

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  
2016-17 SEASON



On the cover: River dogs, Lewiston, January 2016.

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2016-17 SEASON

by

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## **FOREWORD**

This is the California Department of Fish and Wildlife (CDFW) Trinity River Basin Salmon and Steelhead Monitoring Project's twenty-eighth annual report to the United States Bureau of Reclamation (Reclamation). Reported activities were funded by CDFW/Reclamation Cooperative Agreement Number R13AC20027.

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

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

## **ACKNOWLEDGMENTS**

CDFW field staff whom we relied upon during the 2016 field season include: Michael Bradford, Nicholas Campise, Liv Carter, Chris Hubler, Christopher Johnson, Todd Newhouse, Lauren Romero, Jane Sartori, Garth Savage, Ron Smith, Steve Strite, and Ted Tillinghast. Additionally, Loren Aubrey and Dexter Cooper (Hoopa Valley Tribal Fisheries), assisted with weir operations this year. The Hoopa Valley Tribal Fisheries program was again instrumental in the installation of both weirs, and we appreciate that effort. Bob Sullivan, CDFW Lands, continues to be a source of analytical support, and we could not do any of it without Brenda Tuel and Mary Kuehner's administrative support.

We rely on the CDFW Trinity River Hatchery staff during salmonid recovery; landowners Doris Chase, Pierre LeFuel, Tom O'Gorman, and Steve Strite, 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 and funded by Reclamation through the Trinity River Restoration Program office in Weaverville, CA.

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## ABSTRACT

California Department of Fish and Wildlife's Trinity River Project conducted tagging and recapture operations from July 2016 through March 2017 to produce run-size, angler harvest, and spawner escapement estimates of spring- and fall-run Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*O. kisutch*), and fall-run steelhead (*O. mykiss*) in the Trinity River basin. Monitoring results informs the Trinity River Restoration Program's (TRRP) adaptive management decision making process and help evaluate progress toward achieving fundamental objectives outlined in the Integrated Assessment Plan (TRRP 2009). Additionally, run-size estimates are used in annual fishery management decisions, feeding into the Pacific Fishery Management Council's Klamath River basin fishery regulation and quota determination process.

Using a Petersen mark-recapture methodology, we estimated 3,904 (95% CI 3,013 – 5,158) spring-run Chinook Salmon migrated into Trinity River basin upstream of Junction City weir. The run was comprised of an estimated 1,337 natural-origin adults, 178 natural-origin jacks, 2,022 hatchery-produced adults and 367 hatchery-produced jacks. Using tags returned by anglers we estimate 216 spring Chinook were harvested, yielding an escapement of 3,688 fish. Escapement of 1,258 natural-origin adult spring Chinook is 21.0% of the TRRP goal of 6,000.

An estimated 6,196 (95% CI 5,007 – 7,823) fall-run Chinook Salmon migrated upstream of Willow Creek weir (WCW). The run was comprised of an estimated 2,987 natural-origin adults, 1,022 natural-origin jacks, 1,548 hatchery-origin adults and 639 hatchery-origin jacks. We estimated that 40 fall Chinook were harvested by anglers, yielding a total escapement of 6,156 fish. Escapement of 3,592 natural-origin adult fall Chinook is 5.8% of the 62,000 fish TRRP goal.

Coho Salmon run-size, estimated by linear regression of returns to the Trinity River Hatchery, was 1,325 (95% CI 1,183 – 1,484). Because no Coho were reported as harvested, estimated escapement was also 1,325.

Using a Peterson mark-recapture methodology we estimated 4,540 (95% CI 3,903 – 5,229) adult fall-run steelhead returned to the Trinity River basin upstream of WCW. Anglers harvested an estimated 96 adult fall-run steelhead upstream of the weir, leaving 4,444 (1,972 natural-origin and 2,568 hatchery-origin) fish as potential spawners. Escapement of 1,944 natural-origin adult steelhead is 4.9% of the 40,000 fish TRRP goal.

## PROJECT OBJECTIVES

- To determine run-size, age composition, hatchery/natural origin proportions, 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-run steelhead (TRRP, 2009)].
- To determine in-river sport angler harvest and spawner escapements of Trinity River Chinook Salmon, Coho Salmon, and steelhead [IAP assessments 16A, 17A, 18A, 19A – Monitor harvest (tribal, sport and commercial) of naturally produced spring Chinook, fall Chinook, coho and steelhead].

## INTRODUCTION

The California Department of Fish and Wildlife's (CDFW) Trinity River Project (TRP) annually monitors run-size and spawner escapement of spring Chinook Salmon (spring Chinook) in the Trinity River basin upstream of a weir near Junction City, California and the run-size and spawner escapement of fall Chinook Salmon (fall Chinook), Coho Salmon (Coho), and fall-run steelhead (steelhead) 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<sup>1</sup> to estimate run-size (the number of fish estimated to migrate from the ocean) into the Trinity River basin upstream of the weir sites. Spawner escapement is the number of fish that survive in-river tribal and recreational harvest to spawn in natural areas or enter Trinity River Hatchery (TRH). This is a continuation of studies that began in 1977.

