

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
2014-15 SEASON



On the cover: Coho spawning day, Trinity River Hatchery. 2. Junction City weir put-in. 3. Chinook salmon at weir.

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2014-15 SEASON

by

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SEPTEMBER 2015

FOREWORD

This is the California Department of Fish and Wildlife's (CDFW) Trinity River Basin Salmon and Steelhead Monitoring Project's twenty-sixth annual report to the United States Bureau of Reclamation (Reclamation). The activities reported on occurred between April 2014 and March 2015, 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. The 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 the supporting documentation that enables the final analyses.

ACKNOWLEDGMENTS

The CDFW fisheries technicians on whom we relied during the 2014 field season include: Jasper Amir, Michael Bradford, Nick Campise, Chris Hubler, Todd Newhouse, Laurel Osborne, Lauren Romero, Garth Savage, Ron Smith, Steven Strite, and Ted Tillinghast. We were pleased once again to have Eric Matilton and Loren Aubrey (Hoopa Valley Tribal Fisheries (HVTF)) return to the weir operations this year, and appreciate greatly the effort and cooperation of HVTF during weir installation and pull days. Big thanks to Steve Sanches for keeping our computers humming.

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. We thank Robin Schrock and the TRRP for their contract administration efforts.

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Chinook and Coho Salmon and Fall-Run Steelhead Run-Size Estimates
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ABSTRACT

The California Department of Fish and Wildlife's Trinity River Project conducted tagging and recapture operations from June 2014 through March 2015 to produce run-size, angler harvest, and spawner escapement estimates of spring-run (spring Chinook) and fall-run Chinook salmon [fall Chinook (*Oncorhynchus tshawytscha*)], coho salmon (*O. kisutch*), and fall steelhead (*O. mykiss*) in the Trinity River basin. The monitoring results informs the Trinity River Restoration Program's (TRRP) adaptive management decision making process and helps to evaluate progress toward achieving fundamental objectives outlined in the Integrated Assessment Plan (TRRP, 2009)

Utilizing a Petersen mark-recapture methodology, we estimate a run-size of 6,959 (95% CI 6,419 – 7,523) spring Chinook migrated into the Trinity River basin upstream of Junction City weir. The run was comprised of an estimated 1,998 naturally-produced adults and 132 naturally-produced jacks and 4,300 hatchery-produced adults and 528 hatchery-produced jacks. Using tags returned by anglers we estimate 227 spring Chinook were harvested, yielding an escapement of 6,732 fish. The escapement of 1,931 naturally-produced adult spring Chinook was 32.2% of the TRRP goal of 6,000 spring Chinook.

An estimated run-size of 37,829 (95% CI 33,056 – 43,670) fall Chinook migrated past Willow Creek weir (WCW). The run was comprised of an estimated 11,017 naturally-produced adults and 6,332 naturally-produced jack salmon and 19,874 hatchery-produced adults and 606 hatchery-produced jacks. We estimate 926 were harvested by anglers, yielding a total escapement of 36,803 fish. The escapement of 10,700 naturally-produced adult fall Chinook was 17.4% of the 62,000 fish TRRP goal.

Both the coho run-size and escapement in the Trinity above Willow Creek were estimated at 13,537 (95% CI 12,133 – 15,021), because no coho were reported as harvested. The coho escapement was comprised of an estimated 902 naturally-produced adult and 99 naturally-produced jack coho and 9,297 hatchery-produced adult and 3,239 hatchery-produced jacks. The escapement of 902 naturally-produced coho adults was 64.4% of the TRRP goal of 1,400 fish.

An estimated run-size of 10,282 (95% CI 9,046 – 11,601) adult fall steelhead returned to the Trinity River basin upstream of WCW. Anglers harvested an estimated 208 adult fall steelhead above the WCW, leaving 10,074 (5,753 naturally-produced and 4,321 hatchery-produced) fish as potential spawners. The escapement of 5,753 naturally-produced adult steelhead was 14.4% of the 40,000 fish TRRP goal.

PROJECT OBJECTIVES

- To determine the 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 the 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 the run-size and spawner escapement of spring Chinook salmon (*Oncorhynchus tshawytscha*) 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 (*O. kisutch*), and fall-run steelhead (*O. mykiss*) in the 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. 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.

The information from this investigation is provided to the Trinity River Restoration Program (TRRP) to help evaluate fundamental program objectives including naturally-produced (off-spring 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)]. The 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, the 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

The following methods are specific to the 2014-15 season. For complete, standardized methods across years, please see 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 June 10, 2014 through November 21, 2014 by TRP and HVTF personnel at two temporary weir sites located on the main stem Trinity River (Figure 1).

The 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 June 10 through September 15, 2014, and is primarily operated to capture, measure, and tag spring-run Chinook salmon (spring Chinook).

The 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 September 4 through November 21, 2014. The 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 is 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 those fish as hatchery produced. All steelhead and 25% of all Chinook produced at TRH are adipose fin-clipped (ad-clipped) before release. The Chinook that are ad-clipped are also coded-wire tagged (CWTed). All TRH reared coho have their right maxillary clipped as a hatchery identifier as well.

Weir and Trap Design

The 2014 weir configuration at WCW consisted of two trap boxes and a boat gate, while the JCW utilized its standard configuration of one trap box and boat gate (Figure 2-4).

Tagging of Fish at Weirs

The tagging pattern in 2014 was similar to that in 2013: Half of Chinook tagged at JCW received \$20 tags, half received non-reward value tags, and all steelhead received \$10 tags. At WCW, tags with \$0 reward, \$10 rewards, and \$20 rewards were applied to the adult steelhead at a 1:1:1 ratio, while fall Chinook were tagged 1:1:1 with \$0:\$20:\$50 tags. Coho at both weirs are tagged with non-reward tags only, and juvenile ("half-pounder") steelhead are not tagged at either weir.

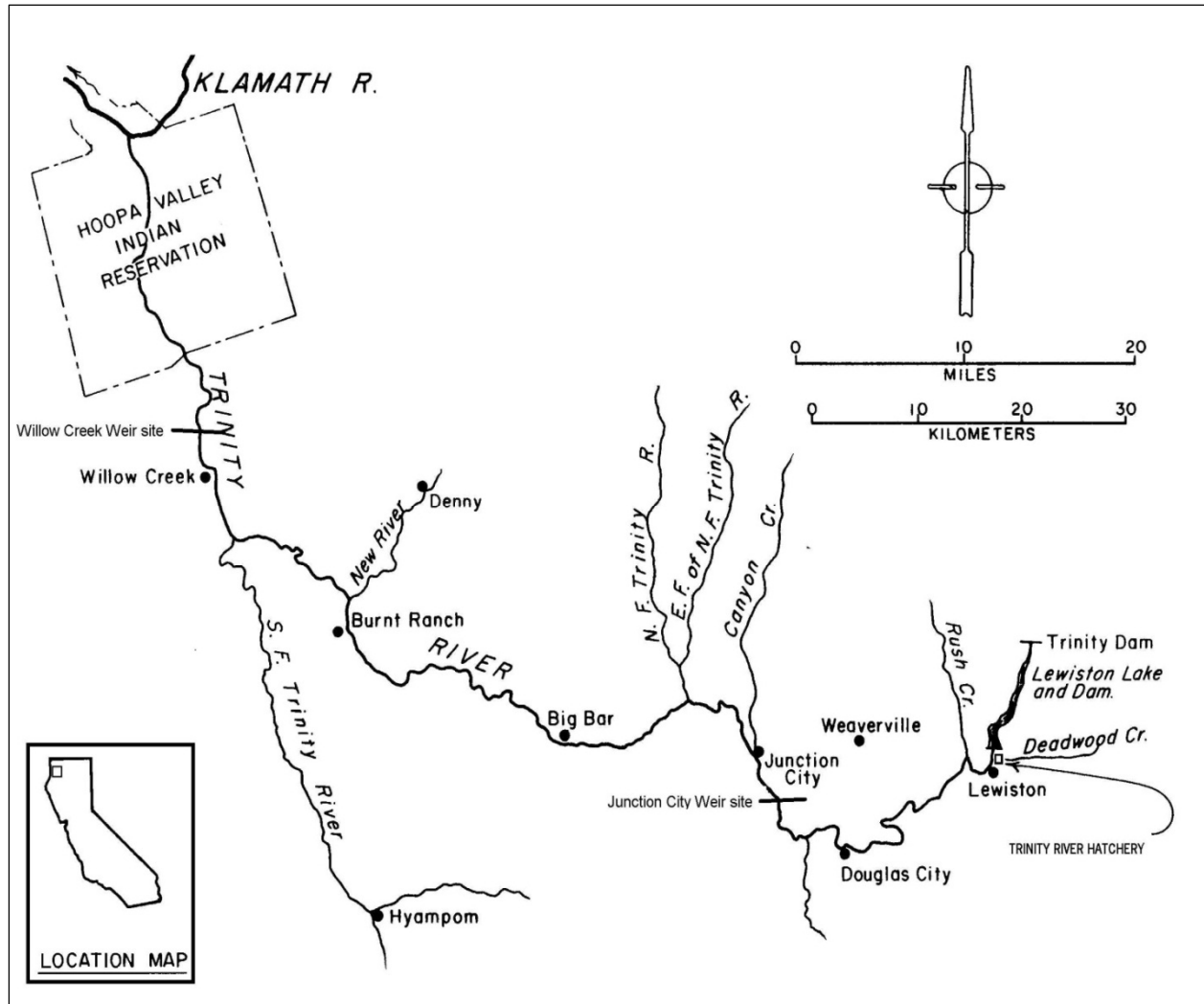


Figure 1. Location of trapping/tagging weirs near Willow Creek and Junction City, and Trinity River Hatchery, the the Trinity River basin, 2014.

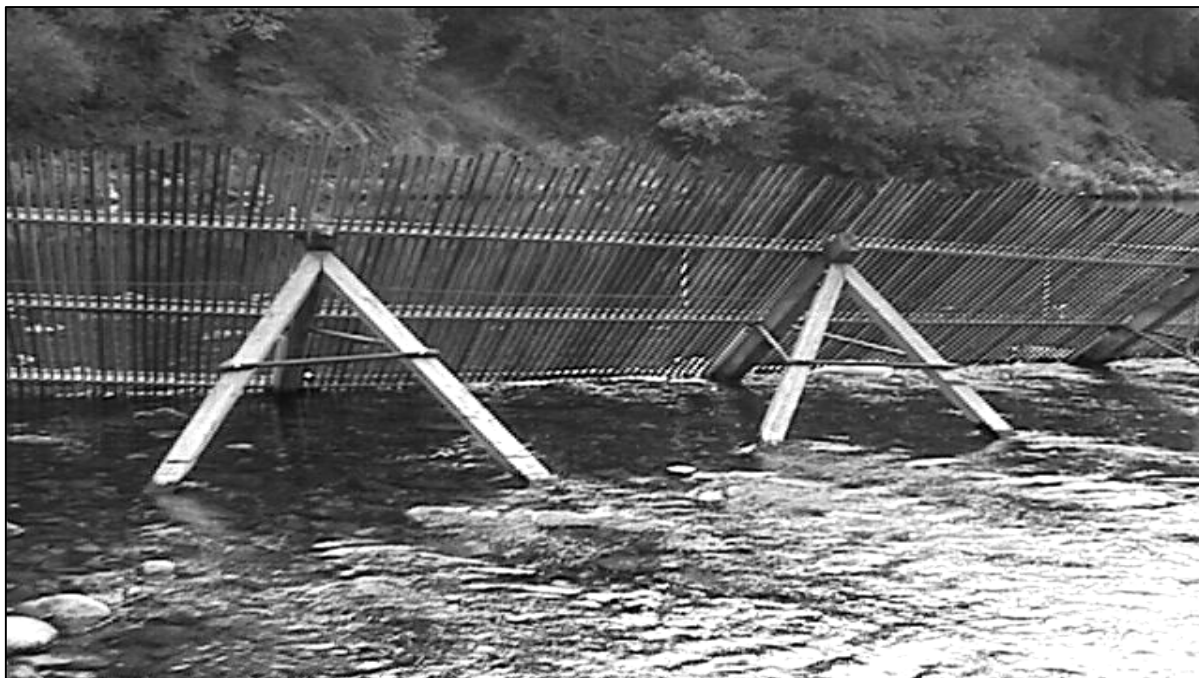


Figure 2. Photograph of Alaskan-style weir, tripods, support channels and conduit (looking upstream).



Figure 3. Set up of Willow Creek weir, 2014. Two trap boxes and a boat gate (in opened position).



Figure 4. 2014 Junction City weir configuration (looking slightly upstream). Note the single trap box (on far side).

Recovery of Tagged Fish

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

Angler Tag Returns

Tags returned to the TRP Arcata field office through May 31, 2015 were included in assessing harvest and catch and release rates for the 2014 runs. Any 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 commenced 2014 spawning operations on September 2, 2014. All fish entering TRH are inspected for project tags during spawning operations. All tags are removed and their unique tag information recorded. Scales are 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 are retained during the spawning process for later CWT analysis.

Spring Chinook were spawned on fourteen days (typically twice a week) from September 2, 2014 to October 9, 2014. Hatchery personnel physically closed the bottom of the fish ladder for two weeks, starting on October 9, 2014. This is a routine practice at TRH to temporally segregate spring and fall races of Chinook. Spawning operations resumed on October 27, 2014. Fall Chinook were spawned on twenty days between October 27, 2014 and December 16, 2014. Coho salmon were spawned on five days between November 11, 2014 and December 9, 2014. Spawning operations for coho typically occur once a week on a different day than Chinook spawning operations to facilitate the logistics of spawning multiple species concurrently. Steelhead were spawned on eleven days from December 30, 2014 to March 10, 2015.

Trinity River spring Chinook immigrate mainly between April and September while fall Chinook immigrate August through December. While CDFW acknowledges the temporal overlap of the runs, for analysis we designate a hard date for a spring/fall separation point, and we use a Julian week 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 2014 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 2014-15 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 the total population run-size estimate we used various methods to derive the jack and adult components of the run.

For fall Chinook we used HVTF's scale/aging analysis performed for the Klamath River Technical Team (KRTT, 2015) and applied the scale-based age proportions to the run-size estimate to obtain the number of jack and adults. We also used the mixdist application within the R statistical program to estimate proportions of jack and adult fall Chinook sampled at WCW in 2014. The results were used for comparison with proportions derived by inspection (using nadir) of length-frequency histograms and scale analyses.

We used fork length distribution (using nadirs) to estimate the length which 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 are due solely to rounding differences.

RESULTS

Trapping, Tagging and Recovery

Spring/Fall Chinook Salmon Separation and Run Timing

We recovered 10,813 Chinook salmon at TRH in 2014, of which 2,442 (22.58%) had adipose clips. We recovered coded-wire tags (CWTs) from 721 known spring Chinook and from 1,647 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 15 release (code) groups from the 2009 through 2012 BYs (Appendix 2). Fall Chinook CWTs were composed of 21 release groups representing the 2009 through 2012 BYs.

Trinity River Hatchery-origin spring Chinook passed through JCW from Julian week 23 through JW 37 (Figure 5). Using CWT analysis we designated JW 36 as the last week of spring run at JCW, and included only those JCW-trapped Chinook through JW 36 in our mark-recapture analysis for spring Chinook estimates.

No Chinook tagged at WCW arrived at TRH before JW 40, and no TRH-origin spring CWTed fish were tagged at WCW and recovered at TRH during 2014. We therefore determined all Chinook trapped at WCW in 2014 to be fall run Chinook.

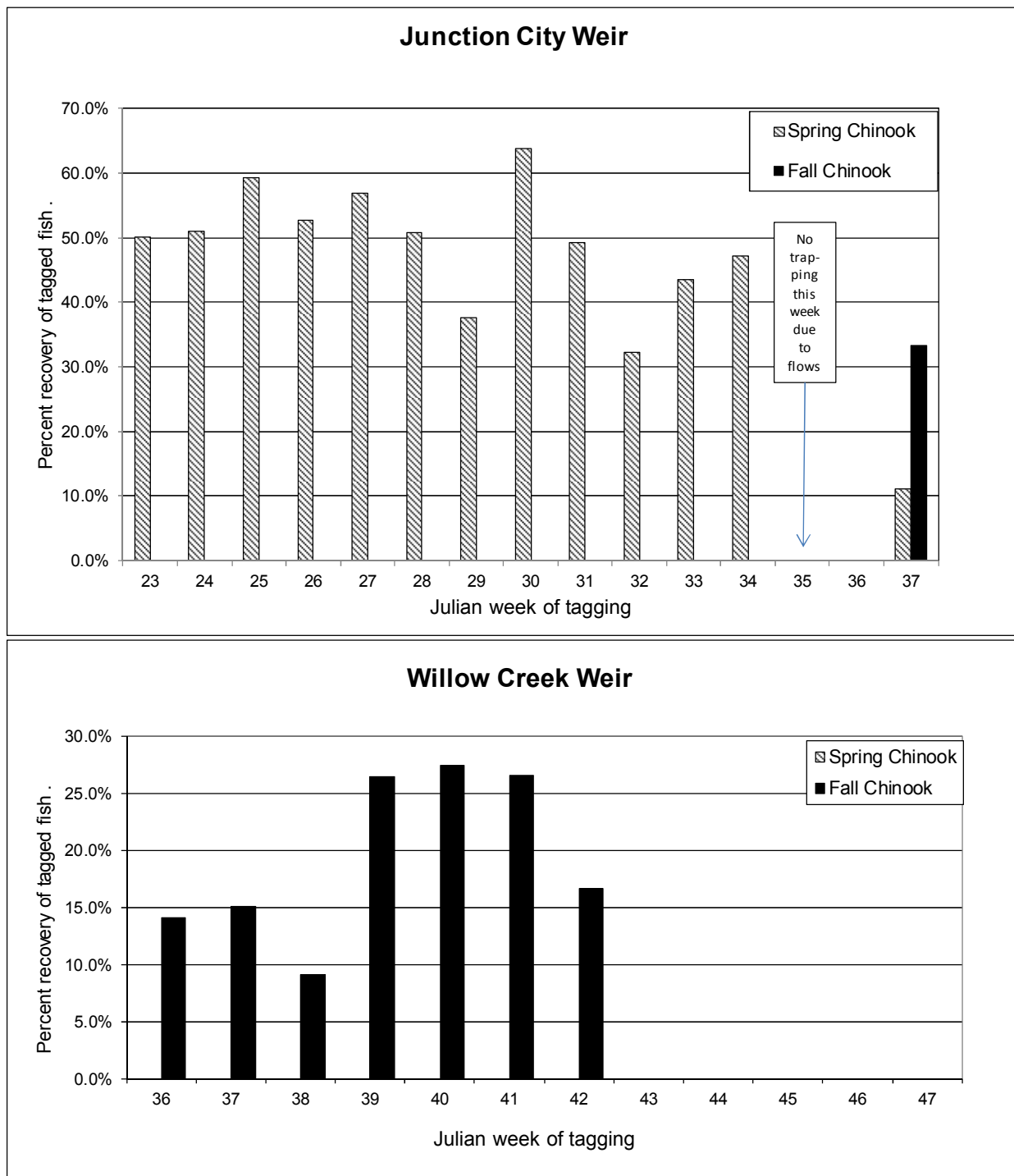


Figure 5. Percent recovery of Junction City weir and Willow Creek weir marked Chinook at Trinity River Hatchery during the 2014-15 season. Junction City weir trapped during Julian weeks 23 - 37; Willow Creek during Julian weeks 36 - 47.

Spring Chinook Trapping and Tagging

California DFW and HVTF installed JCW June 9 (JW 23) and trapped the first night. The number of spring Chinook trapped peaked during JW 26, with 46 fish per night (Table 1, Figure 6). The weir was modified (conduit was removed or raised) in JWs 34 and 35 to accommodate emergency augmentation flow releases from Lewiston Dam. The emergency release was to address fish health concerns in the lower Klamath River. The conduit was reinstalled and trapping resumed during JW 36. The weir was removed for the season on September 15, 2014 (JW 37).

A total of 1,019 spring Chinook were trapped at JCW, of which 1,003 (75 jack and 928 adult) were effectively tagged (Appendix 3). There were nine tagging mortalities and six fish reported as caught and released by anglers. Ad-clipped fish comprised 16.2% of the spring Chinook captured (165 of 1,019) at JCW. The Chinook trapped and tagged later than JW 36 were determined to be fall Chinook so were not included in the numbers presented for JCW.

Size and Age of Trapped Fish

Spring Chinook trapped at JCW and TRH averaged 69.4 and 69.7 cm FL, respectively, with a combined average 69.6 cm FL (Figure 7). Fork length distribution analysis shows the nadir separating jack from adult spring Chinook was between 54 and 55 cm FL. Data from known age, hatchery-marked spring Chinook that entered TRH supported the minimum adult fork length of 55 cm. While 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 55 cm FL to the observed population, an estimated 7.7% and 10.0% of the spring Chinook observed were jacks at JCW and TRH, respectively.

Spring Chinook Recovery

Angler Tag Recovery

Anglers reported harvest of a single Project-tagged jack spring Chinook in 2014 and a harvest of 31 Project-tagged adult spring Chinook representing an estimated harvest of 227 total fish (Appendix 3). The total harvest rate of Project-tagged spring Chinook upstream of JCW was 1.3% for jacks, 3.34% for adults. There also were five tag returns from adults and one from a jack in the catch and release fishery, and three 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 September 8 to December 19, 2014 from TRH to Weitchpec. During the spawner surveys 31 Project-tagged spring Chinook were recovered.

Tagging Mortalities

Nine spring Chinook were identified as tagging mortalities at JCW in 2014.

Table 1. Weekly summary of Chinook trapped in the Trinity River at Junction City weir during 2014.^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	2	0	2	0	2.0
24	11-Jun - 17-Jun	5	2	0	121	24	123	24	24.6
25	18-Jun - 24-Jun	5	1	0	205	29	206	29	41.2
26	25-Jun - 1-Jul	5	4	0	230	36	234	36	46.8
27	2-Jul - 8-Jul	4	9	2	132	21	141	23	35.3
28	9-Jul - 15-Jul	5	6	0	65	10	71	10	14.2
29	16-Jul - 22-Jul	5	6	0	34	5	40	5	8.0
30	23-Jul - 29-Jul	5	2	1	9	2	11	3	2.2
31	30-Jul - 5-Aug	5	21	3	39	6	60	9	12.0
32	6-Aug - 12-Aug	5	9	2	19	0	28	2	5.6
33	13-Aug - 19-Aug	5	19	3	58	8	77	11	15.4
34	20-Aug - 26-Aug	3 ^d	3	2	16	1	19	3	6.3
35	27-Aug - 2-Sep	0 ^d	0	0	0	0	0	0	--
36	3-Sep - 9-Sep	4	1	0	5	0	6	0	1.5
Fall Chinook									
37	10-Sep - 16-Sep	4	1	0	8	2	9	2	2.3
38	17-Sep - 23-Sep	0 ^d	0	0	0	0	0	0	0.0
Total:		58	84	13	943	144	1,027	157	
Mean:									17.7

a/ Trapping at Junction City weir took place June 10 - September 15, 2014 (Julian weeks 23-37).

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

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

d/ Weir out of operation parts of JWeeks 34 - 38 due to emergency augmentation flow release from Lewiston Dam.

