

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

Appendix 31. Fall-run adult steelhead (>41 cm FL) estimated for the Trinity River upstream of Willow Creek weir, 1977 - 2015. Fall-run adult steelhead (>41cm FL) estimated for the Trinity River upstream of Willow Creek weir, 1977 – 2015.



Appendix 32. Daily mean flow (CFS) recorded at USGS gauge (11526250) and water (°C) temperature for Trinity River near Junction City, 2015.



Appendix 33. Daily mean flow (CFS) recorded at USGS gauge (11530000) and water (°C) temperature for Trinity River near Willow Creek weir, 2015 sampling season.