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

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<sup>1</sup> Generally all estimates are made using Peterson type mark-recapture; in 2016 Coho Salmon were estimated using linear regression; see Methods.

proportion of hatchery-marked<sup>2</sup> or TRP-tagged<sup>3</sup> fish), distribution, and timing of salmonid runs in the Trinity River basin.

## **METHODS**

Our general study design employs a simple Peterson mark/recapture experiment in which fish are marked at a weir (either Willow Creek or Junction City weirs), then recaptured upon returning to Trinity River Hatchery. An angler tag return program is integrated into the study design to estimate angler sport harvest. These methods have been followed essentially unchanged for the 40 years this project has been implemented.

Methods noted below are specific to the 2016-17 season; standardized methods across years are found in CDFW (2014b), 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 July 20 through October 12, 2016 by TRP and HVTF personnel at two temporary weir sites located on the main stem Trinity River (Figure 1).

Junction City weir (JCW) was located at approximately 136.5 river kilometers (rkm) (~river mile [rm] 84.4) upstream from the Klamath River confluence near Weitchpec (40°41'0.24"N 123° 1'37.71"W.). The JCW was operated July 20 through September 30, 2016 and is primarily operated to capture, measure, and tag spring Chinook.

Willow Creek weir (WCW) was located 36.5 rkm (~rm 22.7) upstream from the Klamath River confluence near Weitchpec (40° 58' 29.85" N, 123° 38' 8.61" W) and was operated August 25 through October 12, 2016; WCW is primarily operated to capture, measure, and tag fall Chinook, Coho, and steelhead.

Trinity River Hatchery (TRH) is located at rkm 179.8 (~rm 111.7) just below Lewiston Dam, the current terminus of anadromy on the main stem Trinity River. Pre-release clipping of fish reared at TRH is performed by TRP and HVTF staff to identify fish as hatchery produced. All steelhead and 25% of all Chinook produced at TRH are adipose fin-clipped (ad-clipped) before release. Ad-clipped Chinook are also coded-wire tagged

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<sup>2</sup> Adipose fin-clipped and coded-wire-tagged (ad-clipped and CWT), hatchery-produced Chinook and right-maxillary (RM)-clipped Coho Salmon.

<sup>3</sup> Spaghetti tags applied by CDFW personnel to salmonids on their up-river migration (spawning run).



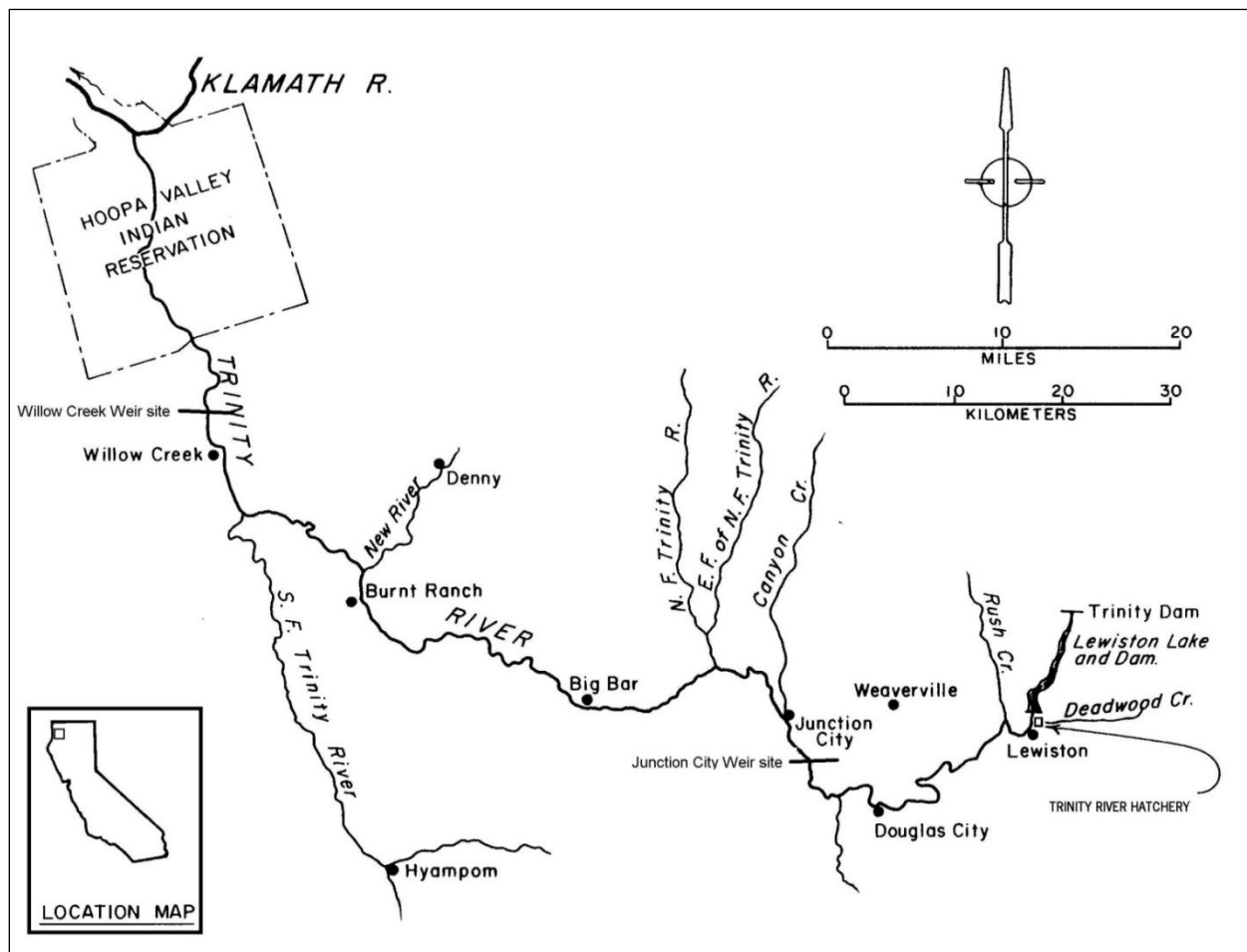
(CWT). Additionally, all Coho reared at TRH have their right maxillary (RM) clipped as a hatchery identifier.