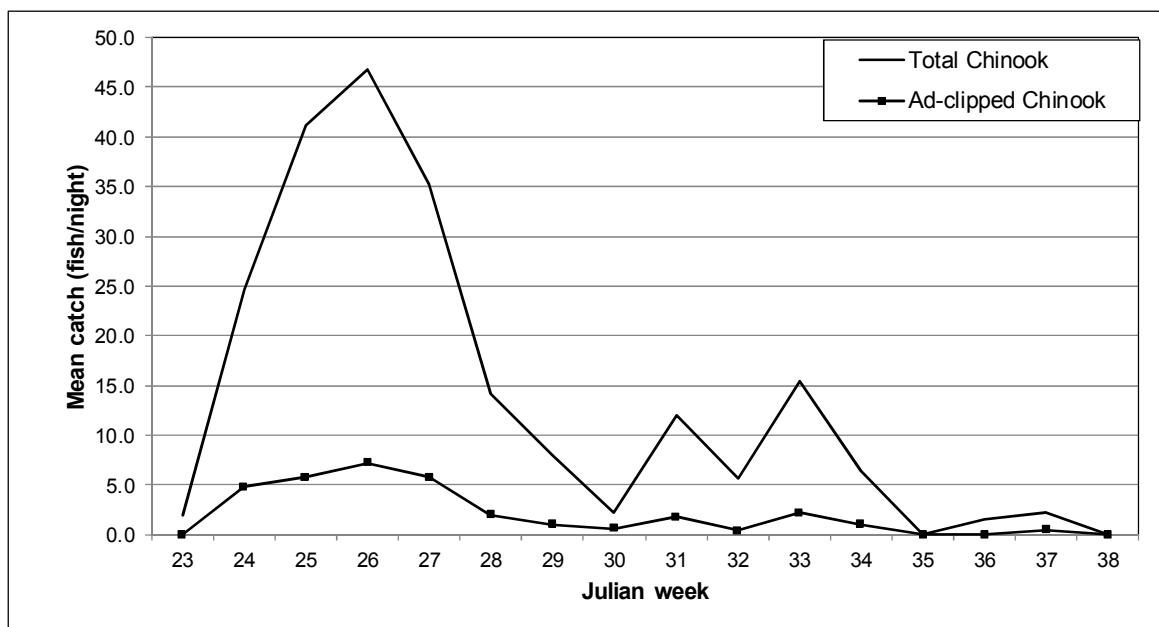


Figure 6. Mean catch of Chinook in the Trinity River at Junction City weir, 2014.

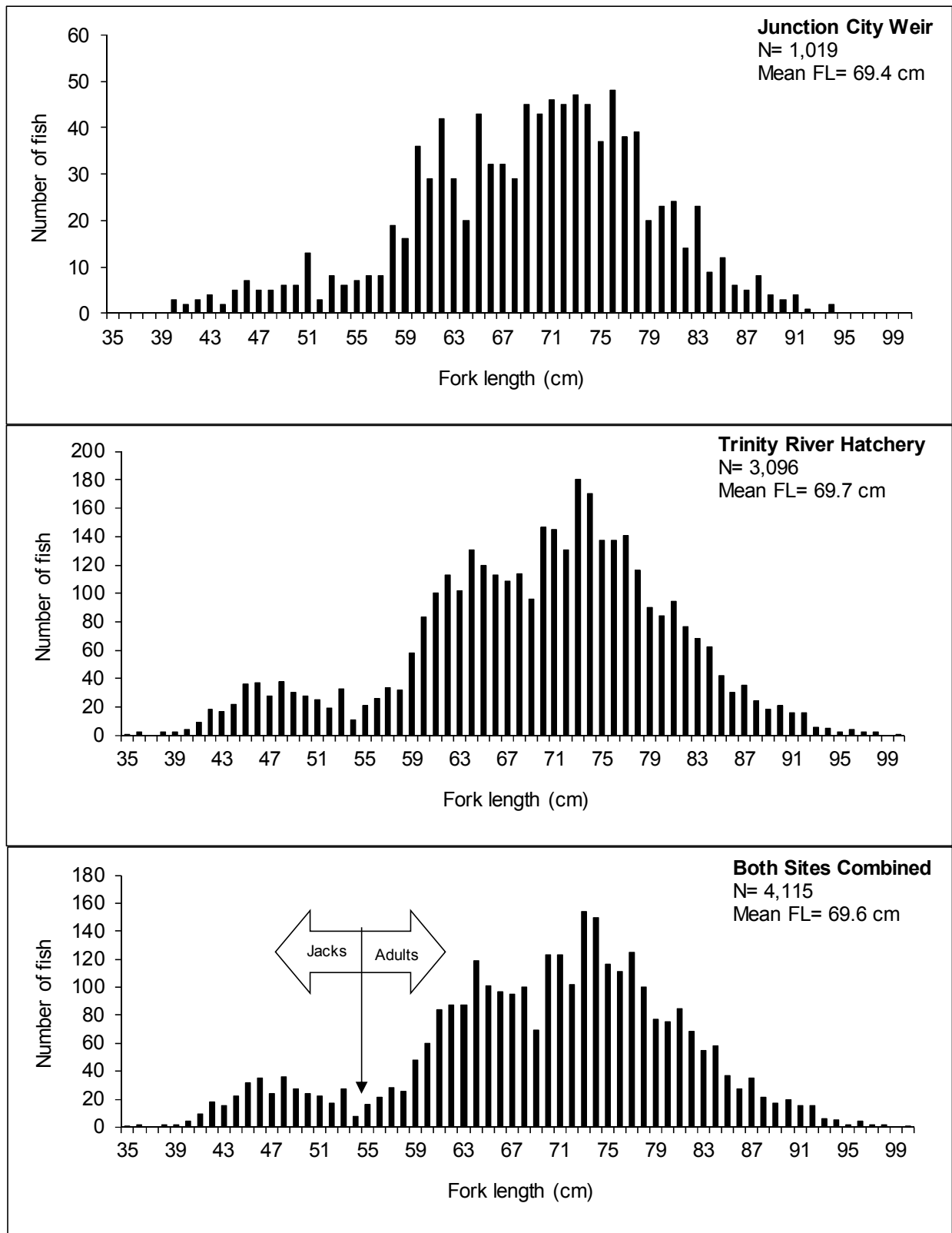


Figure 7. Spring Chinook fork lengths (cm) observed at Junction City weir, Trinity River Hatchery, and both sites combined during the 2014-15 season. The arrow denotes the size used to separate jacks and adults for analysis.

Trinity River Hatchery Recovery

Spring Chinook began entering TRH on August 30 (during JW 35). They continued to enter TRH through JW 41 (Appendix 5). Recovery of spring Chinook peaked in JW 39 when 1,400 Chinook entered, although the peak week of CWTed fish was JW 38 (Table 2). Of the 1,003 spring Chinook effectively tagged at JCW, 521 (51.9%) were recovered at TRH. Based on run-timing (by CWT analysis) an estimated 3,617 (362 jack and 3,255 adult) spring Chinook were recovered at TRH, from which 721 readable CWTs were recovered.

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

Based on estimated total Chinook run-size above JCW, the ad-clip rate of spring Chinook at JCW, the estimated angler harvest rate, and recovery of spring-run CWT fish at TRH, 1,114 (125 jack and 989 adult) CWT spring Chinook returned to the Trinity River above JCW during the 2014 season (Table 3). We estimate 3 jack and 33 adult CWT spring fish were harvested by anglers during the season. Escapement of CWT spring Chinook was divided between 730 fish recovered at TRH and 348 estimated available to spawn in natural areas. Based on CWTs, the known age composition of the 2014 hatchery-produced spring Chinook run was composed of 125 (11.22%) age 2; 282 (25.36%) age 3; 694 (62.33%) age 4; and 12 (1.09%) age 5 fish.

Table 2. Recoveries at Trinity River Hatchery, by Julian week, of TRH-origin coded-wire tagged spring Chinook during the 2014-15 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	42	
068821-f	2009	1		1						2
068822-f	2009		1		1					2
068836-y	2009	1	1		1	1				4
068773-f	2010	13	4	9	26	9		2		63
068774-f	2010	41	19	19	44	7	1	1		132
068775-f	2010	8	6	5	43	12	6	2	2	84
068776-y	2010	59	22	37	58	4	1			181
068838-f	2011	12	15	13	25	6				71
068839-f	2011	4	2	3	7	2	4			22
068840-f	2011	2	1	3	19	10	5	2		42
068846-y	2011	19	8	6	10	6	2	1		52
060490-f	2012	4	6	6	4	5	4			29
060491-f	2012			1	7	6		1		15
060492-f	2012	1	1		4	1				7
060497-y	2012		1	4	6	2	1	1		15
No CWT ^d		4	3	4	4	4	1			20
Weekly totals:		169	90	111	259	75	25	10	2	741

a/ Trapping occurred at TRH September 2, 2014 - March 10, 2015 (JWs 35-10; 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 40 were considered fall run.

Table 3. Run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, spring Chinook salmon, expanded for lost or unreadable tags, returning to the Trinity River during the 2014-15 season.

	Run-size estimate		Harvest rates		TRH Ad-clips with CWTs	Percentage of ad clips at weir		Ad+CWT run-size estimates		
	Jacks	Adults	Jacks	Adults		Jacks	Adults	Jacks	Adults	Total
Spring Chinook (JCW)	660	6,298	2.4%	3.3%	98.50%	19.2%	15.9%	125	989	1,114

CWT code	BY	Age	TRH Total No.	% of total	Run-size	Angler harvest	Spawning escapement		
							TRH	Natural	Total
Adults									
068821	09	5	2.03	0.31%	3.024	0.10	2.03	0.90	2.92
068822	09	5	2.02	0.30%	3.006	0.10	2.02	0.89	2.91
068836	09	5	4.07	0.61%	6.069	0.20	4.07	1.80	5.87
068773	10	4	63.83	9.63%	95.225	3.18	63.83	28.21	92.04
068774	10	4	133.58	20.15%	199.266	6.66	133.58	59.03	192.61
068775	10	4	84.96	12.82%	126.739	4.23	84.96	37.55	122.51
068776	10	4	183.03	27.61%	273.032	9.12	183.03	80.89	263.91
068838	11	3	71.82	10.83%	107.137	3.58	71.82	31.74	103.56
068839	11	3	22.22	3.35%	33.148	1.11	22.22	9.82	32.04
068840	11	3	42.55	6.42%	63.480	2.12	42.55	18.81	61.36
068846	11	3	52.77	7.96%	78.714	2.63	52.77	23.32	76.09
Totals:			662.86	100.00%	988.843	33.03	662.86	292.95	955.82
Jacks									
060490	12	2	29.39	43.92%	54.909	1.34	29.39	24.18	53.57
060491	12	2	15.27	22.83%	28.537	0.70	15.27	12.57	27.84
060492	12	2	7.08	10.58%	13.228	0.32	7.08	5.83	12.91
060497	12	2	15.17	22.67%	28.339	0.69	15.17	12.48	27.65
Totals:			66.91	100.00%	125.014	3.05	66.91	55.05	121.96
Spring Totals:			729.77		1,113.86	36.08	729.77	348.00	1,077.78

2009 Brood Year

The 2014 spawning season was the last year for returns of the 2009 BY. The total contribution of the five (four fingerling and one yearling) 2009 tag code release groups that returned to the Trinity River ranged from 0.88% (the yearling group) to 2.93% (a fingerling group (Appendix 6). The percent return of the 2009 BY fingerlings release type was 2.71%, and 0.88% for the yearling, with a combined final total return rate for all 2009 BY spring Chinook release groups of approximately 1.972%, surpassing the mean return rate of 0.710% since 1986 (Appendix 7).

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

The estimated contribution of TRH-origin spring Chinook to the total Trinity River run-size estimate upstream of JCW was 4,828 fish. This represents 80.0% (528/660) of the jacks, 68.3% (4,300/6,298) of the adult run, and 69.38% (4,828/6,958) overall (Table 4).

Of the 4,300 TRH-origin adult spring Chinook in the run-size estimate, 2,883 escaped to TRH, while 1,274 escaped to areas outside of the hatchery and 144 were estimated as harvested. The contribution of TRH-produced spring Chinook (at 69.4%) to the total run-size is above the 24 year mean of 58.5% (Table 5 and Figure 9).

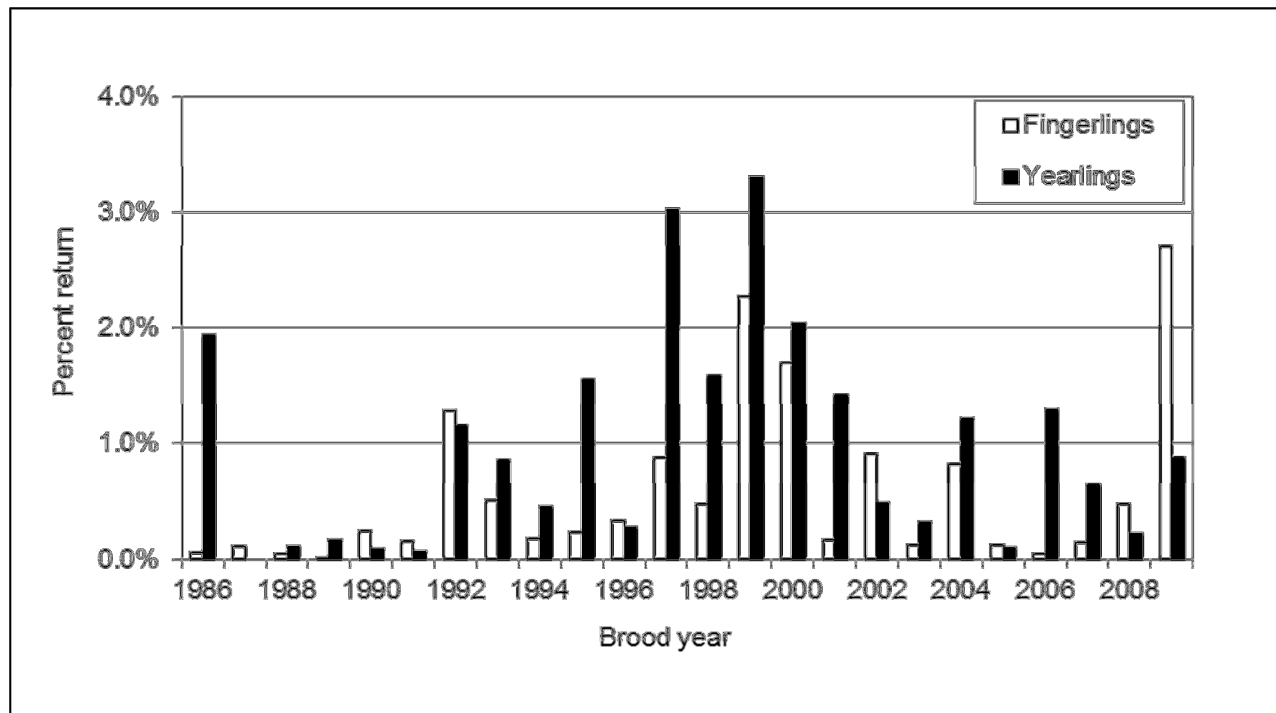


Figure 8. Percent return of Trinity River Hatchery produced, coded-wire tagged, spring Chinook salmon, brood years 1986-2009.

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 2014-15 season.^a

CWT		TRH		Run-size	Expanded run-size e/	Angler harvest	Expanded angler harvest	Spawning escapement					
code b/	BY c/	Age	expansion factor d/					TRH f/	Expanded TRH	River	Expanded River	Escapement Total	Expanded total
Spring Chinook													
Adults													
068821	09	5	4.15	3.02	12.6	0.10	0.4	2.03	8.41	0.90	3.72	2.92	12.13
068822	09	5	4.18	3.01	12.6	0.10	0.4	2.02	8.42	0.89	3.72	2.91	12.15
068836	09	5	4.09	6.07	24.8	0.20	0.8	4.07	16.64	1.80	7.35	5.87	24.00
068773	10	4	4.21	95.23	400.9	3.18	13.4	63.83	268.74	28.21	118.77	92.04	387.51
068774	10	4	4.17	199.27	830.9	6.66	27.8	133.58	557.01	59.03	246.17	192.61	803.18
068775	10	4	4.49	126.74	569.1	4.23	19.0	84.96	381.46	37.55	168.59	122.51	550.05
068776	10	4	4.24	273.03	1157.7	9.12	38.7	183.03	776.03	80.89	342.96	263.91	1,118.99
068838	11	3	4.80	107.14	514.3	3.58	17.2	71.82	344.73	31.74	152.35	103.56	497.08
068839	11	3	4.46	33.15	147.8	1.11	4.9	22.22	99.10	9.82	43.80	32.04	142.90
068840	11	3	4.33	63.48	274.9	2.12	9.2	42.55	184.26	18.81	81.43	61.36	265.69
068846	11	3	4.51	78.71	355.0	2.63	11.9	52.77	237.97	23.32	105.17	76.09	343.14
Total adult				988.84	4,300.47	33.03	143.64	662.86	2,882.79	292.95	1,274.04	955.82	4,156.83
Jacks													
060490	12	2	4.18	55.08	230.2	1.34	5.6	29.39	122.85	24.35	101.77	53.74	224.62
060491	12	2	4.17	28.62	119.4	0.70	2.9	15.27	63.69	12.65	52.77	27.93	116.46
060492	12	2	4.21	13.27	55.9	0.32	1.4	7.08	29.81	5.87	24.69	12.95	54.50
060497	12	2	4.31	28.43	122.5	0.69	3.0	15.17	65.37	12.57	54.16	27.73	119.53
Total jack				125.39	527.95	3.05	12.84	66.91	281.72	55.43	233.39	122.34	515.11
Total spring Chinook				1,114.24	4,828.42	36.08	156.48	729.77	3,164.51	348.38	1,507.43	1,078.16	4,671.94

a/ Estimates are upstream of Junction City and Willow Creek weirs for spring and fall estimates respectively.

b/ CWT=coded-wire tag code. Fish are of the same race and release type (smolt or yearling).

c/ BY=brood year.

d/ Expansion factor used to account for untagged releases of the same BY and release type for each CWT group.

e/ Run-size times TRH expansion factor.

f/ TRH=Trinity River Hatchery.

Table 5. Estimated contributions of Trinity River Hatchery (TRH)-produced spring Chinook to total estimated run-size above Junction City weir, 1991-2014 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%
Means:	15,806	9,741	6,065	58.5%

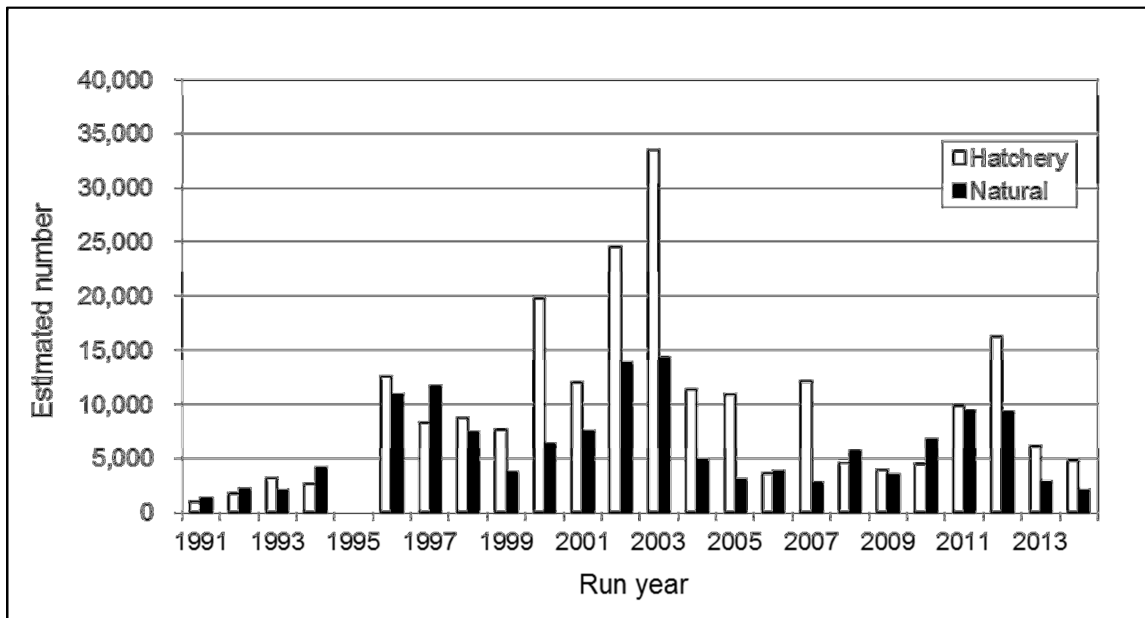


Figure 9. Hatchery and natural contributions to total spring Chinook run-size, upstream of Junction City weir, 1991 - 2014.

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

An estimated run-size of 6,959 (95% CI 6,419 – 7,523) spring Chinook, composed of 660 jacks and 6,298 adults, migrated into the Trinity River basin upstream of JCW in 2014 (Appendix 8). Based on expansion of the tags returned by anglers, we estimate anglers harvested 16 jacks, and 210 adult spring Chinook during the 2014 season. Spawning escapement above JCW was an estimated 6,732 fish, including the 3,716 spring Chinook that entered TRH and 3,115 natural area spawners (Appendix 9). The escapement of 1,931 naturally-produced adult spring Chinook was 32.2% of the TRRP goal of 6,000 spring Chinook (Appendix 10). This year's run-size estimate is approximately 41% of the 35 year average spring Chinook run-size of 17,103. Estimated spring Chinook run-size has ranged from 2,381 fish in 1991 to 62,692 fish in 1988 (Appendix 11- 13).

Fall Chinook Trapping and Tagging

Willow Creek weir fished beginning September 4 (JW 36). The number of fall Chinook trapped peaked during JW 40, with 55.6 fish per night (Table 6, Figure 10). Trinity River Project personnel pulled conduit to accommodate lower Klamath river augmentation flows during JW 38 and had to pull conduit again during parts of JW 43 and 44 for a storm event, but were able to reinstall and trap through November 21 (JW 47).

A total of 1,095 fall Chinook were trapped at WCW, of which 1,045 (192 jack and 853 adult) were effectively tagged (Appendix 14). There were 12 tagging mortalities and eight fish reported as caught and released (their tags removed) by anglers. Ad-clipped fish comprised 12.8% of the fall Chinook captured (140 of 1,095) at WCW. All of the Chinook trapped and tagged at WCW in 2014 were determined to be fall Chinook.

Size and Age of Trapped Fish

Fall Chinook trapped at WCW and TRH averaged 69.9 and 70.7 cm FL, respectively, with a combined average 70.6 cm FL (Figure 11). Using fork length distribution analysis, the nadir separating jack from adult fall Chinook was between 55 and 56 cm FL. Data from known age, hatchery-marked fall Chinook that entered TRH supported the minimum adult fork length of 56 cm. As with the 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 18% and 3.0% at WCW and TRH, respectively. The results from the mixdist analyses estimated the proportion of jacks sampled at WCW was 17%, age 3 composed 41% and age 4 were 42% of the population. Mixdist did not identify any 5 year-old Chinook. Mixdist of the TRH returnees was 5% jack, 48% age 3 and 47% age 4, with no age 5 Chinook detected.

Table 6. Weekly summary of Chinook trapped in the Trinity River at Willow Creek weir during 2014.^a

Julian week	Inclusive dates	Nights trapped	Number trapped					Ad-clip total	Fish/night
			Jacks ^b	Ad-clip ^c		Ad-clip	Total		
				Jacks	Adults	Adults			
36	3-Sep - 9-Sep	4	25	1	50	7	75	8	18.8
37	10-Sep - 16-Sep	5	53	2	183	22	236	24	47.2
38	17-Sep - 23-Sep	1	7		28	3	35	3	35.0
39	24-Sep - 30-Sep	5	7	1	66	3	73	4	14.6
40	1-Oct - 7-Oct	5	26		252	50	278	50	55.6
41	8-Oct - 14-Oct	5	13		159	26	172	26	34.4
42	15-Oct - 21-Oct	5	5		85	10	90	10	18.0
43	22-Oct - 28-Oct	2	2		11	2	13	2	6.5
44	29-Oct - 4-Nov	2	0		6	2	6	2	3.0
45	5-Nov - 11-Nov	5	5		35	5	40	5	8.0
46	12-Nov - 18-Nov	5	7		47	5	54	5	10.8
47	19-Nov - 25-Nov	3	3		20	1	23	1	7.7
Total:		47	153	4	942	136	1,095	140	
Mean:									23.3

a/ Trapping at Willow Creek weir took place September 03 - November 21, 2014 (Julian weeks 36-47).

b/ Fall Chinook <55 cm FL were considered jacks in 2014.

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

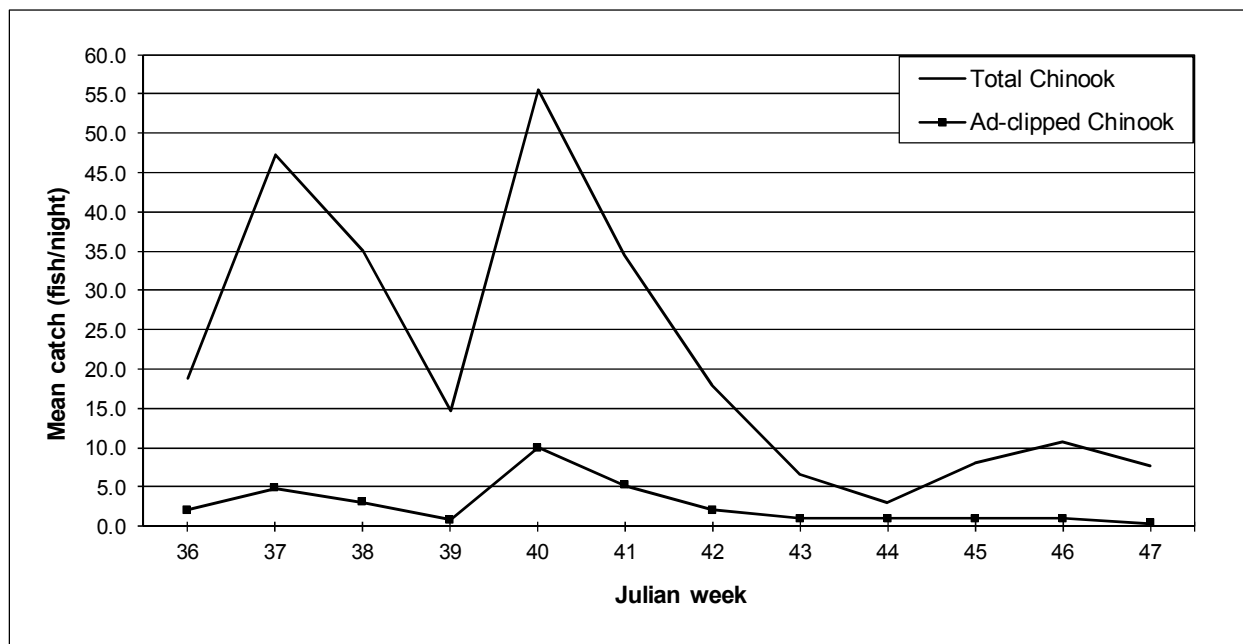


Figure 10. Mean catch of fall Chinook in the Trinity River at Willow Creek weir, 2014.

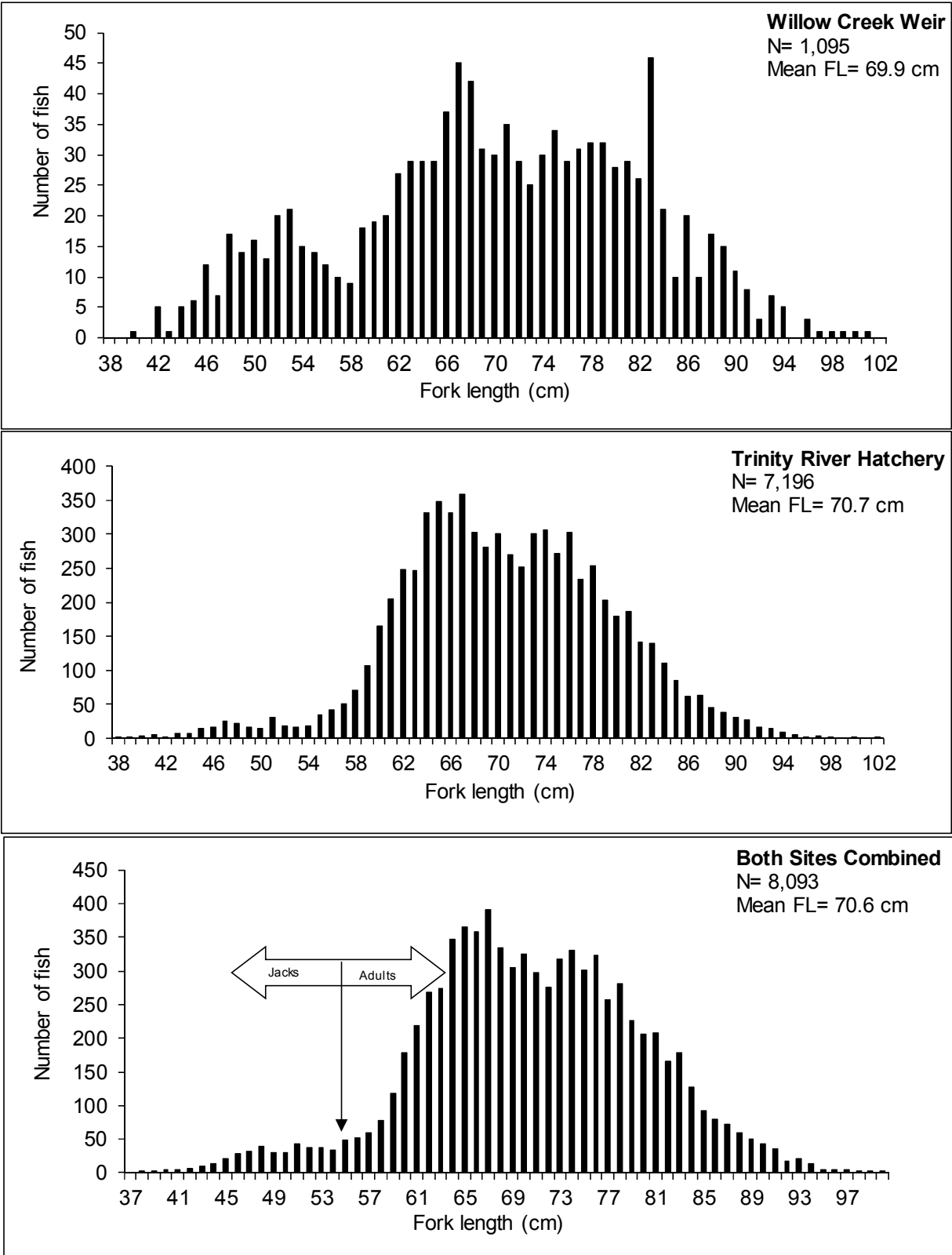


Figure 11. Fork length frequency distribution of fall Chinook at Willow Creek weir and Trinity River Hatchery, 2014.

Fall Chinook Recovery

Angler Tag Recovery

Two Project-tagged jack fall Chinook were reported harvested in 2014 (Appendix 14), for an estimated harvest of 114 jacks. The reported harvest of 19 Project-tagged adult fall Chinook represents an estimated harvest of 812 adults. The total harvest rate of Project-tagged fall Chinook upstream of WCW was 1.98% for jacks, 2.54% for adults. There were eight tag returns from adult fish from the catch and release fishery, and four tags found and returned by anglers or other river users.

Spawner Survey Recovery

During the 2014 spawner surveys 57 Project-tagged fall Chinook were recovered.

Tagging Mortalities

Twelve fall Chinook were identified as tagging mortalities at WCW in 2014.

Trinity River Hatchery Recovery

One CWTed fall Chinook entered TRH during JW 35, but the majority arrived later in the season, from JW 42 through JW 46 (Table 7). Recovery of fall Chinook peaked in JW 46 when 3,122 Chinook entered (Appendix 5), coincident to the peak of 569 CWTed fish. Of the 1,045 fall Chinook effectively tagged at WCW, 196 (18.8%) were recovered at TRH. Based on run-timing (from CWT analysis) an estimated 7,196 (221 jack and 6,975 adult) fall Chinook were recovered at TRH, from which 1,647 readable CWTs were recovered.

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

Based on estimated total Chinook run-size above WCW, the ad-clip rate of fall Chinook at WCW, the estimated angler harvest rate, and recovery of fall-run CWT fish at TRH, we estimate 4,788 (137 jack and 4,651 adult) CWT fall Chinook returned to the Trinity River above WCW during the 2014 season (Table 8) and three jack and 134 adult CWT fall fish were harvested by anglers during the season. Escapement of CWT fall Chinook was divided between 1,684 fish recovered at TRH and 2,967 estimated available to spawn in natural areas. Based on CWTs, the known age composition of the 2014 hatchery-produced fall Chinook run was composed of 137 (2.85%) age 2; 2,527 (52.78%) age 3; 2,107 (44.00%) age 4; and 18 (0.37%) age 5 fish.

Table 7. Recoveries at Trinity River Hatchery, by Julian week, of TRH-origin coded-wire tagged fall Chinook during the 2014-15 season.

CWT number and release type ^c	Brood year	Number of fall Chinook entering TRH, by Julian week ^{ab}																			Totals
		35	36	37	38	39	40	41	42	43 ^d	44	45 ^e	46	47	48	49	50				
068827-f	2009										1								1		
068837-y	2009							1			1		3						5		
068777-f	2010					1	2	4	6		13	1	6	3	1				37		
068778-f	2010					1	3	3	6		18	2	8	4					45		
068779-f	2010								2		3		21	9	1	1			37		
068780-f	2010								1		6		14	3	3		1		28		
068835-f	2010										1		4	1	1				7		
068781-y	2010				2	7	8	17	63		197	25	198	28	13	3	1		562		
068792-f ^f	2010	1						1											2		
068793-f ^f	2010					1		1											2		
068794-f ^f	2010							1											1		
068795-f ^f	2010					1													1		
068830-f	2011							1			2		3						6		
068841-f	2011							3	6		11	1	6	4					31		
068842-f	2011						2		8		14		6	2	1				33		
068844-f	2011										2	2	14	18	4	1			41		
068845-f	2011										2		7	5	7	1			22		
068847-y	2011				1	3	9	35	106		227	30	271	37	9	5			733		
060493-f	2012								1		3								4		
060494-f	2012								2		4		1						7		
060504-y	2012						1	3	8		17	1	7	3	1	1			42		
No CWT ^g									10		16	6	15	3	2				52		
Weekly totals:		1	0	0	3	14	27	68	219	0	537	69	584	120	43	12	2		1,699		

a/ Trapping occurred at TRH September 2, 2014 - March 10, 2015 (JWs 35-10; 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

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

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

e/ Hatchery equipment broken during this week, causing lower numbers of fish processed than otherwise would have been.

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

g/ No CWTs were recovered from these ad-clipped fish. Chinook with shed or lost tags recovered after Julian week 40 were

2009 Brood Year

The 2014 spawning season was the last year for returns of the 2009 BY. The total contribution of the nine (eight fingerling and one yearling) 2009 BY tag code release groups that returned to the Trinity River ranged from 0.32%⁵ (a fingerling group) to 3.19% (the yearling group) (Appendix 16). The percent return of the 2009 BY fingerlings release type was 0.60%, and 3.19% for the yearlings, with a combined final total return rate for all 2009 BY fall Chinook release groups of approximately 1.42%, which is above the mean return rate of 0.869% since 1986 (Appendix 17).

⁵ The two fingerling groups used to test juvenile rotary screw trap efficiency (that were released far downstream of TRH) returned to TRH at lower rates (0.20 and 0.32%).

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 2014-15 season.

FINAL				Run-size estimate		Harvest rates		TRH Ad-clips with	Percentage of ad clips at weir		Ad+CWT run-size estimates		
Run-size estimates				Jacks	Adults	Jacks	Adults	CWTs	Jacks	Adults	Jacks	Adults	Total
Fall Chinook (WCW)				6,938	30,891	2.0%	2.9%	99.00%	1.99%	15.21%	137	4,652	4,788

CWT		TRH		% of		Angler	Spawning escapement		
code	BY	Age	Total No.	total	Run-size	harvest	TRH	Natural	Total
Adults									
068827	09	5	1.08	0.07%	3.08	0.09	1.08	1.91	2.99
068837	09	5	5.10	0.31%	14.54	0.42	5.10	9.03	14.12
068777	10	4	37.86	2.32%	108.04	3.11	37.86	67.07	104.92
068778	10	4	46.05	2.83%	131.42	3.78	46.05	81.58	127.63
068779	10	4	37.64	2.31%	107.40	3.09	37.64	66.67	104.31
068780	10	4	28.51	1.75%	81.37	2.34	28.51	50.51	79.02
068781	10	4	574.93	35.27%	1,640.70	47.25	574.93	1,018.51	1,593.44
068792	10	4	2.02	0.12%	5.76	0.17	2.02	3.58	5.59
068793	10	4	2.06	0.13%	5.88	0.17	2.06	3.65	5.71
068794	10	4	1.00	0.06%	2.85	0.08	1.00	1.77	2.77
068795	10	4	1.04	0.06%	2.95	0.09	1.04	1.83	2.87
068835	10	4	7.13	0.44%	20.34	0.59	7.13	12.63	19.75
068830	11	3	6.12	0.38%	17.46	0.50	6.12	10.84	16.96
068841	11	3	31.74	1.95%	90.59	2.61	31.74	56.23	87.98
068842	11	3	33.70	2.07%	96.18	2.77	33.70	59.71	93.41
068844	11	3	41.83	2.57%	119.38	3.44	41.83	74.11	115.94
068845	11	3	22.41	1.38%	63.96	1.84	22.41	39.71	62.12
068847	11	3	749.77	46.00%	2,139.64	61.62	749.77	1,328.25	2,078.01
Totals:			1629.99	100.0%	4,651.54	133.96	1,629.99	2,887.59	4,517.57
Jacks									
060493	12	2	4.10	7.56%	10.33	0.20	4.10	6.03	10.12
060494	12	2	7.16	13.21%	18.06	0.36	7.16	10.54	17.70
060504	12	2	42.96	79.23%	108.30	2.14	42.96	63.19	106.15
Totals:			54.22	100.0%	136.69	2.71	54.22	79.76	133.98
Fall Chinook Totals:			1,684.21		4,788.22	136.67	1,684.21	2,967.34	4,651.55

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

The estimated contribution of hatchery-origin fall Chinook to the total Trinity River run-size estimate upstream of WCW was 20,481 fish. This represents 8.7% (606/6,938) of the jacks, 64.3% (19,875/30,891) of the adult run, and 54.1% (20,481/37,829) overall (Table 9).

Of the 19,875 TRH-origin adult fall Chinook in the run-size estimate 6,965 escaped to TRH, while 12,338 escaped to natural areas and 572 were estimated as harvested.

The contribution of TRH-produced fall Chinook (at 54.1%) to the total run-size is above the 24 year mean of 50.8% (Table 10 and Figure 13).

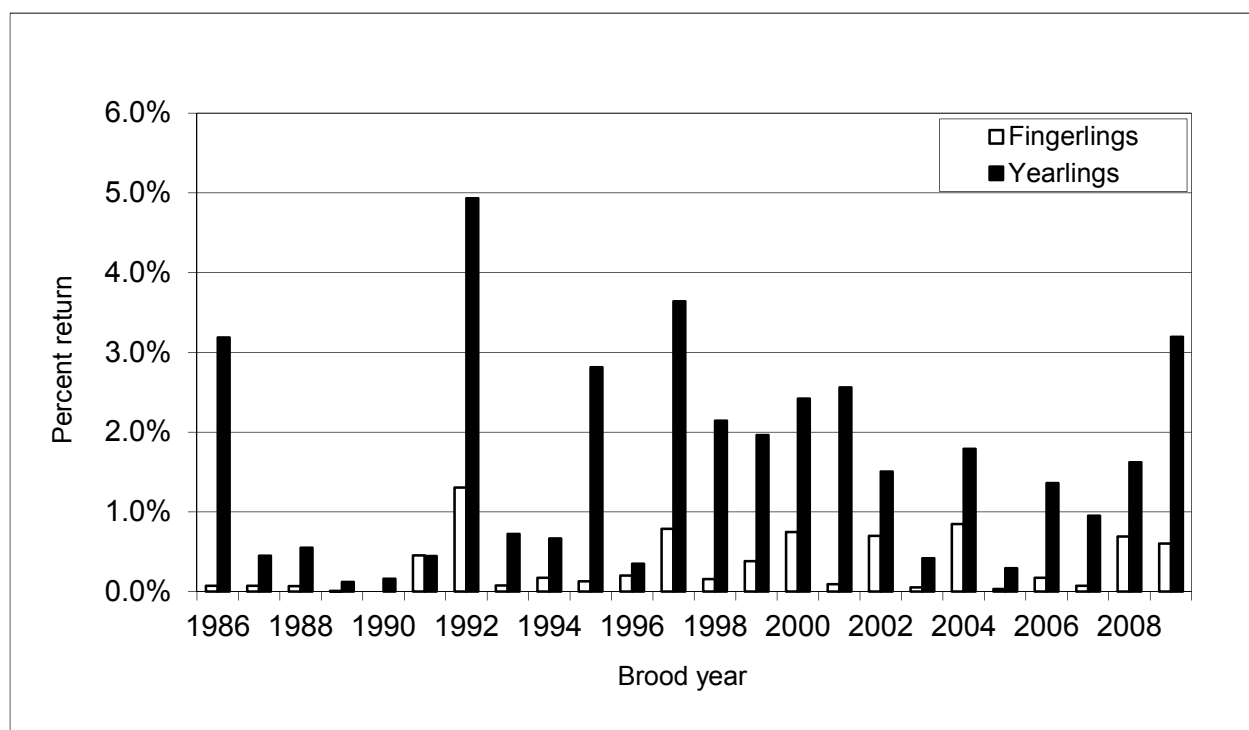


Figure 12. Percent return of Trinity River Hatchery produced, coded-wire tagged, fall Chinook salmon, brood years 1986-2009.

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 2014-15 season.^a

Returning to the Trinity River during the 2014-15 season:														
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
Adults														
68827	9	5	4.06		3.08	12.50	0.09	0.37	1.08	4.38	1.91	7.75	2.99	12.14
68837	9	5	4.03		14.54	58.60	0.42	1.69	5.10	20.55	9.02	36.35	14.12	56.90
68777	10	4	4.20		108.04	453.77	3.11	13.06	37.86	159.01	67.07	281.69	104.93	440.71
68778	10	4	4.08		131.42	536.19	3.78	15.42	46.05	187.88	81.59	332.89	127.64	520.77
68779	10	4	4.07		107.40	437.12	3.09	12.58	37.64	153.19	66.67	271.35	104.31	424.54
68780	10	4	4.24		81.37	345.01	2.34	9.92	28.51	120.88	50.52	214.20	79.03	335.09
68781	10	4	4.12		1,640.70	6,759.68	47.25	194.67	574.93	2,368.71	1,018.52	4,196.30	1,593.45	6,565.01
68792	10	4	4.04		5.76	23.27	0.17	0.69	2.02	8.16	3.57	14.42	5.59	22.58
68793	10	4	4.18		5.88	24.58	0.17	0.71	2.06	8.61	3.65	15.26	5.71	23.87
68794	10	4	4.03		2.85	11.49	0.08	0.32	1.00	4.03	1.77	7.13	2.77	11.16
68795	10	4	12.18		2.95	35.93	0.09	1.10	1.04	12.67	1.82	22.17	2.86	34.83
68835	10	4	4.29		20.34	87.26	0.59	2.53	7.13	30.59	12.62	54.14	19.75	84.73
68830	11	3	6.06		17.46	105.81	0.50	3.03	6.12	37.09	10.84	65.69	16.96	102.78
68841	11	3	5.07		90.59	459.29	2.61	13.23	31.74	160.92	56.24	285.14	87.98	446.06
68842	11	3	4.76		96.18	457.82	2.77	13.19	33.70	160.41	59.71	284.22	93.41	444.63
68844	11	3	4.31		119.38	514.53	3.44	14.83	41.83	180.29	74.11	319.41	115.94	499.70
68845	11	3	4.49		63.96	287.18	1.84	8.26	22.41	100.62	39.71	178.30	62.12	278.92
68847	11	3	4.33		2,139.64	9,264.64	61.62	266.81	749.77	3,246.50	1,328.25	5,751.32	2,078.02	8,997.83
Total adult					4,651.54	19,874.66	133.96	572.41	1,629.99	6,964.51	2,887.59	12,337.74	4,517.58	19,302.25
Jacks														
60493	12	2	4.43		10.33	45.8	0.20	0.89	4.10	18.16	6.03	26.71	10.13	44.88
60494	12	2	4.39		18.06	79.3	0.36	1.58	7.16	31.43	10.54	46.27	17.70	77.70
60504	12	2	4.44		108.30	480.9	2.14	9.50	42.96	190.74	63.20	280.61	106.16	471.35
Total jack					136.69	605.9	2.70	11.97	54.22	240.34	79.77	353.59	133.99	593.93
Total fall Chinook					4,788.23	20,480.56	136.66	584.38	1,684.21	7,204.85	2,967.36	12,691.33	4,651.57	19,896.18

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 - 2014.

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	20,480	17,349	54.1%
Means:	40,397	20,958	19,439	50.8%

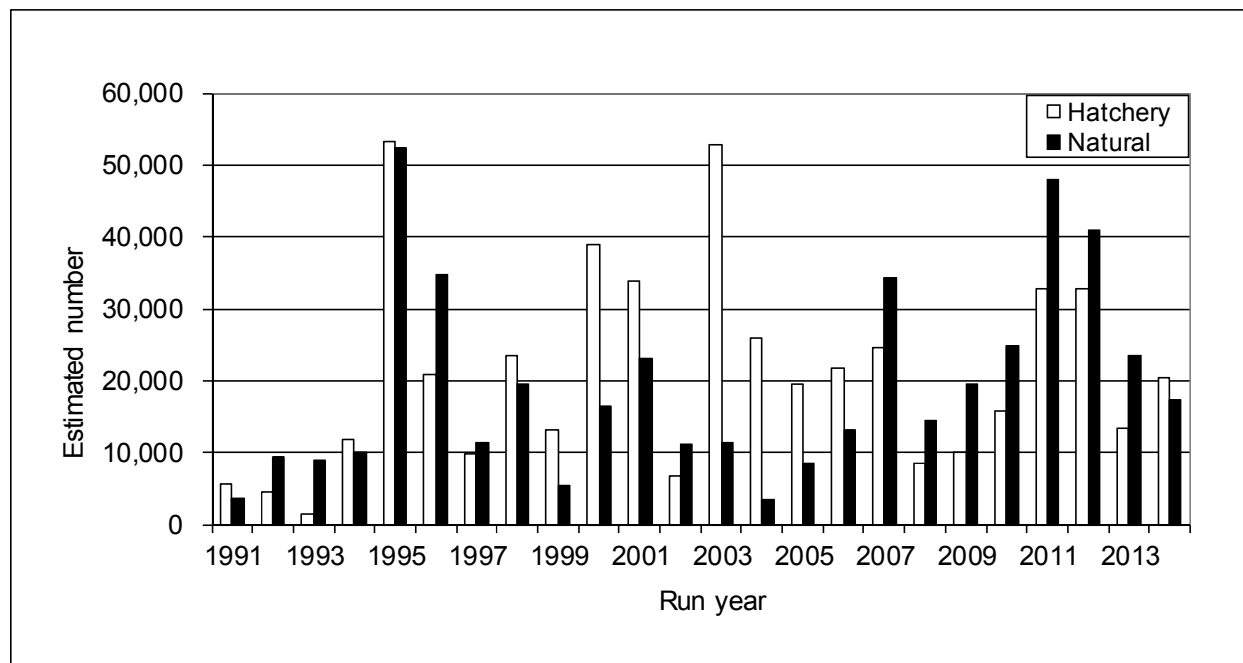


Figure 13. Hatchery and natural contributions to total fall Chinook run-size, upstream of Willow Creek weir, 1991 - 2014.

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

An estimated run-size of 37,829 (95% CI 33,056 – 43,670) fall Chinook, composed of 6,938 jacks and 30,892 adults, migrated into the Trinity River basin upstream of WCW in 2014 (Appendix 8). Trinity River fall Chinook spawner escapement was estimated at 36,904 (6,824 jack and 30,080 adult) fish, including 7,196 fall Chinook that entered TRH and 29,708 natural area spawners (Appendix 9). Harvest rates generated from tags applied at WCW were used to estimate 114 jack and 812 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 37,829 is approximately 86.8% of the 43,606 mean run-size for the years since 1977. The 10,777 naturally-produced adult fall Chinook component of the spawning escapement was 17.4% of the 62,000 TRRP goal (Appendix 10).