### **Weir and Trap Design**

The 2016 weir configuration at JCW consisted of one trap box and a boat gate; WCW used its standard configuration of two trap boxes and a boat gate (Figure 2-4).

### **Tagging of Fish at Weirs**

All Chinook tagged at JCW received \$20 tags, and steelhead received \$10 tags. At WCW, tags with \$0 reward, \$10 rewards, and \$20 rewards were applied to adult steelhead at a 1:1:1 ratio, whereas fall Chinook were tagged 1:1 with \$0:\$50 tags. Coho at WCW were tagged with non-reward tags, no Coho were trapped at JCW. Juvenile (“half-pounder”) steelhead were not tagged at either weir, and natural-origin steelhead (those with intact adipose fins) were not tagged at JCW.



**Figure 1. Location of trapping/tagging weirs near Willow Creek, Junction City, and Trinity River Hatchery (TRH), Trinity River basin, 2016.**



**Figure 2. Photograph of Alaskan-style weir, tripods, support channels, and conduit (looking upstream). Picture taken at Willow Creek weir, 2016.**



**Figure 3. Photograph of Junction City weir (JCW) in configuration used in 2016. Note single trap box with boat gate just beyond.**





Figure 4. Picture of standard Willow Creek weir (WCW) configuration, with two trap boxes.

### **Recovery of Tagged Fish**

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

#### **Angler Tag Returns**

Tags returned to the TRP Arcata field office through April 30, 2017 were included in assessing harvest and catch and release rates for the 2016 runs. Tags returned after that date were processed for payment but not used for analysis. Public service announcements distributed to press throughout the Northern California region, posted online in social media and in store-front windows throughout the Trinity basin encouraged the timely (same-season) return of tags.

#### **Trinity River Hatchery Recovery**

Trinity River Hatchery commenced 2016-17 spawning operations on September 8, 2016. All fish entering TRH are inspected for TRP tags during spawning operations. All tags are removed and tag information recorded. Scales were collected from fall Chinook by HVTF personnel, and any fin or maxillary clips or other marks are recorded. All

snouts of ad-clipped Chinook were retained during the spawning process for later CWT reading.

Hatchery personnel physically closed the bottom of the fish ladder for two weeks starting on October 6, 2016. This is a routine practice at TRH to temporally segregate spring and fall races of Chinook. Spawning operations resumed on October 24, 2016.

Trinity River spring Chinook immigrate mainly between April and September, whereas fall Chinook immigrate August through December. Although CDFW acknowledges temporal overlap of runs, for analysis we designate a hard date for a spring/fall separation point, and we use a Julian Week (JW) format that allows inter-annual comparisons of identical weekly periods (Appendix 1). To arrive at that hard separation date we calculate the percent of spring vs. fall Chinook entering TRH (based on CWT recoveries and expansions) for each week that the fish ladder is open (the ladder is closed for a spawning break on JWs 41 and 42). We also track the arrival to TRH of Chinook tagged at JCW and WCW. The week in which the percentage of fall Chinook entering TRH exceeds the percentage of spring Chinook is designated as the first week of fall Chinook arrival, and we consider any Chinook without a spring CWT returning to TRH from that date forward as a fall Chinook.

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

### **Run-size Estimates**

Run-size estimates in 2016 for spring and fall Chinook and adult steelhead were calculated using Chapman's version<sup>4</sup> 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 fish<sup>5</sup>

$C$  = the number of fish examined at TRH

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

During the 2016-17 spawning season, we marked and recovered insufficient numbers of jack and adult spring Chinook or fall Chinook to obtain stratified jack and adult estimates with 95% confidence intervals for each strata, therefore the estimate we used in each case was for the total (un-stratified) run-size. We used fork length (FL) frequency distribution analysis (identified the nadir in the distribution as the cut-off point between

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<sup>4</sup> 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).

<sup>5</sup> 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.

age classes) to arrive at the size threshold to separate jacks from adults for both spring Chinook and Coho, then we applied the combined TRH/JCW proportion of jacks/adults to derive the proportion of jacks/adults in the spring Chinook run, and used the proportion from TRH only (FL frequency distribution) for the Coho split. We used HVTF's scale/aging analysis performed for the Klamath River Technical Team (KRTT, 2017) and applied the scale-based age proportions to the run-size estimate. The steelhead estimates above WCW are for adults only, defined as those larger than the half-pounder cutoff of 41cm FL.

Only three Coho were trapped and marked at WCW in 2016 before elevated stream flows resulting from storm events ended our sampling for the season, and none of these fish were recovered at TRH. Thus, we had insufficient data to estimate Coho escapement using our standard Peterson Single Census Method. The total number of Coho returning to the Trinity River upstream of WCW in 2016, including returns to TRH, was, therefore, estimated from returns to TRH using linear regression. Separate linear regressions were fit between the natural log of jack and adult returns to TRH (independent variable,  $Abund_{TRH,J}$ ,  $J$  in the subscript indicates jacks, and  $A$  will be used for adults) and the natural log of jack and adult returns upstream of WCW (dependent variable,  $Abund_{WCW,J}$ ) for the years 1977 to 2015. Log transformations were applied to meet the model assumptions of constant and normally distributed variance, and model residuals were examined to evaluate model assumptions. The fitted regressions were then used to estimate returns of jack and adult Coho upstream of WCW in 2016 from the observed number jack and adult Coho returning to TRH in 2016 by back transforming the prediction from log-log space and applying a bias correction factor as follows (equations for jacks are shown):

$$Abund_{WCW,J} = e^{\left(\beta_0 + \beta_1 \log(Abund_{TRH,J}) + \frac{s^2}{2}\right)},$$

where  $\beta_0$  and  $\beta_1$  are the fitted regression coefficients and  $\frac{s^2}{2}$  is the bias correction factor (Baskerville 1971). 95% confidence intervals were estimated as follows (Land 1971):

$$Abund_{WCW,J} \pm t_{(\alpha,n-1)} \sqrt{\frac{s^2}{n} + \frac{s^4}{2(n-1)}},$$

where  $t_{(\alpha,n-1)}$  is Student's  $t$ -distribution with  $\alpha = 0.05$  and  $n - 1$  degrees of freedom and  $s$  is the residual standard error. The total (jacks and adults combined) was estimated as the sum of jack and adult returns, and the confidence interval for the total was calculated as the sums of the lower and upper confidence intervals for jacks and adults. All analyses were conducted in the R statistical computing environment (R Core Team 2016). We also considered estimating total returns of Coho upstream of WCW using the same methods, then partitioning the total into jacks and adults based on the proportion of jacks observed in the hatchery. However, the proportion of jacks returning to TRH

and natural spawning grounds has not been consistent and using that method would not provide confidence intervals for both jacks and adults.

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

## **RESULTS**

### **Trapping, Tagging and Recovery**

#### **Spring/Fall Run Chinook Salmon Separation and Run Timing**

Sixty-six Chinook (both adipose fin-clipped [ad-clipped] and unclipped) tagged at JCW entered TRH between JW 36 and 46. Fifty-three of those (10 spring CWT and 43 others) entered TRH before JW 41, while the remaining 13 (three fall CWT and 10 others) entered TRH after the ladder was reopened in JW 43. Based on timing of passage through JCW, the timing of those fishes arrival at TRH, coupled with CWT analysis, we designated Chinook that passed through JCW from JW 29 through JW 37 (Figure 5) to be spring, and those that passed through JCW after JW 37 to be fall Chinook.

Two TRH-origin spring CWT fish tagged at WCW during JW 34 and 35 were subsequently recovered at TRH in JW 38, along with four other Chinook tagged at WCW in JW 36 and recovered at TRH before JW 41. All of those fish were designated as spring Chinook. All Chinook tagged at WCW after JW 36, including all fall CWT tagged at WCW, entered TRH after JW 42, we therefore determined all Chinook tagged after JW 36 at WCW to be fall Chinook.

We recovered 3,650 Chinook at TRH in 2016, of which 820 (22.46%) had ad-clips. We recovered CWTs from 471 known spring Chinook and 328 from known fall Chinook. Twenty-one Chinook with shed, lost, or unreadable CWTs were classified as either spring- or fall-run based on their date of entry into TRH (as determined above). Spring Chinook CWTs were represented by 19 CWT release groups from the 2011 through 2014 BYs (Appendix 2). Fall Chinook CWTs were composed of 19 release groups representing the 2011 through 2014 BYs.