Coho Salmon Trapping and Tagging

A total of 1,095 coho were trapped at Willow Creek weir during the 2014 season. We applied tags to 1,081 (264 jacks and 817 adult) of the trapped fish (Appendix 21). We chose not to tag 14 fish to minimize stress that may lead to tagging mortality. Coho were trapped most weeks of the sampling season at WCW, except JWs 36 and 44. The number of trapped coho peaked in JW 40 with 68.2/night (Table 11, Figure 14), which coincided with the peak of right-maxillary clipped [RM (TRH-origin)] coho, when 64.0/night were trapped. Hatchery-origin fish comprised 92.6% (1,014 of 1,095) of the total coho captured at WCW.

Size and Age of Trapped Fish

Coho trapped at WCW and TRH averaged 59.7 and 60.3 cm FL, respectively, with a combined average of 60.3 cm FL (Figure 15). Using fork length distribution analysis, the nadir separating jack from adult coho salmon was between 52 and 53 cm FL. Based on the nadir, jacks comprised 24.7% of the coho sampled at WCW, and 23.9% at TRH.

Table 11. Weekly summary of coho trapped in the Trinity River at Willow Creek weir during 2014.^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	
36	3-Sep - 9-Sep	4	0	0	0	0	0	0	0.0
37	10-Sep - 16-Sep	5	24	24	14	11	38	35	7.6
38	17-Sep - 23-Sep	1	3	3	1	1	4	4	4.0
39	24-Sep - 30-Sep	5	101	97	190	174	291	271	58.2
40	1-Oct - 7-Oct	5	88	88	253	232	341	320	68.2
41	8-Oct - 14-Oct	5	42	39	263	237	305	276	61.0
42	15-Oct - 21-Oct	5	10	10	85	80	95	90	19.0
43	22-Oct - 28-Oct	2	2	1	16	14	18	15	9.0
44	29-Oct - 4-Nov	2	0	0	0	0	0	0	0.0
45	5-Nov - 11-Nov	5	0	0	2	2	2	2	0.4
46	12-Nov - 18-Nov	5	0	0	1	1	1	1	0.2
Total:		44	270	262	825	752	1,095	1,014	
Mean:									24.9

a/ Trapping at Willow Creek weir took place September 03 - November 21, 2014 (Julian weeks 36-47).

b/ Coho <53cm FL were considered jacks in 2014.

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

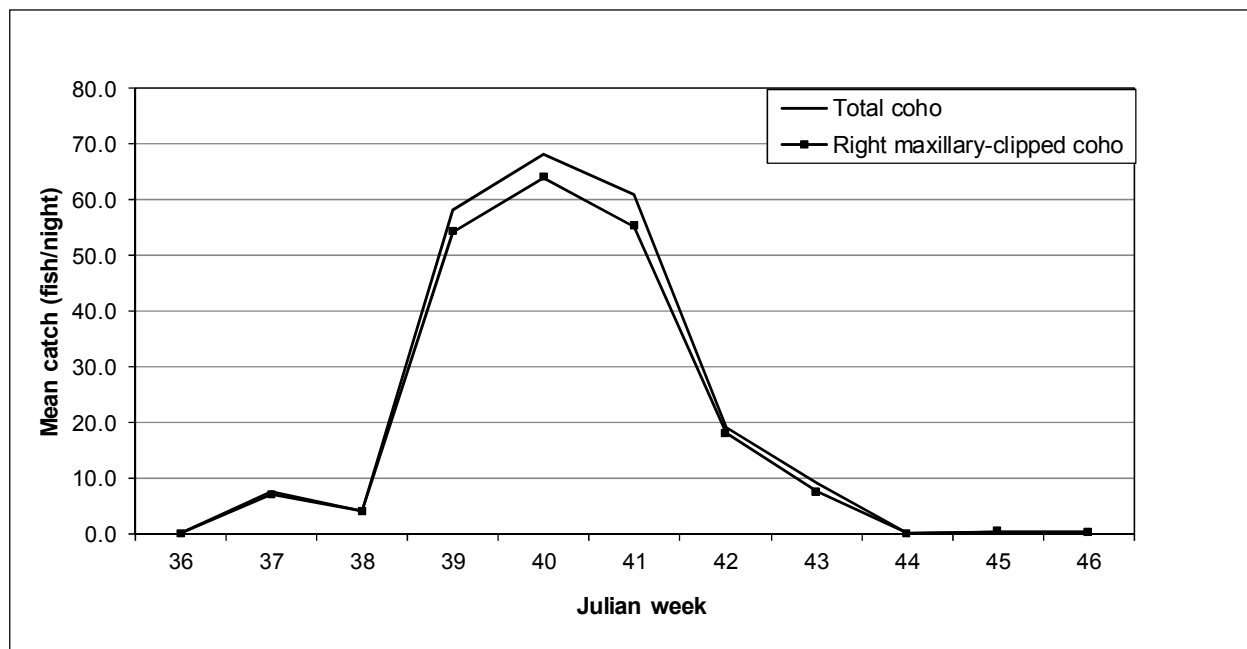


Figure 14. Mean catch of coho trapped in the Trinity River at Willow Creek weir, 2014.

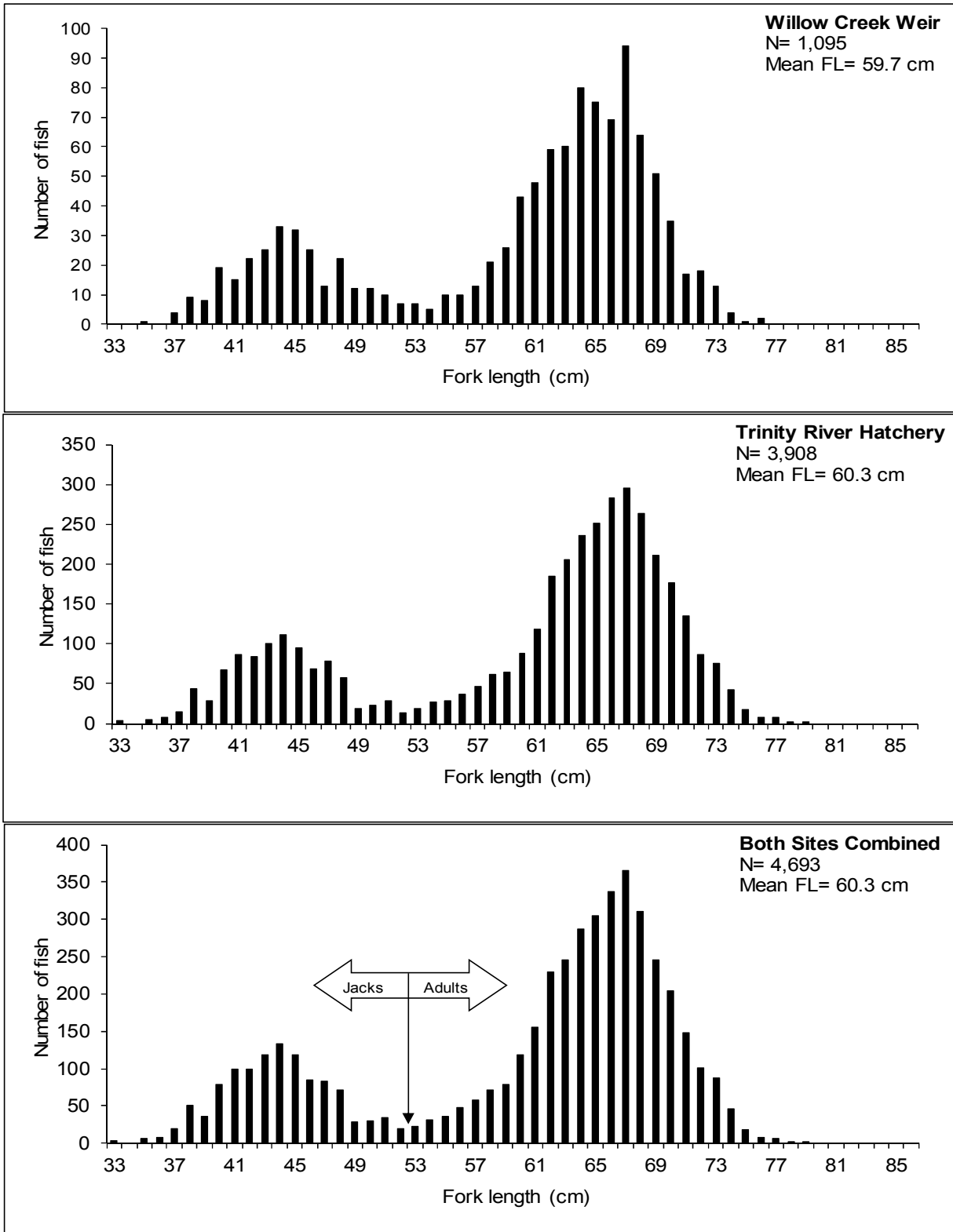


Figure 15. Coho salmon fork lengths (cm) observed at Willow Creek weir, Trinity River Hatchery and both sites combined during the 2014-15 season. The arrow denotes the size used to separate jacks and adults for analysis.

Coho Salmon Recovery

Angler Tag Recovery

There was no reported harvest of Project-tagged coho in 2014 (Appendix 21). There were four tags returned from the catch and release fishery.

Spawner Survey Recovery

During the spawner surveys 63 (nine jack and 54 adult) Project-tagged coho were recovered.

Tagging Mortalities

We observed one coho mortality, a result of tagging stress, at WCW in 2014.

Trinity River Hatchery Recovery

The first coho entered TRH during JW 38 and coho continued returning through JW 2 of 2015 (Appendix 5). The run peaked in JW 46 when 2,003 coho entered TRH. A total of 3,908 coho (937 jack and 2,971 adults) were recovered at TRH during the season. Of the 1,080 coho effectively tagged at WCW, 310 were recaptured at TRH.

Of the 3,908 coho that entered TRH in 2014, we observed 3,824 (97.9%) with right-maxillary (RM) clips, indicating TRH-origin; 84 (2.1%) had no clip. The unclipped fish are assumed to be naturally-produced coho salmon which entered the hatchery.

Based on length frequency analysis, TRH-produced RM-clipped coho salmon were assigned into two brood years (Table 12). The 932 coho measuring less than 53 cm FL were considered jacks (age 2, from the 2012 BY), while the 2,892 greater than 52 cm FL were considered adults (age 3, from the 2011 BY). The 84 coho without RM clips which 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 2014-15 season.

Release data						TRH Recovery data					Number recovered	
	Egg source	Brood year	Date	Number	Site	Males		Females		Total	Tagging site	
						No.	FL ^a	No.	FL ^a		No.	WCW
RM ^b	TRH	2011	03/15-20/13	511,618	TRH	1,372	66.2	1,520	64.9	2,892	224	--
RM ^b	TRH	2012	03/15-18/14	528,029	TRH	886	43.6	46	47.1	932	81	--
Total coho:						2,258		1,566		3,824	305	0

a/ FL = Mean fork length in cm.

b/ Since 1996, all coho produced at TRH have received a right maxillary clip (RM). Coho <53 cm FL were classified as brood year 2012 and coho >52 cm FL were classified as brood year 2011. Age cutoff based on fork length distribution.

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

An estimated run-size of 13,537 coho (95% CI 12,133 – 15,021) composed of 3,338 jacks and 10,199 adults, migrated into the Trinity River basin upstream of the WCW in 2014 (Appendix 8). A count of 3,908 entered TRH (Appendix 9) and we estimate 9,629 were natural area spawners. The 2014 coho escapement was comprised of an estimated 902 naturally-produced adults and 99 jack coho in addition to 9,297 hatchery-produced adults and 3,239 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 2014. The escapement of 902 naturally-produced coho adults was 64.4% 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 13,537 is ranked 19th of the 38 years on record, and is 79.3% of the 17,066 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 the 2014-15 season were of BY 2012 brood stock. Coho salmon adults (age 3) returning to the Trinity River in 2014-15 were of BY 2011 brood stock. Based on recoveries of right maxillary-clipped adult recoveries, total percent return for TRH produced coho from BY 2011 was 2.34% (Table 13). Since 1994 the BY total return rate has ranged from 0.99 to 6.60 % (Appendix 26 and Appendix 27). In 2014-15 adult escapement of TRH BY 2011 was estimated at 9,297 fish. These consisted of 2,892 that entered TRH and an estimated 6,405 that spawned in natural areas. The total adult run-size estimate (10,199) for 2014-15 consisted of 91% TRH-produced fish. The TRH-produced jack escapement in 2014-15 from BY 2012 was estimated at 3,239 fish or 0.63% of the TRH total coho release, and contributed 97% 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-produced coho salmon returning to the Trinity River upstream of WCW during the 2014-15 season.

Ranking the 2011-12 Season											
Release Data							Estimated Returns				
Clip a/	Brood	Date	Number b/	Site	Age c/	Run-size	% of release	River harvest	Spawning Escapement		
	Year								TRH d/	Natural	Total
RM	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
RM	2012	3/15-18/14	528,029	TRH	2	3,239	0.63%	0	932	2,307	3,239

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 the entire TRH BY 2013 production of coho salmon (age 1) was completed by February 19, 2015. Approximately 2% of these individuals (5,764) were sampled for RM clip quality and fork length measurement (FL) prior to the start of their volitional release which commenced on March 15, 2015 (Table 14).

The pre-release fork length measurements of BY 2013 production ranged from 88 mm to 263 mm with a mean across all raceways of 154.9 mm.

Based on the quality control sampling, we estimate 99.94% of the BY 2013 production was effectively RM clipped. Factoring in post-marking losses, a total of 287,868 (287,723 marked and 145 unmarked) individuals were volitionally released beginning March 15, 2015.

Table 14. Production, marking totals, and quality control data for BY 2013 TRH coho salmon volitionally released March 15, 2015.

Raceway	Net marked	2% check	Estimated % unmarked	Effectively marked ^{a/}	Estimated unmarked releases	Marked releases	Total released
M3-M4	48,816	978	0.00%	48,816	0	48,806	48,806
M1-M2	47,680	955	0.00%	47,680	0	47,675	47,675
N3-N4	49,108	984	0.00%	49,108	0	49,101	49,101
N1-N2	42,336	848	0.12%	42,337	49	42,332	42,381
O3-O4	51,145	1,025	0.19%	51,147	96	51,139	51,235
O1-O2	48,675	975	0.00%	48,675	0	48,670	48,670
Total	287,760	5,764	0.05%	287,763	145	287,723	287,868

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

Fall Adult Steelhead Trapping and Tagging

Thirty adult steelhead were trapped at JCW in 2014; one of which was ad-clipped, indicating TRH-origin; the majority were trapped during JWs 25 and 31. The ad-clipped fish was tagged, but because the run-size estimate for steelhead is above WCW, the results of this particular tagging are purely qualitative in nature and not included in run-size estimates.

We trapped 1,112 fall-run steelhead at WCW in 2014 (Table 15, Figure 16); 100 half-pounders (<42 cm FL) and 1,012 adults. Two peaks are showing in the steelhead run, one during JW 38 when we trapped 56.0/night, followed by a slightly higher peak in JW 43 when we averaged 64.5 steelhead per night. Julian weeks 39 and 42 had nearly identical average high catch per unit efforts of ad-clipped (hatchery-origin) steelhead (23.4 and 23.6/night) and non-ad clipped (natural-origin) steelhead also peaked in the same weeks.

Of the 1,012 adult steelhead trapped during the season, 1,005 were tagged (Appendix 28). There was one tagging mortality, and 94 reported as caught and released (their tags removed) by anglers, leaving 910 effective tags. Hatchery-origin adult fish comprised 43.4% (439 of 1,012) of the steelhead captured at WCW, and 97.6% of the adult steelhead at TRH.

Size of Trapped Fish

Steelhead trapped at WCW and TRH averaged 57.7 and 54.9 cm FL, respectively, with a combined average of 55.4 cm FL (Figure 17). Adult steelhead (>41 cm FL) made up 91.0% and 86.0% 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 2014.^a

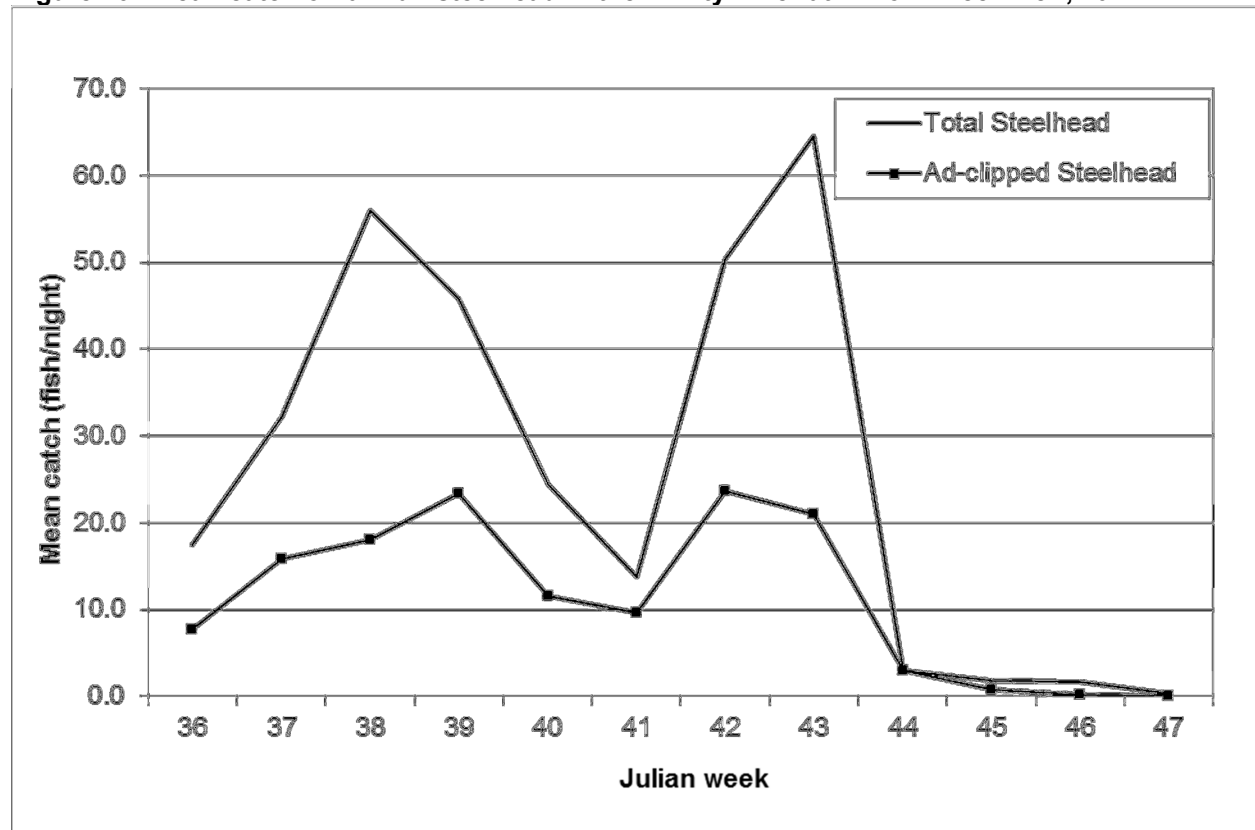
Julian week	Inclusive dates	Nights trapped	Number trapped						Fish/night	
			1/2 lbers	Ad-clipped 1/2 lbers ^c	Ad-clipped Adults	Ad-clipped Adults	Total	Ad-clip total		
36	3-Sep - 9-Sep	4			70	31	70	31	17.5	
37	10-Sep - 16-Sep	5	14	10	147	69	161	79	32.2	
38	17-Sep - 23-Sep	1	1	1	55	17	56	18	56.0	
39	24-Sep - 30-Sep	5	54	45	175	72	229	117	45.8	
40	1-Oct - 7-Oct	5	10	8	112	50	122	58	24.4	
41	8-Oct - 14-Oct	5	2	1	67	47	69	48	13.8	
42	15-Oct - 21-Oct	5	7	6	245	112	252	118	50.4	
43	22-Oct - 28-Oct	2	8	8	121	34	129	42	64.5	
44	29-Oct - 4-Nov	2	2	2	4	4	6	6	3.0	
45	5-Nov - 11-Nov	5	1	1	8	3	9	4	1.8	
46	12-Nov - 18-Nov	5	1	1	7		8	1	1.6	
47	19-Nov - 25-Nov	3	0		1		1	0	0.3	
Total:			47	100	83	1,012	439	1,112	522	
Mean:										23.7

a/ Trapping at Willow Creek weir took place September 03 - November 21, 2014 (Julian weeks 36-47).

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, 2014.



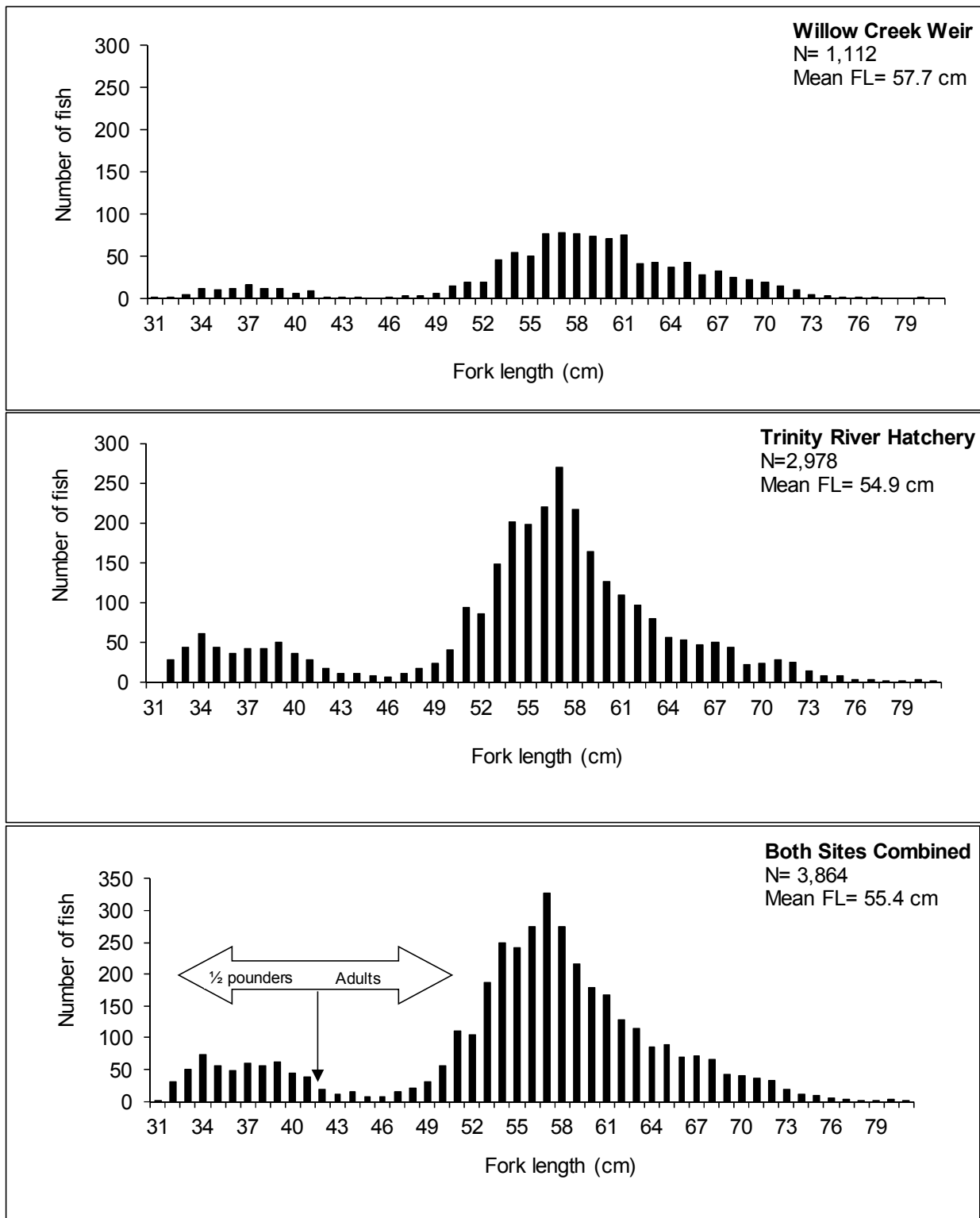


Figure 17. Steelhead fork lengths (cm) observed at Willow Creek weir, Trinity River Hatchery and both sites combined during the 2014-15 season. The arrow denotes the size used to separate ½ pounders (sub-adults) and adults for analysis..