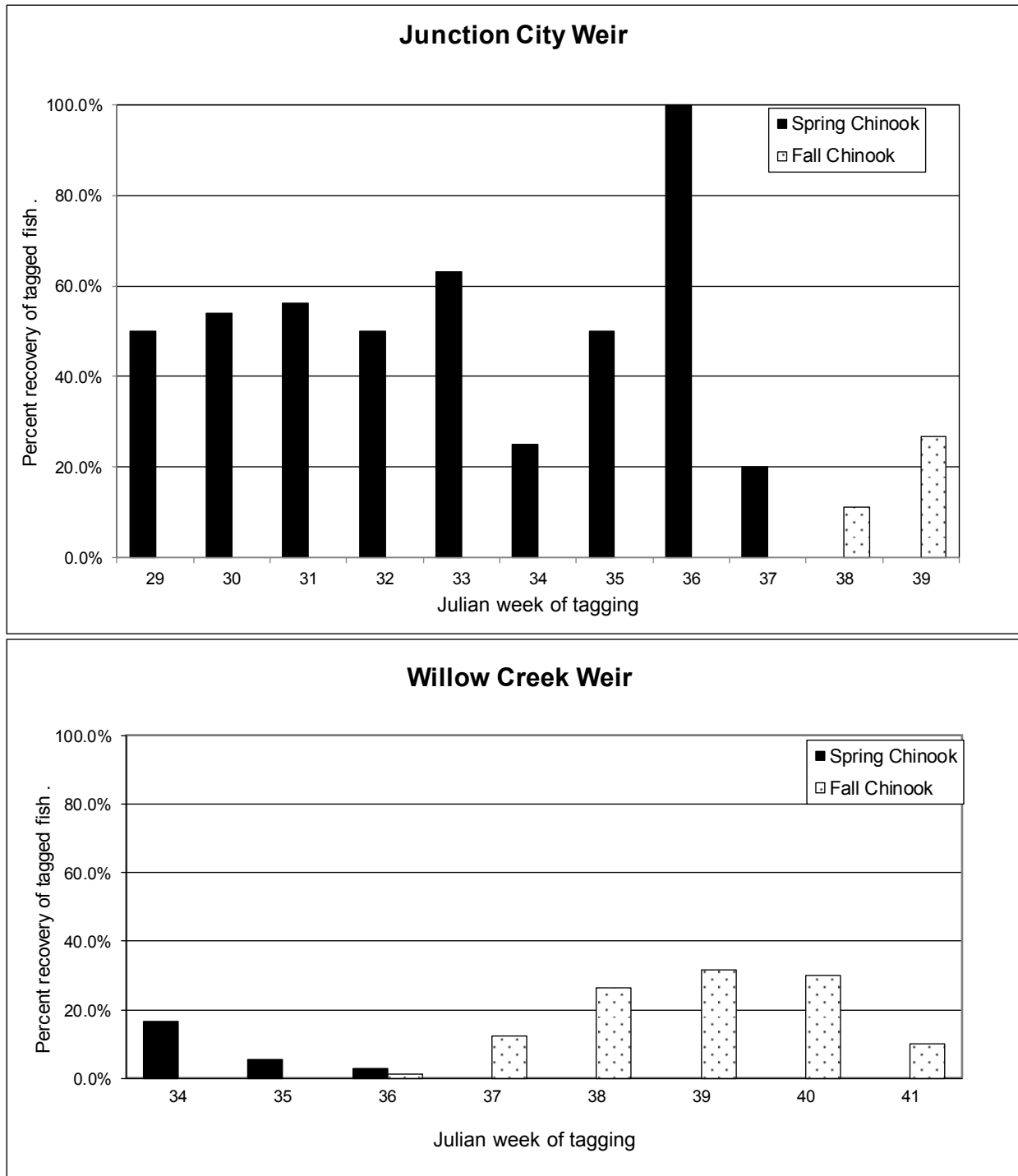


Figure 5. Percent recovery of Junction City weir and Willow Creek weir marked Chinook at Trinity River Hatchery during the 2016-17 season. Junction City weir trapped during Julian weeks 29 through 39; Willow Creek during Julian weeks 34 through 41.

## **Spring Chinook Trapping and Tagging**

The CDFW and HVTF installed JCW July 19 (JW 29) and trapped the first night. The number of spring Chinook trapped at JCW peaked at 7.8 fish per night during JW 33 (Table 1, Figure 6). The weir was operated through the fall augmentation flow release to 1,260 cfs (as recorded on the USGS gauge at Douglas City, upstream of JCW). The augmentation release was to address fish (adult Chinook) health concerns in the lower Klamath River. The weir was removed on September 30, as scheduled.

A total of 100 spring Chinook were trapped at JCW, all of which were tagged (Appendix 3), one fish had its tag removed by an angler in the catch-and-release fishery leaving 99 (31 jack and 68 adult) spring Chinook effectively tagged. There were no tagging mortalities observed. Ad-clipped fish comprised 15% of the spring Chinook captured (15 of 100) at JCW. Chinook trapped and tagged prior to JW 38 at JCW were determined to be spring Chinook.

### **Size and Age of Trapped Fish**

Spring Chinook trapped at JCW and TRH averaged 58.9 and 63.7 cm FL, respectively, with a combined average of 63.5 cm FL (Figure 7). Fork length distribution analysis shows the nadir separating jack from adult spring Chinook was between 52 and 53 cm FL. Data from known age, hatchery-marked spring Chinook that entered TRH mostly supported the minimum adult fork length of 53 cm. There was some overlap between sizes of age 2 and age 3 fish (Appendix 4), but the mean FL of those CWT brood years (BY) were distinctly different. Applying the minimum adult size of 53 cm FL to the observed population, an estimated 31.0% and 14.0% of the spring Chinook observed were jacks at JCW and TRH, respectively.