Fall Steelhead Recovery

Angler Tag Recovery

There were 14 Project-tagged steelhead reported as harvested in 2014 (Appendix 28), and two tags found on the riverbank and returned by anglers or other river users. There were 94 tags returned from the catch and release fishery.

Spawner Survey Recovery

There was one Project-tagged steelhead recovered during the spawner surveys in 2014.

Tagging Mortalities

One steelhead mortality was identified as a result of tagging stress at WCW in 2014.

Trinity River Hatchery Recovery

Steelhead entered TRH during every week the fish ladder was open (Appendix 29). The largest number entered in JW50 when 367 steelhead entered TRH. A total of 2,561 adult steelhead (plus 417 half pounders) were recovered at TRH during the season. Two hundred twenty seven (24.9%) of the 910 steelhead effectively tagged at WCW were recaptured at TRH.

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

An estimated run-size of 10,282 adult fall steelhead (95% CI 9,046 – 11,601) migrated upstream of WCW this season (Appendix 8). An estimated 69 naturally-produced and 139 TRH-produced steelhead were harvested by anglers above WCW (Appendix 9), leaving an estimated 10,074 adult fish, of which 2,561 (62 natural-origin and 2,499 hatchery-origin) entered TRH. Of the remaining 7,513 natural area spawners, 5,691 were of natural origin, and 1,822 were of hatchery origin.

In the 31 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 - Appendix 31). The mean estimated run-size for fall adult steelhead in the Trinity River above WCW across the period of record is 15,143 fish. This year's run was 68% of the average. The natural origin spawner escapement above WCW of 5,753 is 14.4% of the TRRP goal of 40,000 natural-origin steelhead (Appendix 10).

DISCUSSION

Spring Chinook

Results from the 2014 mark-recapture study indicate the total run-size of 6,959 (95% CI 6,419-7,523) spring Chinook is a decline of approximately 2,000 fish (22%) from the 2013 estimate (Appendix 11). The number of adults decreased by approximately 27% however the number of jacks increased by 235% compared to 2013 estimates. The estimate of 1,931 naturally-produced adults is a 26% decline from 2013 escapement and is well below the TRRP annual escapement goal of 6,000 naturally produced adult spring Chinook (Figure 18). Approximately 32% of the adult spring Chinook escapement (escapement to the TRH and to natural areas) was composed of naturally-produced fish. In natural river areas alone, we estimate 55% of the spring Chinook adults were naturally-produced.

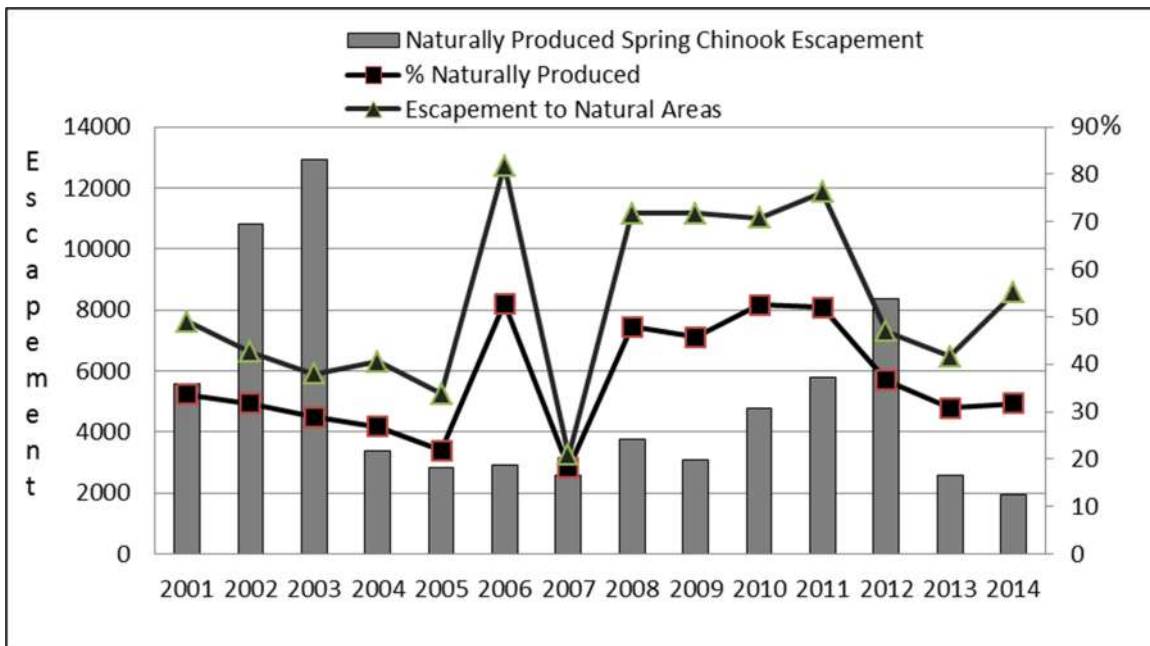


Figure 18. Adult escapement of naturally-produced spring Chinook to the Trinity River above Junction City weir 2001-2014. The 2014 escapement is below the TRRP production goal of 6,000 adult fish.

In a recent note Kinzinger (2014 written communication) suggests that preservation of the spring Chinook life history strategy in the upper Trinity is largely due to TRH hatchery practices. The spawning practices at TRH have helped to maintain separate spring and fall Chinook runs, while competition for spawning area and interbreeding in the upper river contributes to mixing of the two Chinook races.

Fall Chinook

The 2014 total run-size estimate for fall Chinook of 37,829 (95% CI 33,182 - 43,837) is similar to 2013 estimates of 36,989 fish (Appendix 18). The jack (18%) to adult (82%) ratio was also similar to the 2013 estimates. The 2014 escapement of 10,777 naturally-produced adult fall Chinook returning to natural areas is below the 62,000 TRRP goal and a decline of approximately 35% from the 2013 estimate (Figure 19). The estimate of naturally-produced adult fall Chinook is approximately 36% of the total adult escapement to natural areas and TRH. We estimate 47% of the fall Chinook adults in natural areas were naturally produced in 2014. Recoveries of TRH-produced Chinook during the 2014 carcass surveys appeared generally consistent with TRH recoveries.

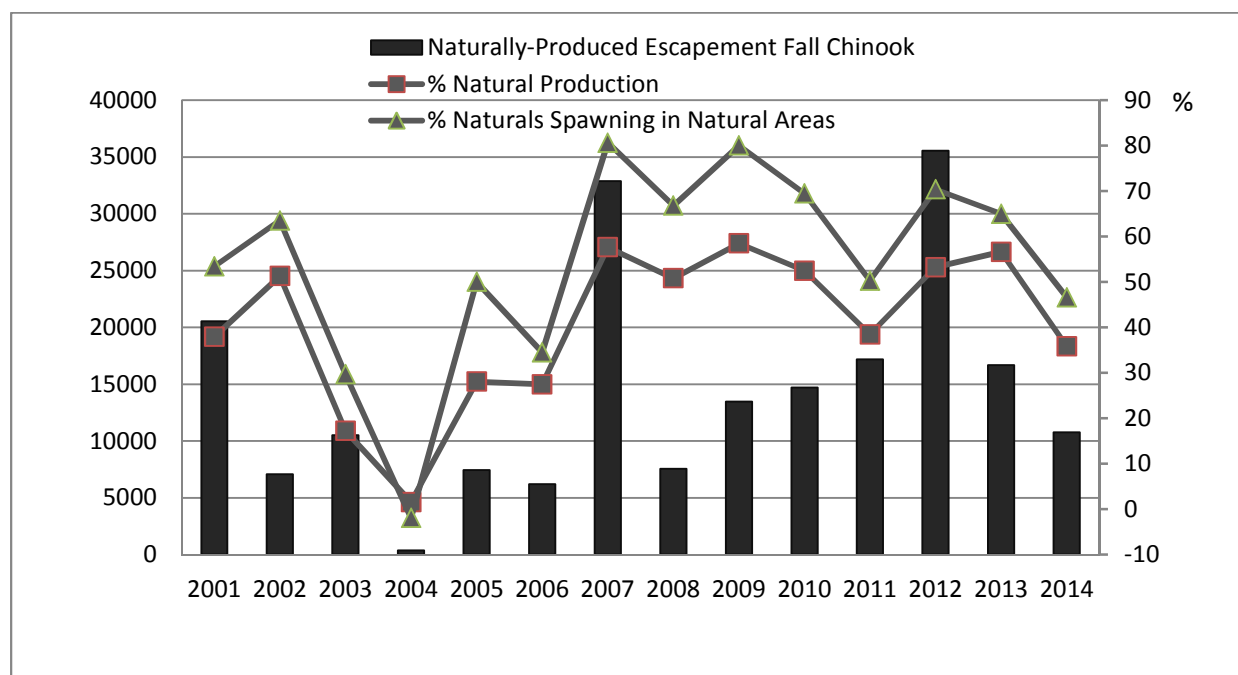


Figure 19. Adult escapement of naturally produced fall Chinook to the Trinity River above Willow Creek weir, 2001-2014. The 2014 escapement is below the TRRP production goal of 62,000 adults.

Coho Salmon

The 2014 coho run-size of 13,537 (95% CI 12,133 – 15,021) is a 38% decrease from the 2013 estimate which ends a recent four year increasing run-size trend (Appendix 24). Coho jacks comprised 25% of the 2014 run which is an increase from 13% jacks in 2013. Escapement of 902 naturally-produced coho decreased to 9% of the total adult escapement (Figure 20). In natural areas alone, 11% of the coho adults were naturally produced.

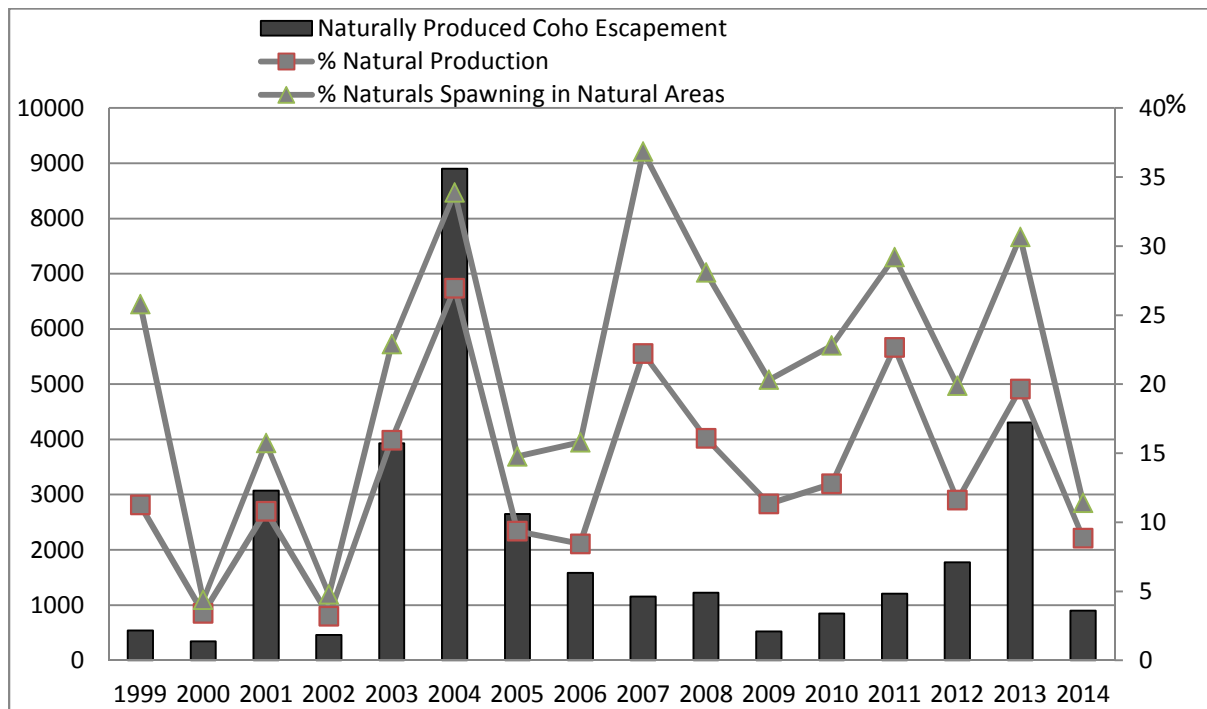


Figure 20. Adult escapement of naturally-produced coho salmon to the Trinity River above Junction City weir 2001-2014. The 2014 escapement is below the TRRP production goal of 1,400 adult fish.

Fall Steelhead

The 2014 run-size estimate for adult fall steelhead of 10,282 is a decline of 38% from 2013 estimates (Appendix 30). The 2014 escapement of 5,753 naturally-produced adult steelhead is a 37% decline from the 2013 estimate. The estimate of naturally-produced adult fall steelhead remained constant compared to 2013 with 57% of the combined escapement to natural areas and TRH (Figure 21). Naturally-produced adult fall steelhead comprised 76% of the natural area (in-river) adult steelhead escapement, areas, which is the highest proportion observed for many years.

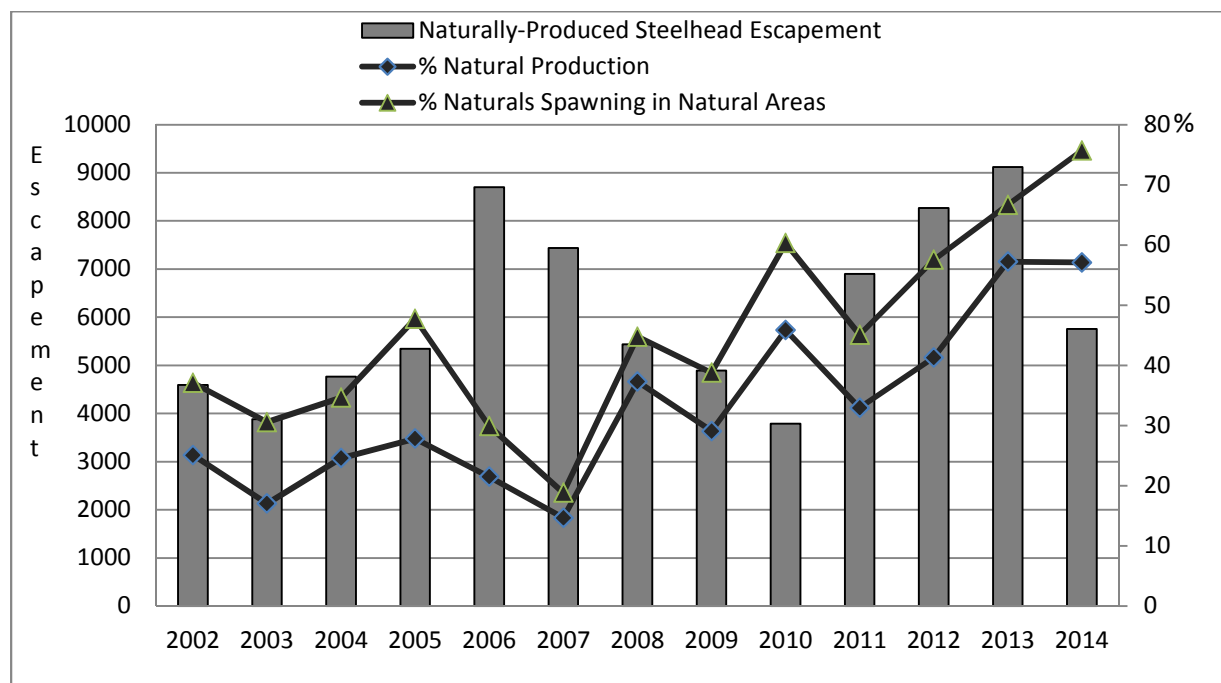


Figure 21. Adult escapement of naturally-produced steelhead to the Trinity River above Junction City weir 2001-2014. The 2014 escapement is well below the TRRP production goal of 40,000 adult fish. The total percent (escapement to TRH and natural areas) and percent spawners in natural areas of naturally-produced fish are shown.

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 which directly affect salmonid run-size and, therefore, progress toward production goals, are environmental influences, natural mortality and the amount of ocean and in-river harvest. A full discussion of environmental and harvest factors which influence fish production and escapement is beyond the scope of this monitoring report and is left to TRRP and its partners to examine. Below we will briefly discuss and review the factors which could influence our run-size, harvest, and escapement estimates.

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 run Chinook. Total annual harvest allocation of Klamath/Trinity Basin fall Chinook determined by PFMC can range from no harvest up to two-thirds of the projected run-size to the basin. Thus providing dependent harvests may have a large impact on fall Chinook escapement to the basin and Trinity River. In 2014 approximately 20% of the Klamath-Trinity Basin fall Chinook adult run was reported harvested (CDFW 2015). Harvest of spring Chinook also occurs in the ocean and in-river fisheries. Reported in-river harvests of spring Chinook for 2014 comprised 44% of the estimated Klamath/Trinity run-size (CDFW 2015). Coho salmon are protected from sport harvest entirely, and only hatchery marked steelhead are allowed for sport harvest. There are no quotas set for tribal coho or steelhead fisheries.

Other factors influencing the escapement estimates are the accuracy and precision of mark-recapture field studies and data analyses. Accuracy of the modified Peterson mark-recapture estimator relies on a set of assumptions described in this and previous Annual Reports (CDFW, 2014). 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) demonstrates 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 operations 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. Our reliance on experienced crew and adherence to protocol contributes to a relatively small number of tagging mortalities though in 2014, with low flow conditions prevailing and a high incidence of ich and other pathogens in our third year of drought, we observed more mortality than usual. We believe that tagging mortality is not a constant rate and is a function most related to water temperature, disease and other stressors. This postulation leads to difficulty in applying a potential tagging mortality rate for the season.

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. While 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 utilize 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). Preliminary analyses show that anglers tend to return tags with greater rewards at higher rates than tags with lessor or no value.

In 2014, the third year of the study, we ran it unchanged from 2013 (Table 16). Steelhead tags (applied in roughly equal proportions) were returned at a rate showing no statistically significant difference (p value greater than 0.05%) between the non-reward tags (\$0) and the \$10 tags ($p=0.2108$), nor between the \$10 and \$20 tags ($p=0.3582$), though the \$20 tags were returned at a significantly higher rate ($p=0.0307$) than the \$0 tags. With the Chinook we observed a significant difference in rate of return between the \$0 tags and the \$20 tags (p of 0.0110) but not between either the \$20 tags and the \$50 tags (p value of 0.1110), nor between the \$0 and the \$50 tags (p value of 0.3119). This result is contrary to our previous observations. We plan on repeating this study in 2015, utilizing the same tagging protocol at each weir.

Table 16. Angler return rates of non-reward and reward tags applied to fall run Chinook and steelhead in the Trinity River at Willow Creek weir during the 2012, 2013 and 2014 seasons.

Species	2012 Non-reward tag			2012 \$10 Reward tag			2012 \$20 Reward tag		
	Applied	Returned	%	Applied	Returned	%	Applied	Returned	%
Steelhead	1182	147	12.44	1178	170	14.43	1182	190	16.07
Chinook	852	25	2.93	859	29	3.38	845	41	4.85

STEELHEAD	WCW Non-reward tag			WCW \$10 Reward tag			WCW \$20 Reward tag		
	Applied	Returned	%	Applied	Returned	%	Applied	Returned	%
2013	668	82	12.28	668	89	13.32	664	135	20.33
2014	338	27	7.98	333	37	11.11	334	46	13.77

CHINOOK	WCW Non-reward tag			WCW \$20 Reward tag			WCW \$50 Reward tag		
	Applied	Returned	%	Applied	Returned	%	Applied	Returned	%
2013	263	8	3.04	260	11	4.23	257	12	4.67
2014	355	6	1.69	357	19	5.32	351	10	2.85

We believe this year's run-size and escapement estimates were affected by the Lewiston Dam flow release schedule's effect on weir operations. The water year designation in 2014 was "Critically Dry" (TRRP, 2014), and the river was at a level TRP staff could build JCW on June 9 (Appendix 32). The early start of trapping operations made it possible to sample much of the spring Chinook run. Due to a relatively high recapture rate of marked fish, we obtained a 95% confidence interval of $\pm 8\%$ for the spring Chinook run-size estimate.

The critically dry year flow schedule was favorable for the JCW operations but a blue green algae bloom, high augmentation release flows, then high water temperatures (Appendix 33), delayed trapping operations at WCW until September 4. The 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 Chinook near cold water refugia in the Klamath River, Reclamation released extra water from Lewiston Dam designed to maintain a target of 2,500 cfs in the lower Klamath River. During JW 38 augmentation flows required that we modify WCW (pull conduit), allowing fish to pass the weir without being trapped and tagged. Once operations resumed we trapped extra days over the weekend, but this 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, and we might have missed the opportunity to trap an important segment of the fall Chinook run. We had two storm events later in the season that required conduit pulling or other modification as well.

Hatchery and naturally produced fish passing by the weir at different rates during the season could be a source of bias. We tested for bias in trapping results using a chi-square contingency table for two sided proportions and found that during the trapping season there was no significant difference ($X^2 = 15.6121$, $df = 10$, $p\text{-value} = 0.1113$) between the proportions of hatchery and natural fish processed at WCW during the 2014 season. We found no evidence that the assumption of random samples, representative of the population were violated.

Based on a recommendation by Hankin and Bradford (2012) we used the R computer application and mixdist statistical package to derive proportions of jack and adult Chinook within their run-size populations. Results from the mixdist analyses predicted age composition proportions very similar to those estimated by visual inspection of length-frequency histograms and those estimated by fall Chinook scale analyses. This is the second year we have used the mixdist package and we will continue to integrate these analyses to evaluate potential bias associated with the visual estimates of the nadir.

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 (fork-length 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 steelhead population provided evidence bias associated with using the nadir appears insignificant (CDFW 2014).

Since 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 2014.

We had a large number of CWTed fall Chinook return to TRH before what is normally considered the period to expect them, and they came from all the brood years, and most of the CWT groups. The earliest returning fall CWT arrived the first week TRH was open (for the spring run) but it was a stray from Iron Gate Hatchery, whose fall Chinook generally come in a few weeks before TRH returnees. The 2014 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 the salmonid migration behavior causing fish to arrive at the TRH earlier or later than a typical year. We did note that some spring Chinook arrived at the hatchery with their eggs in an immature state, perhaps due to the cooler river temperatures which may have delayed the spring Chinook maturation.

We assume the CWTed 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 would occur. Recoveries of TRH-produced Chinook during the 2014 carcass surveys appeared consistent with TRH recoveries. The largest two segments of (strayed to spawn in natural areas) returnees were the same three and four year old fall yearling groups (068781 and 068847) that returned to TRH in the largest numbers of any other throughout the spawning season.

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 management efforts should consider 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 harmonized across restoration and mitigation programs.

LITERATURE CITED

- Bradford, M. and D. Hankin. 2012. Trinity River Restoration Program (TRRP) adult salmonid monitoring evaluation. TRRP. Weaverville, CA. 47 pp.
- Bureau of Reclamation (Reclamation). 2013. Draft Environmental Assessment: 2013 Lower Klamath River Late Summer Flow Augmentation from Lewiston Dam. EA-13-07-NCAO. Mid-Pacific Region. 31 pp.
- CA Department of Fish and Wildlife (CDFW) 2015. Spring Chinook mega-table. Klamath/Trinity Program. CA Dept. Fish and Wildlife. Arcata, CA
- CA Department of Fish and Wildlife (CDFW). 2014a. Final annual report. Trinity River Basin Salmon and Steelhead Monitoring Project, 2013-14 season. Klamath/Trinity Program. CA Dept. Fish and Wildlife. Redding, CA. 94 pp.
- CA Department of Fish and Wildlife (CDFW). 2014b. Final annual report. Trinity River Basin Salmon and Steelhead Monitoring Project, 2012 – 13 season. Klamath/Trinity Program. CA Dept. Fish and Wildlife. Redding, CA. 163 pp.
- Cannata, S., and J. Hileman. 2014. Task 3. Run-size and contribution to spawning escapement made by naturally- and hatchery-produced coho salmon in the Trinity River. Pages 83-102 *in* Final annual report of the CA Dept. Fish and Wildlife Trinity River Basin Salmon and Steelhead Monitoring Project, 2012-13 season.
- Chapman, D. G. 1948. A mathematical study of confidence of salmon populations calculated from sample tag ratios. *Int. Pac. Sal. Fish. Comm. Bull.* 2:69-85.
- Hankin, D. 2001. A preliminary evaluation of the performance of methods used to estimate spawning escapement of Chinook salmon in the Trinity River. Contract Agreement #000203 between the Hoopa Valley Tribal Fisheries Department and the Humboldt State University Foundation.
- Heubach, B., M. Lau, and E. Miller. 1992. Annual run-size, angler harvest, and spawner escapement of Chinook and coho salmon in the Trinity River basin. Job IV. Pages 93-104 *in* K. Urquhart and R. Carpenter, editors. Annual report of the Trinity River Basin Salmon and Steelhead Monitoring Project, 1990 – 91 season.
- Kier, MC. 2014. Task 1. Annual run-size, harvest, and spawner escapement estimates for Trinity River Basin Chinook and coho salmon and steelhead. Pages 1-60 *in* Final annual report of the CA Dept. Fish and Wildlife Trinity River Basin Salmon and Steelhead Monitoring Project, 2012-13 season.