## **Spring Chinook Recovery**

### **Angler Tag Recovery**

Anglers reported a harvest of one TRP-tagged jack spring Chinook in 2016 and a harvest of four TRP-tagged adult spring Chinook representing an estimated harvest of 215 total fish (Appendix 3). Total harvest rate of TRP-tagged spring Chinook upstream of JCW was 3.23% for jacks, 5.88% for adults. There was one tag return from adults (none from jacks) in the catch and release fishery, and one tag found and returned by anglers or other river enthusiasts.

### **Spawner Survey Recovery**

Main stem Trinity spawner surveys were conducted by TRP personnel in cooperation with Yurok Tribal Fisheries, Hoopa Valley Tribal Fisheries (HVTF), US Forest Service and the US Fish and Wildlife Service from August 29 to December 13, 2016, from TRH to Weitchpec. There were no TRP-tagged spring Chinook recovered during the spawner surveys in 2016.

### **Tagging Mortalities**

There were no spring Chinook identified as tagging mortalities at JCW in 2016.



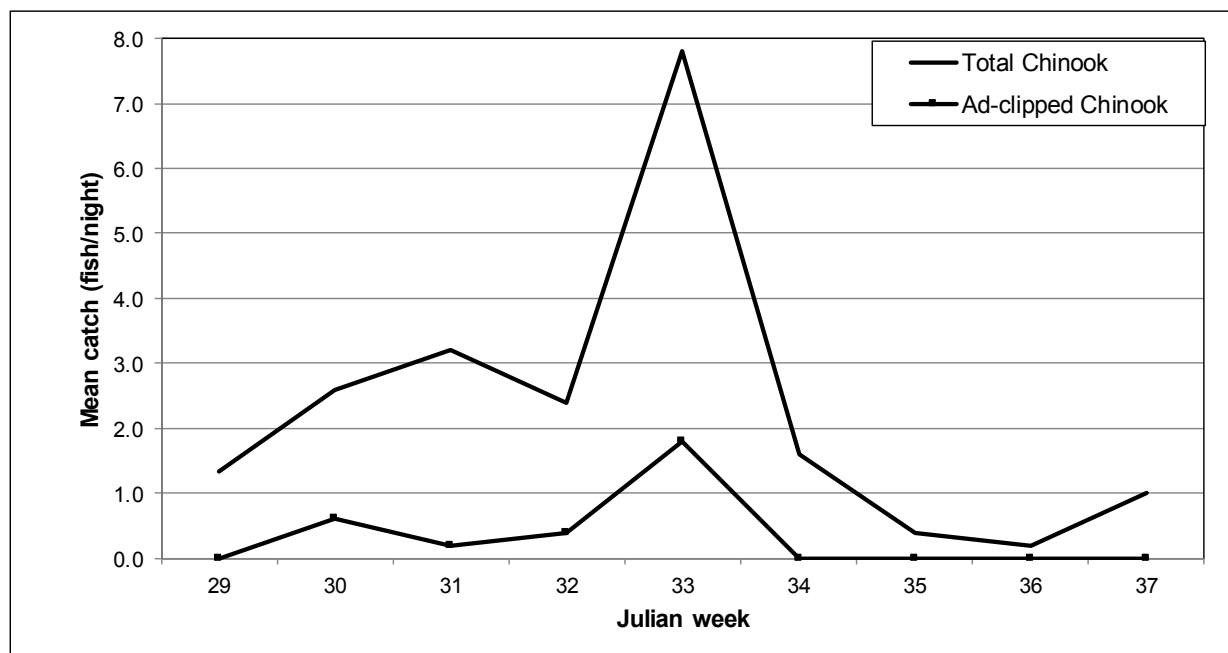
**Table 1. Weekly summary of spring Chinook trapped in the Trinity River at Junction City weir during 2016. <sup>a</sup>**

Julian week	Inclusive dates	Nights Trapped	Number trapped						Fish/night	
			Jacks <sup>b</sup>	Ad-clip Jacks <sup>c</sup>	Adults	Ad-clip Adults	Total	Ad-clip total		
<b>Spring Chinook</b>										
29	16-Jul - 22-Jul	3	0	0	4	0	4	0	1.3	
30	23-Jul - 29-Jul	5	2	1	11	2	13	3	2.6	
31	30-Jul - 5-Aug	5	7	0	9	1	16	1	3.2	
32	6-Aug - 12-Aug	5	4	1	8	1	12	2	2.4	
33	13-Aug - 19-Aug	5	17	3	22	6	39	9	7.8	
34	20-Aug - 26-Aug	5	0	0	8	0	8	0	1.6	
35	27-Aug - 2-Sep	5	1	0	1	0	2	0	0.4	
36	3-Sep - 9-Sep	5	0	0	1	0	1	0	0.2	
37	10-Sep - 16-Sep	5	0	0	5	0	5	0	1.0	
Total:		43	31	5	69	10	100	15		
Mean:									2.3	