- Kier, MC., and J. Hileman. 2014. Task 2. Run-size estimates of naturally- and hatchery-produced Trinity River Chinook salmon. Pages 61-82 *in* Final annual report of the CA Dept. Fish and Wildlife Trinity River Basin Salmon and Steelhead Monitoring Project, 2012-13 season.
- Klamath River Technical Team (KRTT). 2014. Klamath River fall Chinook age-specific escapement, river harvest and run size estimate, 2013 run. 20 pp.
- Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Bull. Fish. Res. Bd. Can. No. 191.
- Trinity River Restoration Program. 2014. Trinity River Restoration Flow Release Schedule Design for Water Year 2014. Technical Memorandum WG-TRRP-Flow-2014-1. TRRP. Weaverville, CA.
- Trinity River Restoration Program, ESSA Technologies Ltd. 2009. Integrated Assessment Plan, Version 1.0 – September 2009. Draft report prepared for the Trinity River Restoration Program. Weaverville, CA. 285 pp.
- United States Department of the Interior (Interior). 2000. Record of Decision. Trinity River Mainstem Fishery Restoration Final Environmental Impact Statement/ Environmental Impact Report. December 2000. 43 pp.

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 2014-15 season.

Release data							TRH Recovery data					Number recovered	
CWT ^a code	Egg source	Brood year	Date	Number	Size (# / lb)	Site	Males		Females		Total	Tagging site	
							No.	FL ^b	No.	FL ^b	No.	WCW	JCW
SPRING CHINOOK													
068821	TRH	2009	06/01-08/10	63,456	44.0	TRH	2	87.5	--	--	2		
068822	TRH	2009	06/01-08/10	82,259	55.0	TRH	--	--	2	76.0	2		
068836	TRH	2009	10/01-09/10	108,824	8.6	TRH	--	--	4	79.8	4		
068773	TRH	2010	06/01-17/11	33,636	65.8	TRH	35	81.7	28	72.9	63		8
068774	TRH	2010	06/01-17/11	63,224	75.5	TRH	44	80.6	88	73.6	132		23
068775	TRH	2010	06/01-17/11	71,842	90.0	TRH	38	81.2	46	74.3	84		12
068776	TRH	2010	10/03-12/12	97,128	13.0	TRH	75	76.8	106	71.2	181		33
068838	TRH	2011	06/01-15/12	59,877	60.0	TRH	35	68.3	36	64.0	71		10
068839	TRH	2011	06/01-15/12	35,222	71.0	TRH	10	66.0	12	63.0	22		
068840	TRH	2011	06/01-15/12	72,106	75.0	TRH	21	67.6	21	64.1	42		4
068846	TRH	2011	10/01-17/12	97,771	12.7	TRH	32	61.3	20	60.4	52		11
060490	TRH	2012	06/01-15/13	94,284	67.0	TRH	29	47.3	--	--	29		3
060491	TRH	2012	06/01-15/13	67,661	74.6	TRH	15	50.5	--	--	15		4
060492	TRH	2012	06/01-15/13	88,310	96.6	TRH	6	46.5	1	46.0	7		
060497	TRH	2012	10/01-14/13	101,471	11.9	TRH	15	60.9	--	--	15		1
Lost CWT ^{c,e}							3	63.0	6	73.8	9		2
No CWT ^{d,e}							5	61.2	6	69.7	11		2
Spring Chinook totals:							365		376		741	0	113
FALL CHINOOK													
068827	TRH	2009	06/01-08/10	90,929	186.0	TRH	--		1	83.0	1		
068837	TRH	2009	10/01-09/10	230,461	11.6	TRH	3	86.0	2	83.0	5		
068777	TRH	2010	06/01-17/11	114,941	122.5	TRH	16	80.8	21	74.0	37		
068778	TRH	2010	06/01-17/11	119,394	124.0	TRH	22	82.4	23	77.0	45	2	
068779	TRH	2010	06/01-17/11	119,945	124.5	TRH	18	82.7	19	75.0	37		
068780	TRH	2010	06/01-17/11	112,828	158.5	TRH	14	81.1	14	76.6	28	2	
068781	TRH	2010	10/03-12/11	231,430	15.3	TRH	289	79.7	273	75.1	562	13	
068792	IGH	2010	6/23/2011	174,555	--	IGH	1	87.0	1	83.0	2		
068793	IGH	2010	6/23/2011	175,428	--	IGH	1	88.0	1	74.0	2		
068794	IGH	2010	6/23/2011	153,296	--	IGH	1	88.0	--	--	1		
068795	IGH	2010	6/23/2011	153,662	--	IGH	--	--	1	71.0	1		
068835 ^f	TRH	2010	06/02-08/13/11	7,945	124.0	River	4	80.0	2	75.0	6		
068781	TRH	2010	10/03-12/11	231,430	15.3	TRH	289	79.7	273	75.1	562		
068830 ^f	TRH	2011	05/24-0827/12	9,706	284.0	River	4	67.8	2	66.0	6	1	
068841	TRH	2011	06/01-15/12	86,357	167.0	TRH	15	69.2	16	66.0	31		
068842	TRH	2011	06/01-15/12	95,355	135.0	TRH	17	67.5	16	65.9	33		
068844	TRH	2011	06/06-15/12	112,093	139.0	TRH	25	67.9	16	66.8	41	1	
068845	TRH	2011	06/07-15/12	102,907	149.0	TRH	16	67.0	6	65.5	22		
068847	TRH	2011	10/01-17/12	200,337	16.2	TRH	458	66.7	275	64.5	733	22	1
060493	TRH	2012	06/01-15/13	105,581	128.6	TRH	4	52.0	--	--	4		
060494	TRH	2012	06/01-15/13	102,559	145.6	TRH	7	52.0	--	--	7	1	
060504	TRH	2012	10/01-14/13	221,247	17.0	TRH	41	48.1	1	48.0	42	1	
Lost CWT ^{c,e}							22	71.1	15	69.1	37	1	
No CWT ^{d,e}							8	71.1	9	67.8	17		
Fall Chinook totals:							1,275		987		2,262	44	1

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 2014-15 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 unspawned 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 2014-15 season.^a

FL (cm)	2009 ^b			2010				2011				2012				Total
	068821-f	068822-f	068836-y	068773-f	068774-f	068775-f	068776-y	068838-f	068839-f	068840-f	068846-y	060490-f	060491-f	060492-f	060497-y	
38															1	1
39															1	1
40												1				1
41															1	1
42												3		2	3	8
43												1	1		1	3
44												3		1	1	5
45												2			2	4
46													2	1	2	5
47												4			1	5
48												3	1			4
49										1		3	1		1	6
50												4	2	2		8
51					2							1	2	1	1	7
52												2	2			4
53											2	2	1			5
54											1					1
55								1								5
56										1			2			6
57									2	1						6
58									1							6
59							1	3		2						9
60							1	4	1	2						13
61							1	6	2	2						15
62					1		3	6	2	4						18
63				1			2	7	2	3						19
64							3	5	2	2						19
65				1	1	2	1	6	4	7						24
66					2		3	2	2	2						13
67					2	1	5	7								16
68				3	2	3	10	3		4						27
69				1	2	3	12	1								19
70				5	5	1	13	2	1	5						32
71				2	11	3	16	4							2	38
72				1	6	4	8	1		1					1	22
73		1		5	14	5	14	4	2	3						48
74				8	8	6	16	4								42
75				3	6	11	12	1		2						35
76				1	11	6	14	1	1							34
77				3	12	3	10									28
78			2	2	7	5	3			1						20
79		1			6	2	2									11
80				2	3	5	6									16
81			1	2	9	2	3	1								18
82			1	2	2	1	7									13
83				7	3	5	3	1								19
84				4	3	4	3									14
85				2	4	2	7									15
86	1			1	4	4	1									11
87					2	1	1									4
88				3	1	1										5
89	1															1
90				1	3											4
91						2										2
92				1		1										2
93				1												1
94				1												1
95																0
96																0
97																0
98						1										1
Totals:	2	2	4	63	132	84	181	71	22	42	52	29	15	7	15	721
Mean	87.5	76.0	79.8	77.8	76.0	77.4	73.5	66.1	64.4	65.9	60.9	47.3	50.5	46.4	44.0	

a/ Trapping occurred at TRH September 2, 2014 - March 10, 2015 (JWs 35-10; 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 2014-15 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
35	27-Aug - 2-Sep	315	116						
36	3-Sep - 9-Sep	208	64						
37	10-Sep - 16-Sep	513	82						
38	17-Sep - 23-Sep	923	186				1		
39	24-Sep - 30-Sep	1,400	61				4		
40	1-Oct - 7-Oct	258	12				14		
41	8-Oct - 14-Oct	330	1			1	37		2
42	15-Oct - 21-Oct	271			2	13	246		4
43	22-Oct - 28-Oct	300				90	10		
44	29-Oct - 4-Nov	1,508				12	375		86
45	5-Nov - 11-Nov	941				73	105		7
46	12-Nov - 18-Nov	3,122				6	2,003		173
47	19-Nov - 25-Nov	500					863		26
48	26-Nov - 2-Dec	166				1	203		11
49	3-Dec - 9-Dec	51					40		1
50	10-Dec - 16-Dec	7					6		
51	17-Dec - 23-Dec								
52	24-Dec - 31-Dec								
1	1-Jan - 7-Jan								
2	8-Jan - 14-Jan						1		
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:		10,813	522	0	2	196	3,908	0	310

a/ Trapping at TRH occurred September 2, 2014 - March 10, 2015 (Julian weeks 35-10; 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 2009 through 2012.

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
068821	2009	06/01-8/10	63,456	TRH	2	427	0.67	5.9	243	177	421
068821	2009				3	1,211	1.91	96.4	456	659	1,115
068821	2009				4	185	0.29	5.4	73	107	179
068821	2009				5	3	0.00	0.1	4	2	6
Totals: d/						1,826	2.88	108	776	945	1,721
Total adults: e/						1,399	2.20	102	532	767	1,300
068822	2009	06/01-8/10	82,259	TRH	2	479	0.58	6.7	273	199	472
068822	2009				3	1,347	1.64	107.2	507	733	1,240
068822	2009				4	271	0.33	7.9	106	156	263
068822	2009				5	3	0.00	0.1	2	1	3
Totals: d/						2,099	2.55	122	888	1,089	1,977
Total adults: e/						1,620	1.97	115	615	890	1,505
068831	2009	06/01-8/10	7,234	TRH	2	65	0.90	0.9	37	27	64
068831	2009				3	127	1.75	10.1	48	69	117
068831	2009				4	10	0.14	0.3	4	6	10
068831	2009				5	0	0.00	0.0	0	0	0
Totals: d/						202	2.80	11	89	102	191
Total adults: e/						137	1.90	10	52	75	127
068832	2009	06/01-8/10	8,104	TRH	2	71	0.87	1.0	40	29	70
068832	2009				3	146	1.80	11.6	55	79	134
068832	2009				4	21	0.25	0.6	8	12	20
068832	2009				5	0	0.00	0.0	0	0	0
Totals: d/						237	2.93	13	103	121	224
Total adults: e/						166	2.05	12	63	91	154
068836	2009	10/1-9/10	108,824	TRH	2	37	0.03	0.5	21	15	36
068836	2009				3	465	0.43	37.0	175	253	428
068836	2009				4	452	0.42	13.2	178	261	439
068836	2009				5	6	0.01	0.2	4	2	6
Totals: d/						959	0.88	51	378	531	908
Total adults: e/						922	0.85	50	357	515	872
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
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
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
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
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
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
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
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
060490	2012	06/01-15/13	94,284	TRH	2	55	0.06	1.3	29	24	54
060491	2012	06/01-15/13	67,661	TRH	2	29	0.04	0.7	15	13	28
060492	2012	06/01-15/13	88,310	TRH	2	13	0.01	0.3	7	6	13
060497	2012	10/01-14/13	101,471	TRH	2	28	0.03	0.7	15	12	28

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 2009. 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 1986-2009.^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%
Means:	218,739	1,177	0.58%	104,708	1,120	1.01%

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 2014-15 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	75	362	35	660	6,419 - 7,523	Normal Approximation
		Adults	928	3,255	486	6,298		
		Total	1,003	3,617	521	6,958		
Fall Chinook	Upstream of Willow Creek weir	Jacks	192	221	7	6,938	33,056 - 43,670	Poisson Approximation
		Adults	853	6,975	191	30,891		
		Total	1,045	7,196	198	37,829		
Coho	Upstream of Willow Creek weir	Jacks	261	937	81	3,338	12,133 - 15,021	Normal Approximation
		Adults	815	2,971	229	10,199		
		Total	1,076	3,908	310	13,537		
Fall-run steelhead	Upstream of Willow Creek weir	Adults	910	2,561	226	10,282	9,046 - 11,601	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 2014-15 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	660	2.4%	16	282	362	644
		Adults	6,298	3.3%	210	2,833	3,255	6,088
		Total	6,958		226	3,115	3,617	6,732
Fall Chinook	Upstream of Willow Creek weir	Jacks	6,938	2.0%	114	6,603	221	6,824
		Adults	30,892	2.6%	812	23,105	6,975	30,080
		Total	37,830		926	29,708	7,196	36,904
Coho	Upstream of Willow Creek weir	Jacks	3,338	0.0%	0	2,401	937	3,338
		Adults	10,199	0.0%	0	7,228	2,971	10,199
		Total	13,537		0	9,629	3,908	13,537
Fall-run adult steelhead	Upstream of Willow Creek weir	Natural	5,822	1.2%	69	5,691	62	5,753
		Hatchery	4,460	3.1%	139	1,822	2,499	4,321
		Total	10,282		208	7,513	2,561	10,074

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 2014-15 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	1,559	372	1,931	6,000	32.2%
		Hatchery	1,274	2,883	4,157		
		Total	2,833	3,255	6,088		
Fall Chinook	Upstream of Willow Creek weir	Naturally	10,767	10	10,777	62,000	17.4%
		Hatchery	12,338	6,965	19,303		
		Total	23,105	6,975	30,080		
Coho	Upstream of Willow Creek weir	Naturally	823	79	902	1,400	64.4%
		Hatchery	6,405	2,892	9,297		
		Total	7,228	2,971	10,199		
Fall-run steelhead	Upstream of Willow Creek weir	Naturally	5,691	62	5,753	40,000	14.4%
		Hatchery	1,822	2,499	4,321		
		Total	7,513	2,561	10,074		

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 are 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 - 2014.

Year	Run-size estimate					Spawner escapements						Angler harvest		
						Natural Area Spawners ^a			Trinity River Hatchery					
	Jacks ^d		Adults		Total	Jacks	Adults	Total	Jacks	Adults	Total	Jacks	Adults	Total
	Number	Percent	Number	Percent										
1977			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						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						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
2002	2,575	6.7	35,910	93.3	38,485	1,883	23,674	25,557	617	10,440	11,057	75	1,796	1,871
2003	1,039	2.2	46,756	97.8	47,795	909	30,211	31,120	130	14,512	14,642	0	2,033	2,033
2004	2,929	18.1	13,218	81.9	16,147	1,708	7,314	9,022	985	5,251	6,236	236	653	889
2005	55	0.4	13,929	99.6	13,984	30	6,003	6,033	25	6,966	6,991	0	961	961
2006	1,963	26.2	5,520	73.8	7,483	1,127	2,955	4,082	819	2,565	3,384	17	0	17
2007	135	0.9	14,700	99.1	14,835	80	8,154	8,234	55	5,981	6,036	0	565	565
2008	2,218	21.6	8,065	78.4	10,283	1,741	4,470	6,211	329	3,437	3,766	148	158	306
2009	260	3.5	7,166	96.5	7,426	191	3,724	3,915	69	3,000	3,069	0	442	442
2010	1,554	13.8	9,731	86.2	11,285	1,309	6,810	8,119	245	2,457	2,702	0	463	463
2011	8,087	42.1	11,132	57.9	19,219	5,217	7,309	12,526	2,758	3,823	6,581	112	0	112
2012	813	3.2	24,804	96.8	25,617	542	16,117	16,659	109	6,712	6,821	163	1,976	2,139
2013	281	3.1	8,680	96.9	8,961	185	5,956	6,141	96	2,482	2,578	0	243	243
2014	660	9.5	6,298	90.5	6,958	282	2,833	3,115	362	3,255	3,617	16	210	226

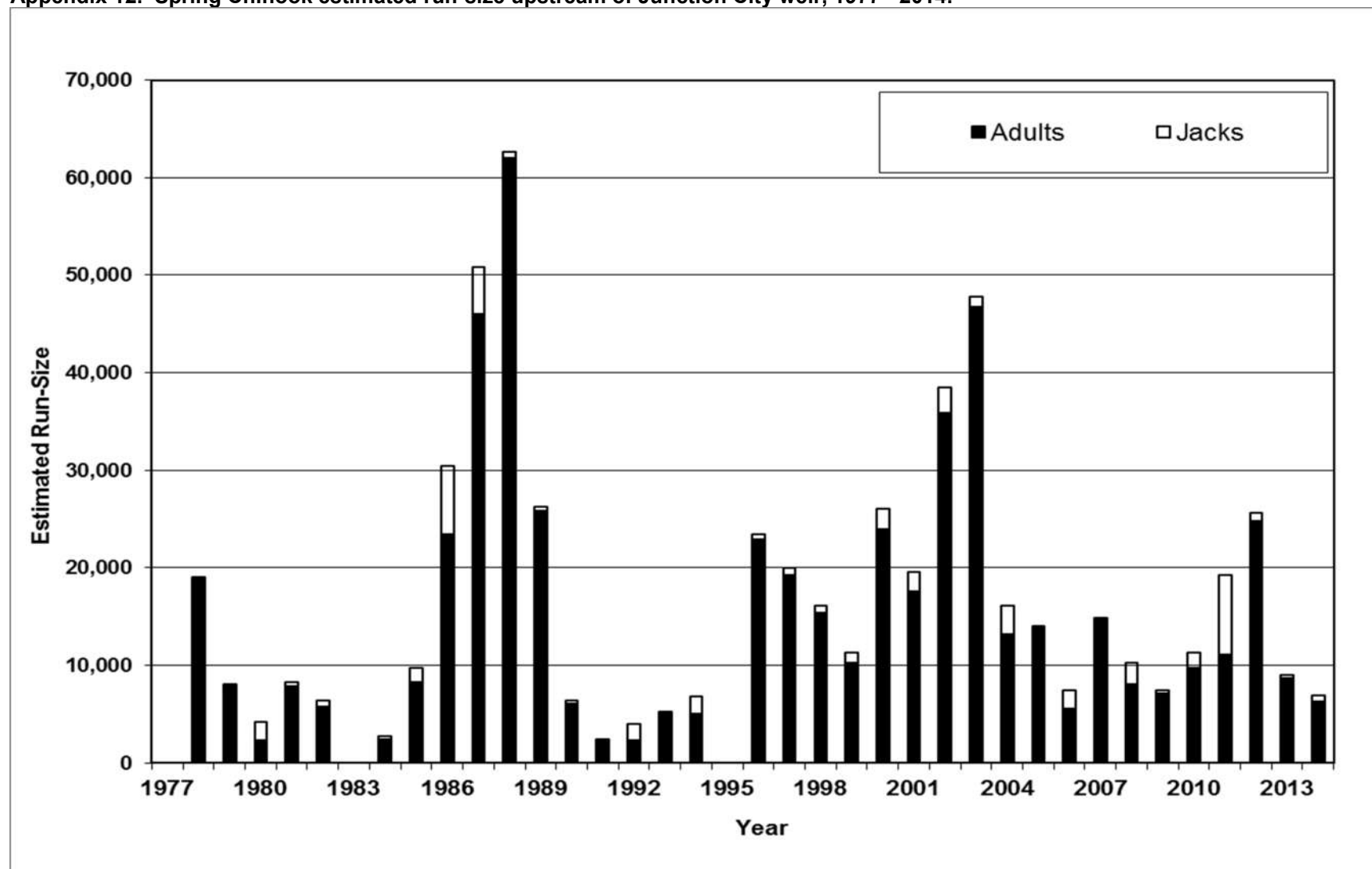
a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

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

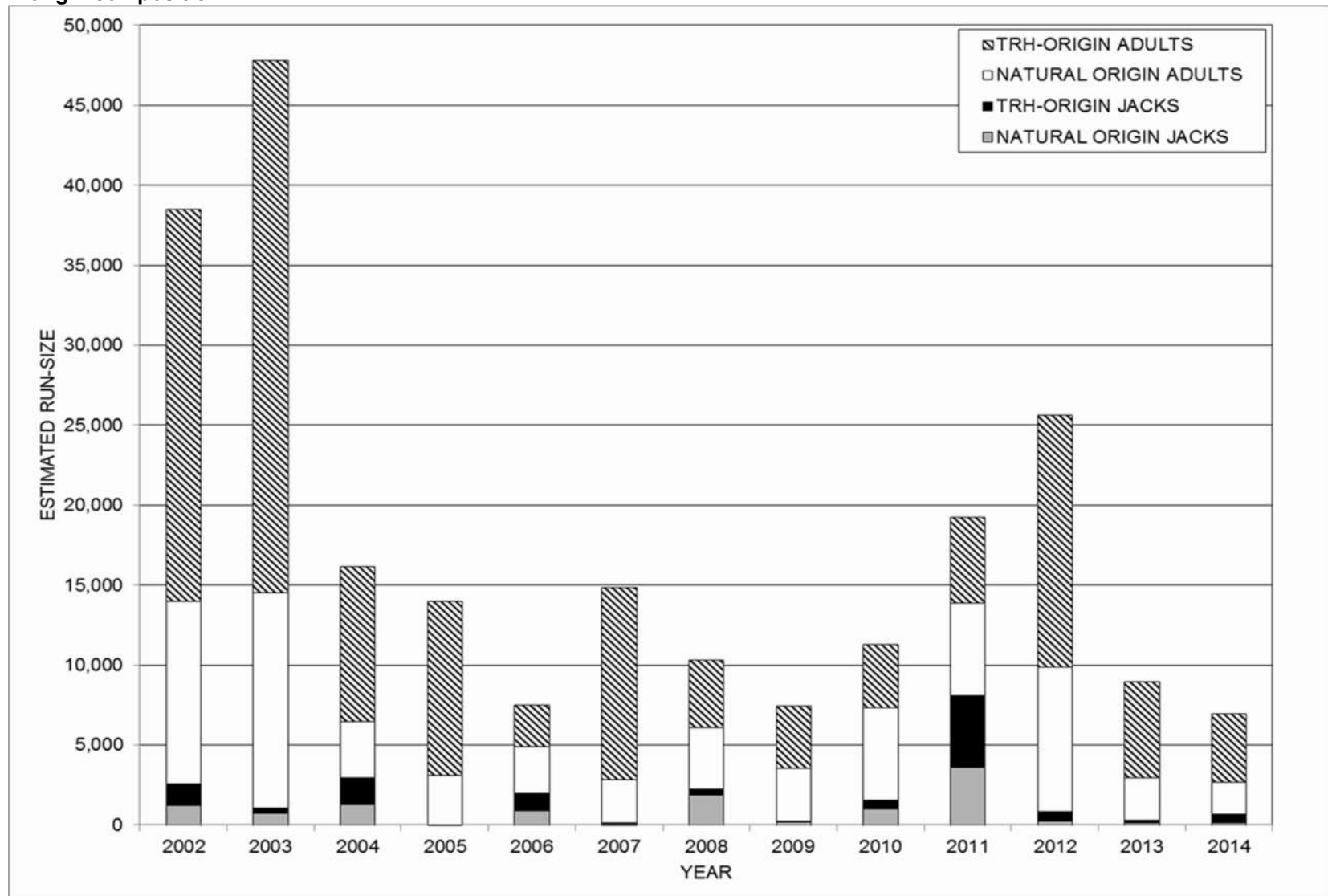
c/ The sport harvest of adult spring Chinook was subject to seasonal and size limit restrictions.