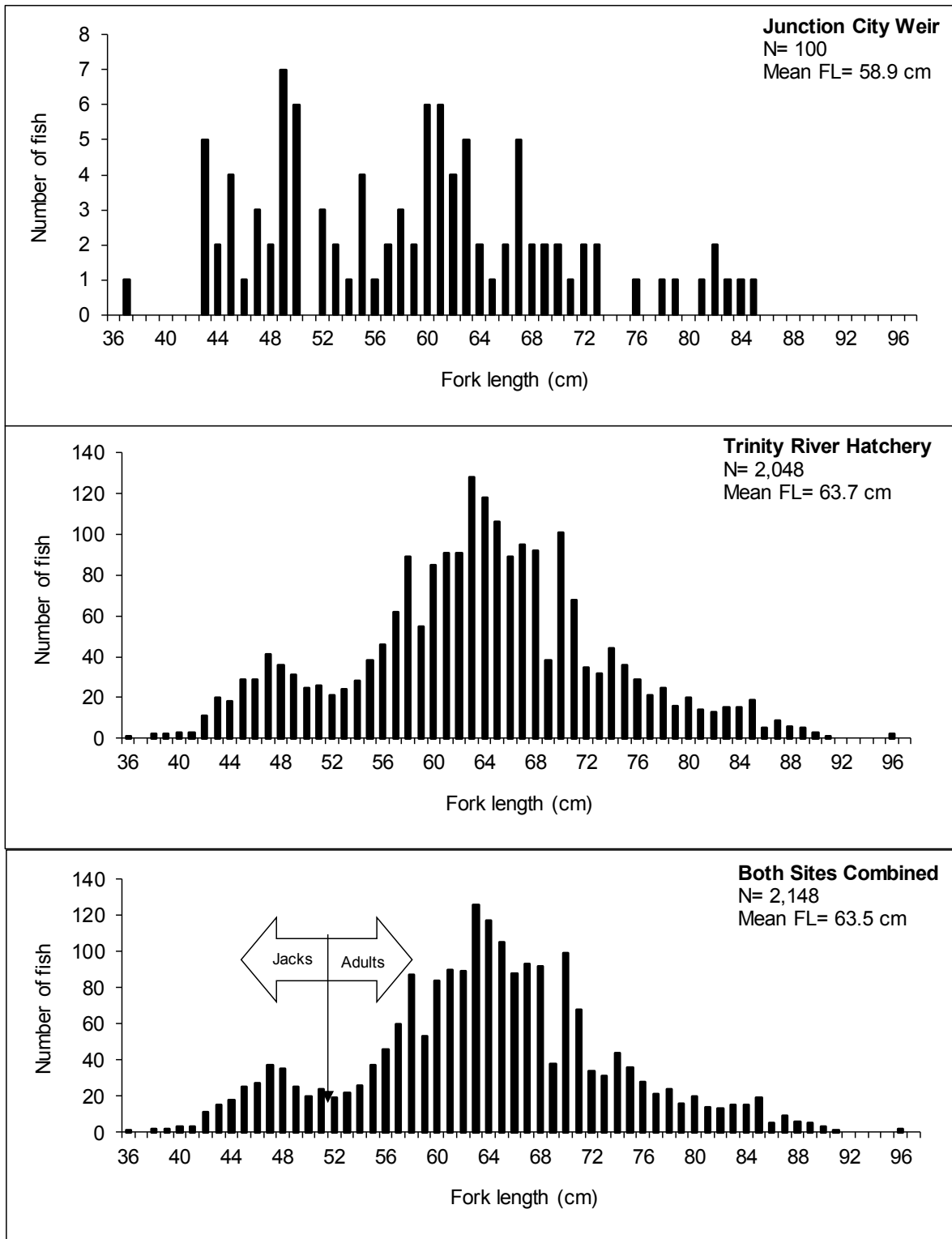
a/ Trapping at Junction City weir took place July 20 - September 30, 2016 (Julian weeks 29-39).

b/ Spring Chinook <52 cm FL were considered jacks in 2016.

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



**Figure 6. Mean catch of spring Chinook in the Trinity River at Junction City weir, 2016.**



**Figure 7. Spring Chinook fork lengths (cm) observed at Junction City weir, Trinity River Hatchery, and both sites combined during the 2016-17 season. Arrow denotes size used to separate jacks and adults for analysis.**

### Trinity River Hatchery Recovery

Spring Chinook began entering TRH on September 6, 2016 (JW 36) and continued to enter TRH through JW 40 (Appendix 5). Recovery of spring Chinook peaked in JW 38 with 599 fish, although the peak week of spring CWT Chinook recovery was JW 36 (Table 2). Of 99 spring Chinook tagged at JCW, 53 (53.5%) were recovered at TRH. Based on run-timing (by CWT analysis) an estimated 2,107 (277 jack and 1,830 adult) spring Chinook were recovered at TRH, from which 471 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, estimated angler harvest rate, and recovery of spring-run CWT fish at TRH, 473 (61 jack and 412 adult) CWT spring Chinook returned to the Trinity River above JCW during the 2016 season (Table 3). We estimate 3 jack and 28 adult CWT spring Chinook were harvested by anglers during the season. Escapement of CWT spring Chinook was divided between 473 fish recovered at TRH and 61 estimated available to spawn in natural areas. Based on CWTs, the known age composition of the 2016 hatchery-produced spring Chinook run was composed of 86 (15.30%) age 2, 286 (50.62%) age 3, 174 (30.78%) age 4, and 19 (3.30%) age 5 fish.