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 - 2014.



Appendix 13. Spring Chinook estimated run-size for the Trinity River upstream of Junction City weir, 2002 – 2014, 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 2014-15 season.^a

FL (cm)	WCW			RECOVERIES						Total Recoveries	% 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		
40	1	1								0	0.0
41										0	--
42	5	5								0	0.0
43	1	1								0	0.0
44	5	5		1					1	2	40.0
45	6	5		1						1	20.0
46	12	12								0	0.0
47	7	7				1	1			2	28.6
48	17	17			1					1	5.9
49	14	14	1			1				1	7.1
50	16	15	1	1						1	6.7
51	13	13	1		1	1				2	15.4
52	20	19	1			1	1			2	10.5
53	21	21		1						1	4.8
54	15	15					1			1	6.7
55	14	13					1			1	7.7
56	12	12	1		1	2				3	25.0
57	10	10	1							0	0.0
58	9	9	3	1		2				3	33.3
59	18	18	4		1	7	2			10	55.6
60	19	19	6			5	1			6	31.6
61	20	20	3		1	8	1			10	50.0
62	27	25	3			7				7	28.0
63	29	28	5			3	5			8	28.6
64	29	28	1		1	12		1	1	15	53.6
65	29	28	2			11				11	39.3
66	37	36	6		2	10	1			13	36.1
67	45	45	8	1	2	12	5			20	44.4
68	42	40	7			10	5			15	37.5
69	31	30	5		1	6	3			10	33.3
70	30	30	5		2	6		1	1	10	33.3
71	35	35	5		3	8	1			12	34.3
72	29	29	4			4	1		1	6	20.7
73	25	25	6	1		7	2		1	11	44.0
74	30	30	4		1	6	1			8	26.7
75	34	33	6		1	4	3			8	24.2
76	29	29	7			9				9	31.0
77	31	30	6		1	8		1		10	33.3
78	32	29	3	1	1	5	5			12	41.4
79	32	31	6		1	9	1		1	12	38.7
80	28	26	5	1		1	2	1		5	19.2
81	29	28	3			8	3			11	39.3
82	26	24	2			2	3		1	6	25.0
83	46	46	5	2		7	2			11	23.9
84	21	20	3			4	2			6	30.0
85	10	9	2			3				3	33.3
86	20	20	1		1	1	1			3	15.0
87	10	9	1	1	1	1			1	4	44.4
88	17	16	3			3	1			4	25.0
89	15	15	1			2				2	13.3
90	11	11								0	0.0
91	8	8	2							0	0.0
92	3	3				1	1			2	66.7
93	7	7	1				1			1	14.3
94	5	4								0	0.0
95										0	--
96	3	2								0	0.0
97	1	1								0	0.0
98	1	1								0	0.0
99	1	1								0	0.0
100	1	1								0	0.0
101	1	1								0	0.0
Totals:	1,095	1,065	140	12	23	198	57	4	8	302	28.4
Mean FL:	70.0	69.9	71.7	66.8	68.8	70.7	72.1	72.8	71.4	70.7	
Total jacks: ^j	68	67	1	2	1	2	1	0	1	7	10.4
Total adults:	1,027	998	139	10	22	196	56	4	7	295	29.6

a/ Trapping at Willow Creek weir took place September 4 - November 21, 2014 (Julian weeks 36-47). All Chinook trapped were considered fall Chinook.

b/ Thirty (3 jack and 27 adult) fall Chinook were not tagged due to poor condition.

c/ Ad-clip = Adipose fin clipped fish.

d/ Tagged fish found dead and spawned 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/ Fall Chinook <55 cm FL were considered jacks in 2014.

Appendix 15. Fork length distribution of coded-wire tagged, Trinity River Hatchery-produced fall Chinook recovered at TRH during the 2014-15 season.^a

FL (cm)	Brood Year							
	2009 ^b		2010					
	068827-f	068837-y	068777-f	068778-f	068779-f	068780-f	068835-f	068781-y
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								1
55								
56								1
57								
58								
59								
60								2
61								1
62								1
63								2
64								1
65				1				6
66							1	1
67			2		2			9
68			2		1			3
69				1	1	2		5
70			2	1				26
71			3	1	1	2		14
72							2	26
73			3	2	5	1		34
74			4	1	1	1		32
75			3	3	1	1		46
76			2	5	2	2		48
77			2	5	1	4		40
78		1	1	2	6	3	1	35
79			1	5	2	2	1	39
80			2		3			34
81		1	1	3	1		1	23
82			2	2	1	2		22
83	1		1	1		1		26
84			2	1	1	3		10
85		1		2	2			20
86			1	3	1			12
87			1	1	2			11
88						2		7
89		1	1			1		8
90				2		1		3
91		1		1	1			6
92								1
93				1				2
94				1				1
95					1			1
96								1
97							1	1
98								
99								
100					1			
101								
102			1					
Totals:	1	5	37	45	37	28	7	562
Mean	83.0	84.8	76.9	79.6	78.8	78.9	77.9	77.5

a/ Trapping occurred at TRH September 2, 2014 - March 10, 2015 (JWs 35-10; 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 2014-15 season.^a

FL (cm)	Brood Year								
	2011					2012			TOTALS
	068841-f	068842-f	068844-f	068845-f	068847-y	060493-f	060494-f	060504-y	
41								1	1
42									0
43								1	1
44								3	3
45								3	3
46								6	6
47								5	5
48						1		5	6
49								6	6
50							1	2	3
51					2		3	3	8
52						1	1	4	6
53					1	1			2
54				1	3		1	2	8
55					4	1	1	1	7
56					7				8
57		1			7				8
58	2		2		13				17
59	1	1	1		19				22
60	1	1			35				39
61	1	1	1	1	47				52
62			2	1	51				55
63	2	2	1	2	40				49
64	1	1	3	2	60				68
65	3	6	3	3	66				88
66	2	5	2	3	67				81
67	3	3	6	2	59				86
68	3	2	4		50				65
69		2	6	1	46				64
70	3	2			31				65
71	3	1	2	1	41				69
72	1	1	5	2	18				55
73		1	1	1	19				67
74	3	1			12				55
75	1	1		2	12				70
76		1			4				64
77					3				55
78			1		7				57
79					3				53
80					1				40
81					1				31
82			1		2				32
83					1				31
84	1				1				19
85									25
86									17
87									15
88									9
89									11
90									6
91									9
92									1
93									3
94									2
95									2
96									1
97									2
98									0
99									0
100									1
101									0
102									1
Totals:	31	33	41	22	733	4	7	42	1635
Mean	67.5	66.8	67.4	66.6	65.9	52.0	52.0	48.1	

a/ Trapping occurred at TRH September 2, 2014 - March 10, 2015 (JWs 35-10; 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 2010 through 2014.

Release data						Estimated returns					
CWT ^a code	Brood year	Date ^b	Number	Site	Age	Run- size	% of release	River harvest	Spawning escapement TRH ^c	Natural	Total ^g
068823	2009	06/1 - 8/10	85,136	TRH	2	331	0.39	8.5	116	206	322
068823	2009				3	462	0.54	11.1	240	211	451
068823	2009				4	88	0.10	2.6	25	60	85
068823	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						880	1.03	22	382	477	858
Total adults: ^e						550	1	14	265	271	536
068824	2009	06/1 - 8/10	89,959	TRH	2	253	0.28	6.5	89	157	246
068824	2009				3	386	0.43	9.3	200	176	377
068824	2009				4	91	0.10	2.7	26	62	89
068824	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						730	0.81	18	316	396	712
Total adults: ^e						477	0.53	12	227	238	465
068825	2009	06/1 - 8/10	91,310	TRH	2	77	0.08	2.0	27	48	75
068825	2009				3	282	0.31	6.8	147	129	275
068825	2009				4	78	0.08	2.3	22	53	75
068825	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						437	0.48	11	196	230	426
Total adults: ^e						360	0.39	9	169	182	351
068826	2009	06/1 - 8/10	88,851	TRH	2	35	0.04	0.9	12	21	34
068826	2009				3	181	0.20	4.3	94	83	176
068826	2009				4	70	0.08	2.1	20	48	68
068826	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						286	0.32	7	126	152	279
Total adults: ^e						251	0.28	6	114	131	245
068827	2009	06/1 - 8/10	90,929	TRH	2	23	0.03	0.6	8	14	22
068827	2009				3	206	0.23	5.0	107	94	201
068827	2009				4	77	0.08	2.2	22	53	75
068827	2009				5	3	0.00	0.1	1	2	3
Totals: ^d						309	0.34	8	138	163	301
Total adults: ^e						286	0.31	7	130	149	279
068828	2009	06/1 - 8/10	39,642	TRH	2	52	0.13	1.3	18	32	50
068828	2009				3	212	0.54	5.1	110	97	207
068828	2009				4	53	0.13	1.5	15	36	51
068828	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						317	0.80	8	144	165	309
Total adults: ^e						265	0.67	7	126	133	259
068833 ^f	2009	03/2-7/10/10	5,664	River	2	3	0.05	0.1	1	2	3
068833 ^f	2009				3	12	0.21	0.3	6	5	11
068833 ^f	2009				4	4	0.06	0.1	1	2	3
068833 ^f	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						18	0.32	0	8	10	18
Total adults: ^e						15	0.27	0	7	8	15
068834 ^f	2009	03/2-7/10/10	5,270	River	2	3	0.05	0.1	1	2	3
068834 ^f	2009				3	8	0.15	0.2	4	4	8
068834 ^f	2009				4	0	0.00	0.0	0	0	0
068834 ^f	2009				5	0	0.00	0.0	0	0	0
Totals: ^d						11	0.20	0	5	5	10
Total adults: ^e						8	0.15	0	4	4	8
068837	2009	10/1 - 9/10	230,461	TRH	2	400	0.17	10.3	141	249	389
068837	2009				3	4,984	2.16	119.8	2,589	2,276	4,865
068837	2009				4	1,963	0.85	57.0	566	1,340	1,906
068837	2009				5	15	0.01	0.4	5	9	14
Totals: ^d						7,361	3.19	188	3,301	3,873	7,174
Total adults: ^e						6,962	3.02	177	3,160	3,624	6,785

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 2010 through 2014.

Release data					Estimated returns						
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
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
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
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
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
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
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
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
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
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
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
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
060493	2012	06/01-15/13	105,581	TRH	2	10	0.01	0.2	4	6	10
060494	2012	06/01-15/13	102,559	TRH	2	18	0.02	0.4	7	11	18
060495	2012	06/01-15/13	67,315	TRH	2	0	0.00	--	--	--	0
060496	2012	06/01-15/13	103,825	TRH	2	0	0.00	--	--	--	0
060499 ^f	2012	5/29-8/29/13	13,752	River	2	0	0.00	--	--	--	0
060504	2012	10/01-14/13	221,247	TRH	2	108	0.05	2.1	43	63	106

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 2009. 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/ Experimental release group. Fish used in screw trap efficiency studies; released near North Fork Trinity River or Willow Creek.

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 1986-2009.

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%
Means:	324,338	1,176	0.34%	190,835	3,299	1.60%

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 – 2014.

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			
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		b/ 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	c/ 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	c/ 472
1993	3,381	32.2	7,104	67.8	10,485	2,473	5,898	8,371	736	815	1,551	172	391	c/ 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	c/ 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	c/ 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	c/ 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	c/ 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	c/ 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	d/ 545
2000	3,163	5.7	52,310	94.3	55,473	1,964	24,880	26,844	1,028	26,018	27,046	171	1,412	d/ 1,583
2001	1,214	2.1	55,895	97.9	57,109	914	36,152	37,066	204	17,971	18,175	96	1,772	d/ 1,868

a/ 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 – 2014.

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Jacks ^e		Adults		Total	Natural Area Spawners ^a			Trinity River Hatchery			Jacks	Adults	Total
	Number	Percent	Number	Percent		Jacks	Adults	Total	Jacks	Adults	Total			
2002 NATURAL	1,314	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	6,332	36.5	11,017	63.5	17,349	6,249	10,767	17,016	-19	10	-9	0	240	240
2014 TRH	606	3.0	19,875	97.0	20,481	354	12,338	12,692	240	6,965	7,205	12	572	584
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

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

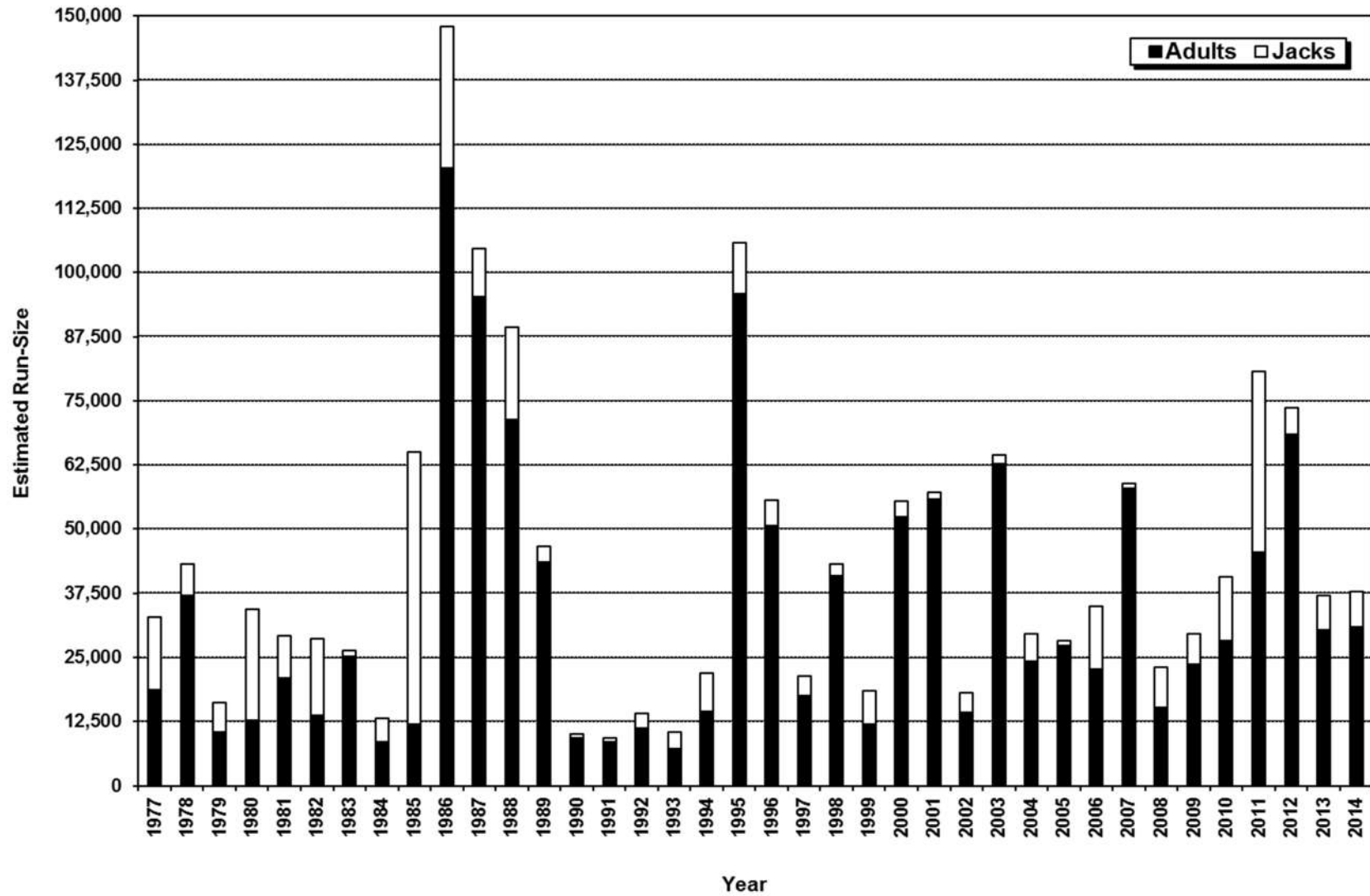
b/ The 1978 sport harvest of fall Chinook was restricted by a salmon fishing closure beginning August 25, 1978.

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

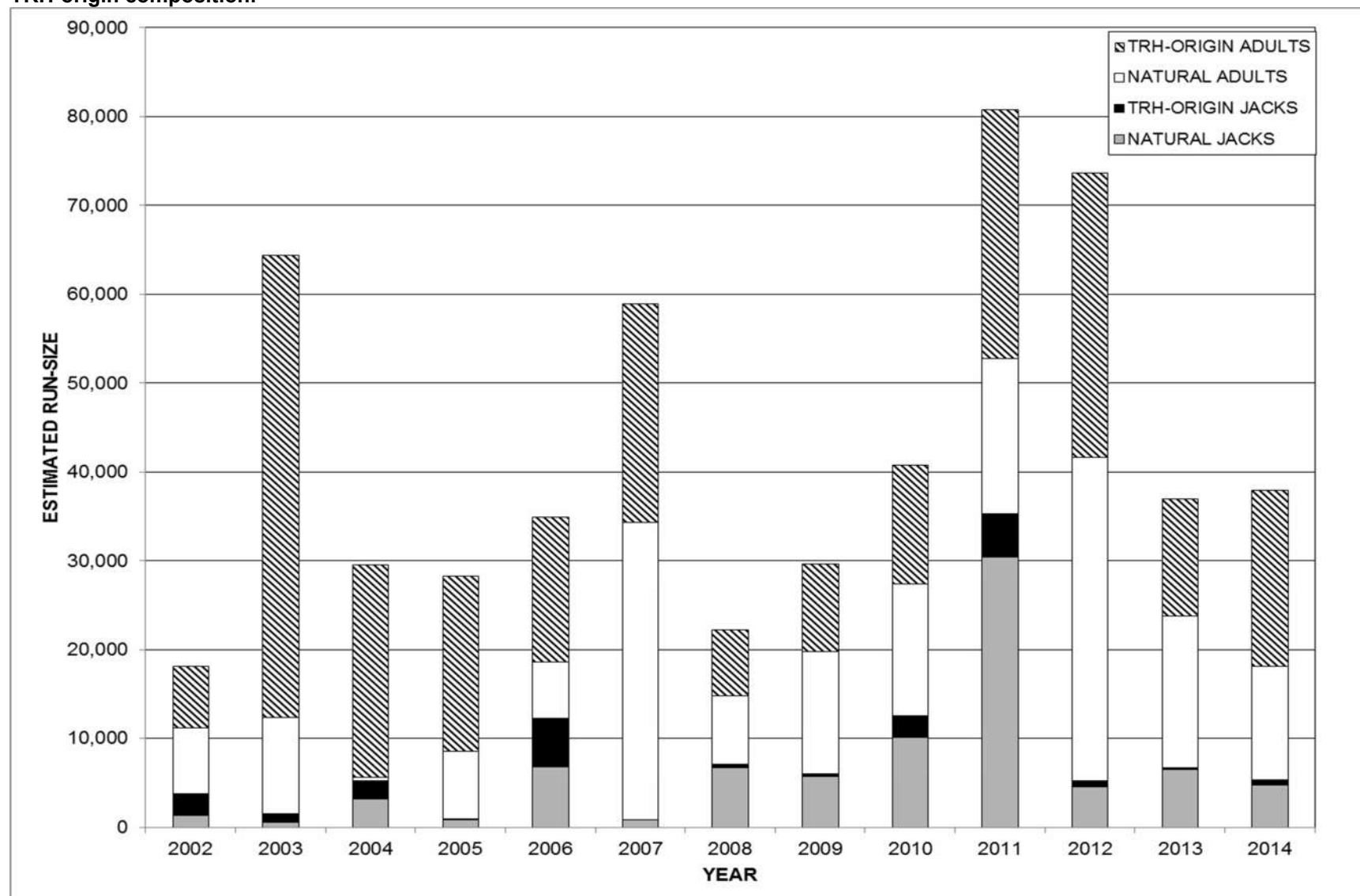
d/ The 1999-2013 sport harvest of Klamath Basin fall Chinook was managed with a quota system. The quota for adult fall Chinook was 957 in 1999; 693 in 2000; 9,834 in 2001; 6,926 in 2002; 10,800 in 2003; 4,700 in 2004; 1,262 in 2005, zero in 2006, 10,600 in 2007, 20,500 in 2008, 30,800 in 2009, 12,000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

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 – 2014.



Appendix 20. Fall Chinook estimated run-size for the Trinity River upstream of Willow Creek weir, 2002 – 2014, 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 2014-15 season.^a

FL (cm)	WCW			RECOVERIES							Total Recoveries	% 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			
31	1	1	1							0	0.0	
32										--	--	
33										--	--	
34										--	--	
35	1	1								0	0.0	
36										--	--	
37	4	3	3							0	0.0	
38	9	9	7			2	1			3	33.3	
39	8	6	7			1				1	16.7	
40	19	18	17			7				7	38.9	
41	15	14	15			3				3	21.4	
42	22	22	21			6			1	7	31.8	
43	25	24	25			6	3			9	37.5	
44	33	33	33			12	2		1	15	45.5	
45	32	32	32			9	1			10	31.3	
46	25	25	25			8			1	9	36.0	
47	13	13	13			8				8	61.5	
48	22	22	22			8	1			9	40.9	
49	12	12	12			3				3	25.0	
50	12	12	12			5	1	1		7	58.3	
51	10	10	10			3				3	30.0	
52	7	7	7							0	0.0	
53	7	6	7			2				2	33.3	
54	5	5	5			1				1	20.0	
55	10	10	9			2	1			3	30.0	
56	10	9	9			1	1			2	22.2	
57	13	13	13			2	1			3	23.1	
58	21	21	2			12				12	57.1	
59	26	25	24			12	1			13	52.0	
60	43	43	40			13	1			14	32.6	
61	48	47	44			11	5	1		17	36.2	
62	59	59	54			14	6			20	33.9	
63	60	59	55			20	4			24	40.7	
64	80	80	73			29	5	1		35	43.8	
65	75	75	70			21	1			22	29.3	
66	69	69	61			15	5	1		21	30.4	
67	94	92	84			24	10	1		35	38.0	
68	64	63	56	1		18	1	1		21	33.3	
69	51	51	46			17	2			19	37.3	
70	35	35	33			6	1			7	20.0	
71	17	17	16			4	4		1	9	52.9	
72	18	18	16			3	1			4	22.2	
73	13	13	10			1	3			4	30.8	
74	4	4	3							0	0.0	
75	1	1	1							0	0.0	
76	2	2	2			1	1			2	100.0	
Totals:	1,095	1,081	995	1	0	310	63	6	4	384	35.5	
Mean FL:	59.7	59.8	59.4	68.0	--	59.2	62.3	62.7	50.8	59.7		
Total jacks: ^j	270	264	262	0	0	83	9	1	3	94	35.6	
Total adults:	825	817	733	1	0	227	54	5	1	290	35.5	

a/ Trapping at Willow Creek weir took place September 4 - November 21, 2014 (Julian weeks 36-47).

b/ Fourteen (6 jack and 8 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 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.

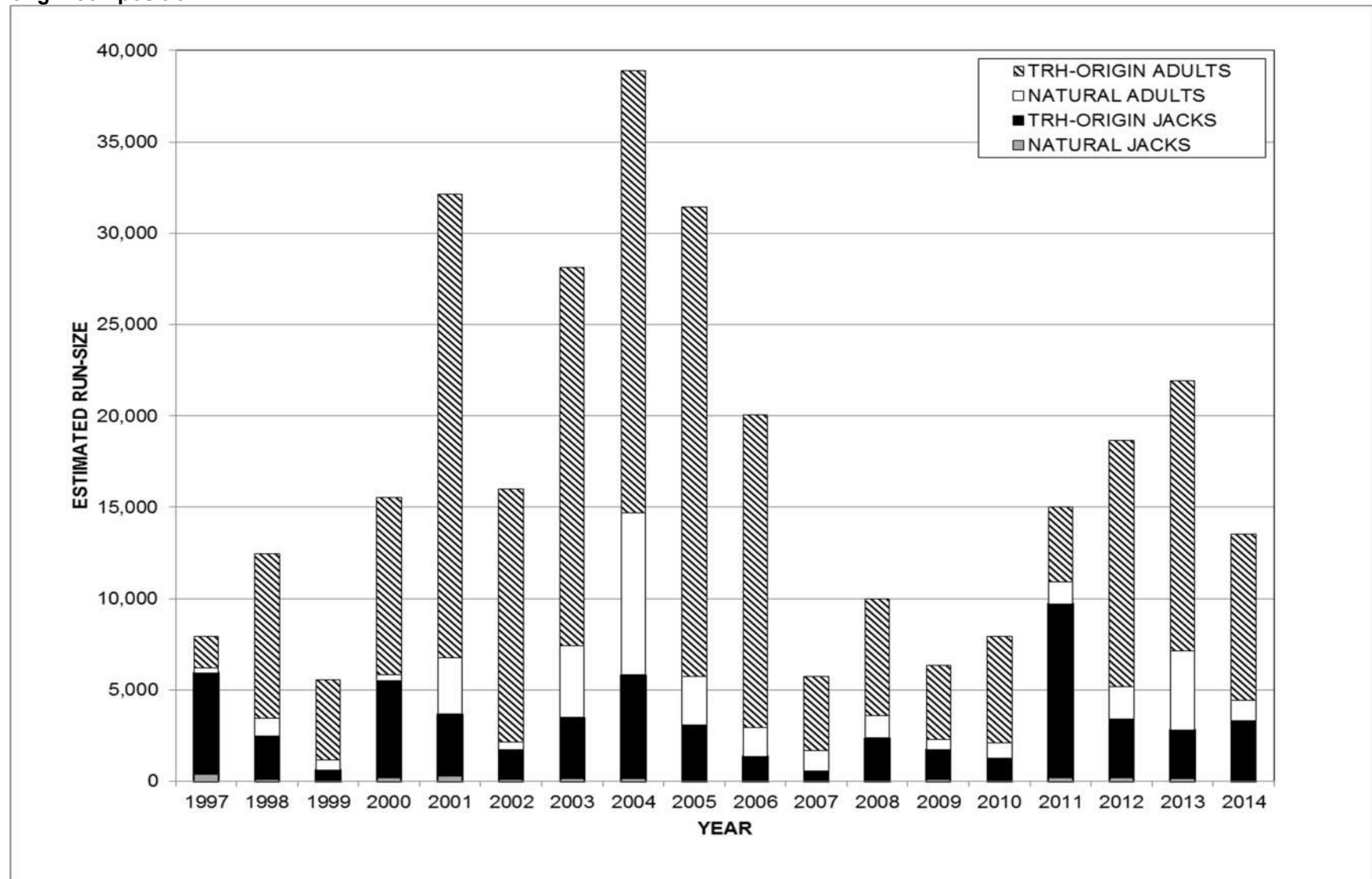
i/ Fish caught and released by anglers, their tag removed.

j/ Coho <53 cm FL were considered jacks in 2014.

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- 2014.

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

Appendix 23. Coho estimated run-size for the Trinity River upstream of Willow Creek weir, 2002 – 2014, 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 - 2014.

YEAR	Run-size estimate					Spawner escapements						Angler harvest		
	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

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

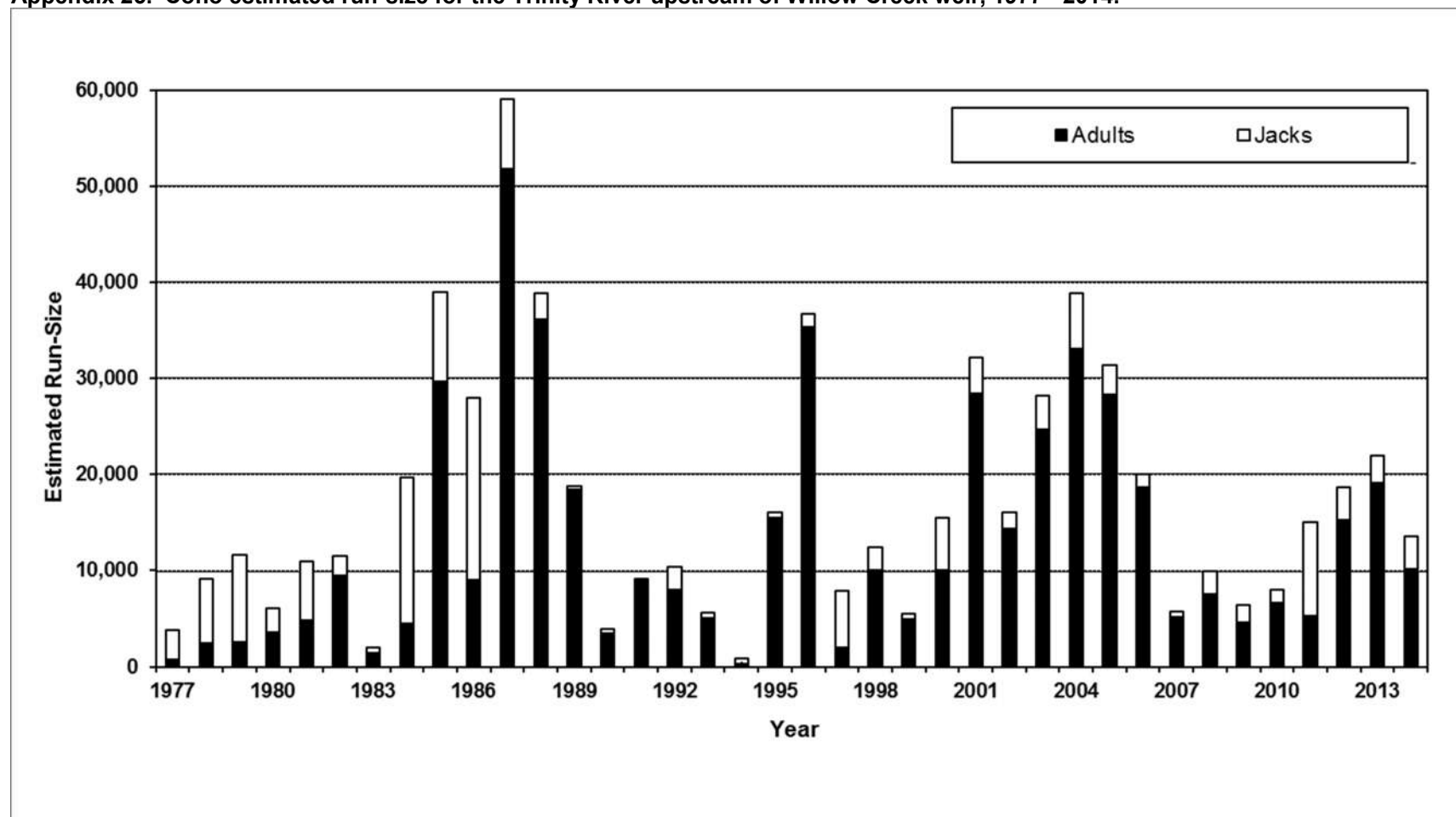
b/ The 1978 sport harvest of coho was essentially eliminated by a salmon fishing closure beginning August 25, 1978.

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.

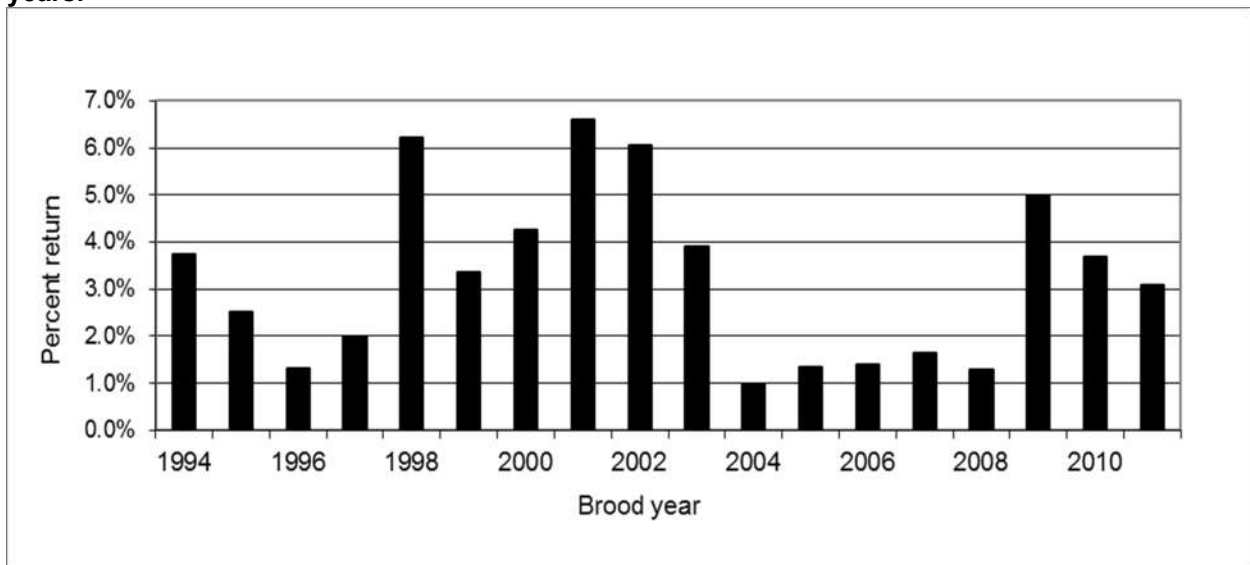
Appendix 25. Coho estimated run-size for the Trinity River upstream of Willow Creek weir, 1977 - 2014.



Appendix 26. Brood year performance and return data for Trinity River Hatchery coho salmon returning to Trinity River, upstream of Willow Creek weir, 1994 - 2011.

Release data				Return data						
Brood year	Date	Effective Number	Site	Age	Run-size	% of release	In-river harvest	Spawner TRH	Escapement 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

Appendix 27. Percent return for Trinity River Hatchery-produced coho salmon, 1994 – 2011 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 2014-15 season.^a

FL (cm)	WCW			RECOVERIES						Total Recoveries	% 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		
31	1									0	--
32	2		2							0	--
33	5		4							0	--
34	12		11							0	--
35	11		6							0	--
36	12		11							0	--
37	17		15							0	--
38	12		12							0	--
39	12		10							0	--
40	7		5							0	--
41	9		7							0	--
42	1	1	1						1	1	100.0
43	1	1	1							0	0.0
44	2	2								0	0.0
45										0	--
46	1									0	--
47	3	2								0	0.0
48	4	4	1						2	2	50.0
49	6	6							2	2	33.3
50	16	16	4	1	1	1			1	4	25.0
51	20	20	6		1	3			3	7	35.0
52	19	19	5			1			2	3	15.8
53	46	46	24			8		1	5	14	30.4
54	55	55	17		1	7			6	14	25.5
55	50	49	20		2	8		1	5	16	32.7
56	77	77	34		2	22			7	31	40.3
57	79	79	32		1	22			4	27	34.2
58	77	76	38			20			10	30	39.5
59	74	74	31			21			9	30	40.5
60	71	71	37			19			4	23	32.4
61	75	75	28		2	16			5	23	30.7
62	41	41	18		1	10			6	17	41.5
63	43	43	18		1	9			4	14	32.6
64	38	38	16			8			2	10	26.3
65	43	41	16			8			4	12	29.3
66	29	29	17			6			1	7	24.1
67	33	33	16			13			2	15	45.5
68	26	26	10			4			4	8	30.8
69	23	23	13		1	3	1		2	7	30.4
70	19	18	10			3			3	6	33.3
71	15	15	11			7				7	46.7
72	11	11	7			3				3	27.3
73	5	5	4		1	2				3	60.0
74	3	3	1			1				1	33.3
75	2	2	1							0	0.0
76	2	2								0	0.0
77	1	1	1			1				1	100.0
78										0	--
79										0	--
80	1	1	1			1				1	100.0
Totals:	1,112	1,005	522	1	14	227	1	2	94	339	33.7
Mean FL:	57.7	59.8	56.7	50.0	58.8	60.6	69.0	54.0	58.7	60.0	
Total 1/2lb's	100	0	83	0	0	0	0	0	0	0	
Total adults ^j :	1,012	1,005	439	1	14	227	1	2	94	339	33.7

a/ Trapping at Willow Creek weir took place September 4 - November 21, 2014 (Julian weeks 36-47).

b/ One hundred seven steelhead were trapped but not tagged at WCW in 2014; 100 half-pounders (too small) and 7 adult (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 anglers.

f/ Trapping occurred at Trinity River Hatchery September 2, 2014 - March 10, 2015 (JWs 36-11; 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/ 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 2014-15 season.^b

Julian Week of Entry ^c	Inclusive Dates		Number Entering TRH	Recoveries from	
				WCW	JCW
35	27-Aug	- 2-Sep	5		
36	3-Sep	- 9-Sep	6		
37	10-Sep	- 16-Sep	1		
38	17-Sep	- 23-Sep	23		
39	24-Sep	- 30-Sep	65	1	
40	1-Oct	- 7-Oct	18		
41	8-Oct	- 14-Oct	3		
42	15-Oct	- 21-Oct	7	1	
43	22-Oct	- 28-Oct	0		
44	29-Oct	- 4-Nov	54	3	
45	5-Nov	- 11-Nov	14		
46	12-Nov	- 18-Nov	302	26	1
47	19-Nov	- 25-Nov	178	13	
48	26-Nov	- 2-Dec	330	36	
49	3-Dec	- 9-Dec	290	34	
50	10-Dec	- 16-Dec	367	33	
51	17-Dec	- 23-Dec	166	8	
52	24-Dec	- 31-Dec	102	12	
1	1-Jan	- 7-Jan	66	10	
2	8-Jan	- 14-Jan	61	5	
3	15-Jan	- 21-Jan	126	11	
4	22-Jan	- 28-Jan	110	13	
5	29-Jan	- 4-Feb	91	12	
6	5-Feb	- 11-Feb	93	1	
7	12-Feb	- 18-Feb	46	6	
8	19-Feb	- 25-Feb	13		
9	26-Feb	- 4-Mar	13		
10	5-Mar	- 11-Mar	11	1	
Totals:			2,561	226	1

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

b/ The fish ladder was open Aug 29, 2014 - March 10, 2015 (Julian weeks 35 -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 - 2014.

Year	Run-size estimate					Spawner escapement						Angler harvest			
	Hatchery ^b		Wild ^c		Total	Natural Area Spawners ^a			Trinity River Hatchery			Hatchery	Wild	Total	
	Number	Percent	Number	Percent		Hatchery	Wild	Total	Hatchery	Wild	Total				
1977			No estimates				No estimates			269	16	285	No estimates		
1978			"				"			628	55	683	"		
1979			"				"			329	53	382	"		
1980	8,449	33.7	16,645	66.3	25,094	5,101	14,462	19,563	1,903	102	2,005	1,445	2,081	3,526	
1981			No estimates				No estimates			892	112	1,004	No estimates		
1982	2,106	20.0	8,426	80.0	10,532	971	6,889	7,860	634	79	713	501	1,458	1,959	
1983	No estimates for hatchery/wild component				8,605			6,661			599			1,345	
1984			"			7,833			6,430		142			1,261	
1985			No estimates				No estimates					461	No estimates		
1986			"				"					3,780	"		
1987			"				"					3,007	"		
1988	No estimates for hatchery/wild 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	"					441	"		
1999			"			5,470	"					1,571	"		
2000			"			8,042	"					768	"		
2001			"			12,638	"					2,333	"		
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	

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

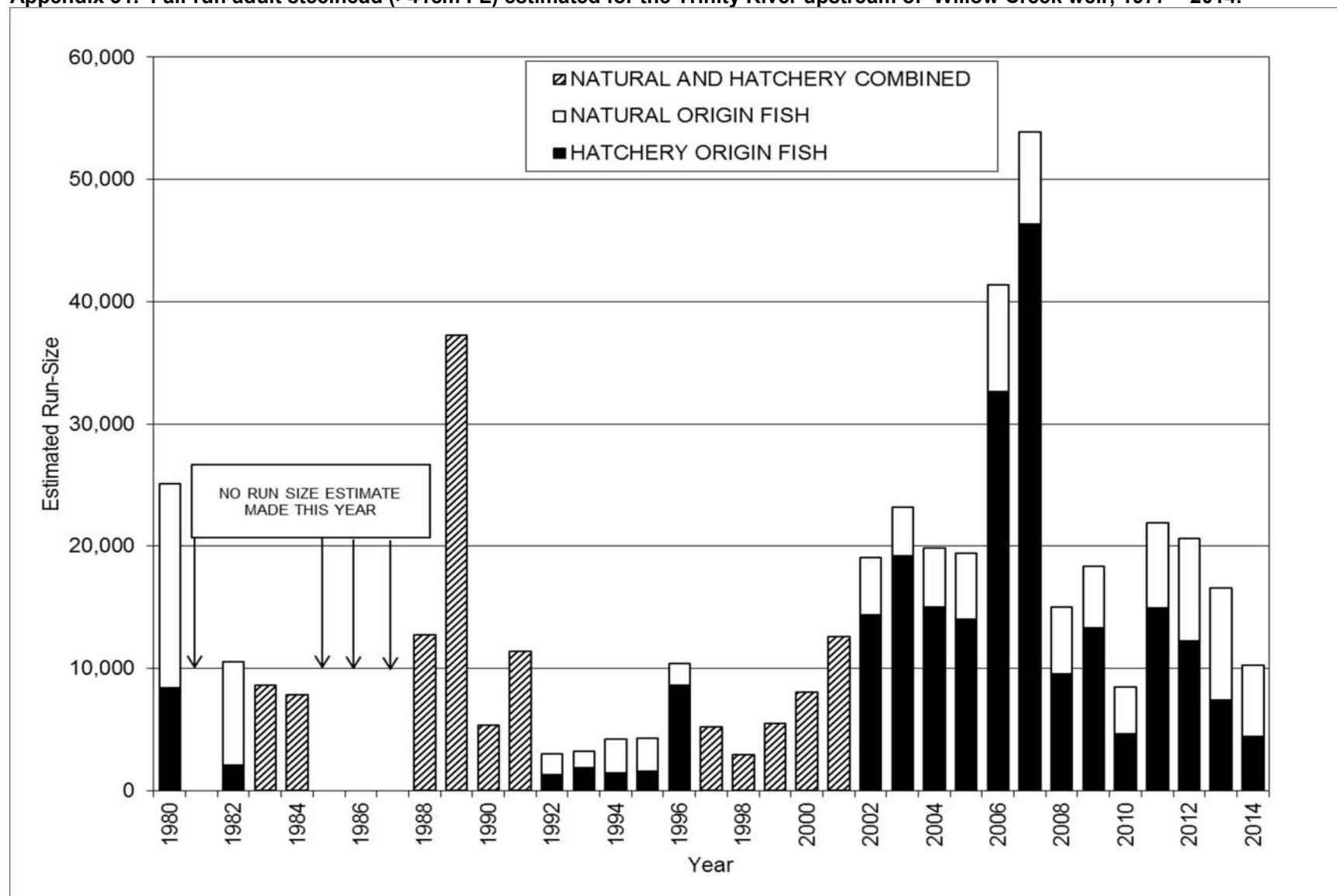
b/ Trinity River Hatchery-produced steelhead.

c/ Naturally produced steelhead.

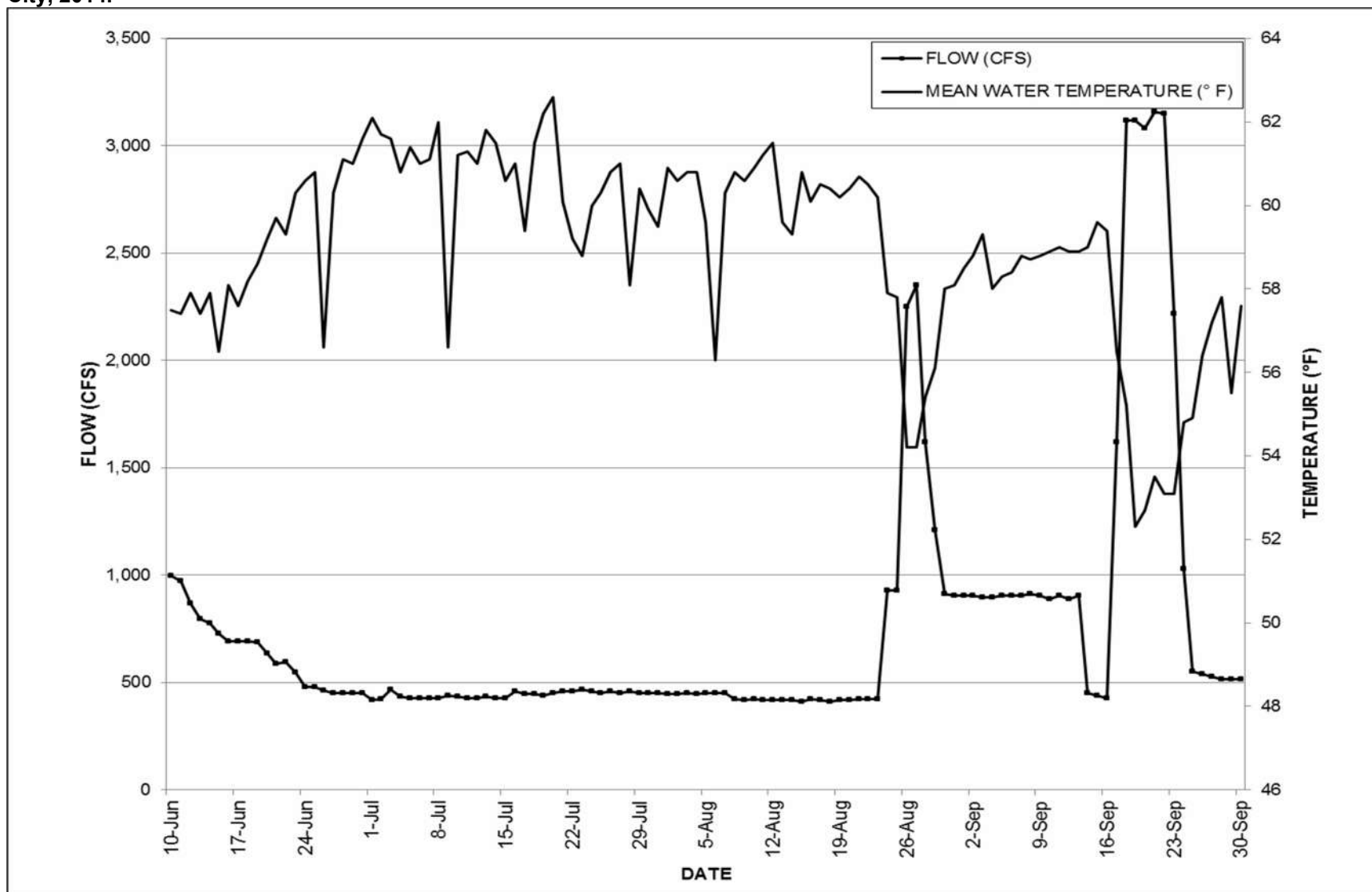
d/ The natural spawner escapement reflects an overestimate due to the unknown number of fish harvested by anglers upstream of Willow Creek Weir.

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

Appendix 31. Fall-run adult steelhead (>41cm FL) estimated for the Trinity River upstream of Willow Creek weir, 1977 – 2014.



Appendix 32. Daily mean flow (CFS) recorded at USGS gauge (11526250) and water (°C) temperature for Trinity River near Junction City, 2014.



Appendix 33. Daily mean flow (CFS) recorded at USGS gauge (11530000) and water (°C) temperature for Trinity River near Willow Creek weir, 2014 sampling season.