**Table 2. Recoveries at Trinity River Hatchery (TRH), by Julian week, of TRH-origin coded-wire tagged spring Chinook during the 2016-17 season.**

Coded-wire tag number and release type <sup>c</sup>	Brood year	Number of spring Chinook entering TRH, by Julian week <sup>ab</sup>											Totals
		36	37	38	39	40	41	42	43	44	45	46	
068838-f	2011	1	1										2
068839-f	2011	1	1										2
068846-y	2011	4	6	2									12
060490-f	2012	9	8	6									23
060491-f	2012	1	8	7	4								20
060492-f	2012	6	9	10	2								27
060497-y	2012	30	24	17	6								77
068843-f	2012	2											2
060605-f	2013	38	34	20	11	1						1	105
060606-f	2013	8	17	18	7	4							54
060607-f	2013	3	6	13	8	7			2				39
060612-y	2013	14	8	15	5	2							44
068848-f	2013			1		1							2
068849-f	2013			1									1
060689-f	2014	2	2	10	3	4							21
060690-f	2014	3	2	10	5	2							22
060691-f	2014		1	1	6	3							11
060696-y	2014		1	1	1	2							5
068772-f	2014		1		1								2
No CWT <sup>d</sup>			2	3	2	1							8
Weekly totals:		122	131	135	61	27	0	0	2	0	0	1	0
													479

a/ Trapping occurred at Trinity River Hatchery September 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

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

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

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

**Table 3. Run-size, angler harvest, and spawner escapement estimates for Trinity River Hatchery (TRH)-produced, coded-wire tagged, spring Chinook Salmon, expanded for lost or unreadable tags, returning to the Trinity River during the 2016-17 season.**

	TRH									
	Run-size estimate		Harvest rates		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)	545	3,359	3.23%	5.88%	98.3%	16.13%	14.49%	86	478	565

CWT code	BY	Age	TRH Total No.	% of total	Run-size	Angler harvest	Spawning escapement		
							TRH	Natural	Total
<b>Spring Chinook salmon</b>									
<b>Adults</b>									
068838	11	5	2.01	0.49%	2.34	0.14	2.01	0.19	2.20
068839	11	5	2.01	0.49%	2.34	0.14	2.01	0.19	2.20
068846	11	5	12.03	2.92%	13.98	0.82	12.03	1.13	13.16
060490	12	4	23.07	5.60%	26.81	1.58	23.07	2.17	25.24
060491	12	4	20.07	4.88%	23.33	1.37	20.07	1.88	21.95
060942	12	4	27.08	6.58%	31.47	1.85	27.08	2.54	29.62
060497	12	4	77.35	18.79%	89.90	5.29	77.35	7.26	84.61
068843	12	4	2.02	0.49%	2.35	0.14	2.02	0.19	2.21
060605	13	3	105.49	25.62%	122.60	7.21	105.49	9.90	115.39
060606	13	3	54.18	13.16%	62.97	3.70	54.18	5.09	59.27
060607	13	3	39.16	9.51%	45.51	2.68	39.16	3.68	42.84
060612	13	3	44.20	10.74%	51.37	3.02	44.20	4.15	48.35
068848	13	3	2.00	0.49%	2.32	0.14	2.00	0.19	2.19
068849	13	3	1.00	0.24%	1.16	0.07	1.00	0.09	1.09
Totals:			411.67	100.00%	478.44	28.13	411.67	38.64	450.31
<b>Jacks</b>									
060689	14	2	21.07	34.36%	29.69	0.96	21.07	7.66	28.73
060690	14	2	22.11	36.06%	31.16	1.01	22.11	8.04	30.15
060691	14	2	11.10	18.10%	15.64	0.51	11.10	4.04	15.14
060696	14	2	5.02	8.19%	7.07	0.23	5.02	1.83	6.85
068772	14	2	2.02	3.29%	2.85	0.09	2.02	0.73	2.75
Totals:			61.32	100.00%	86.41	2.79	61.32	22.30	83.62
Spring Totals:			472.99		564.86	30.92	472.99	60.95	533.94

### 2011 Brood Year

The 2016 spawning season was the last year for returns of the 2011 BY. Total contribution of the four (three fingerling and one yearling) 2011 CWT release groups that returned to the Trinity River ranged from 0.18% (a fingerling group) to 0.33% (a different fingerling group) (Appendix 6). Percent return of the 2011 BY fingerlings release type was 0.24%, and 0.30% for the yearlings, with a combined final total return rate for all 2011 BY spring Chinook release groups of approximately 0.26%, falling well short of the mean return rate of 0.69% since 1986 (Appendix 7 and Figure 8).

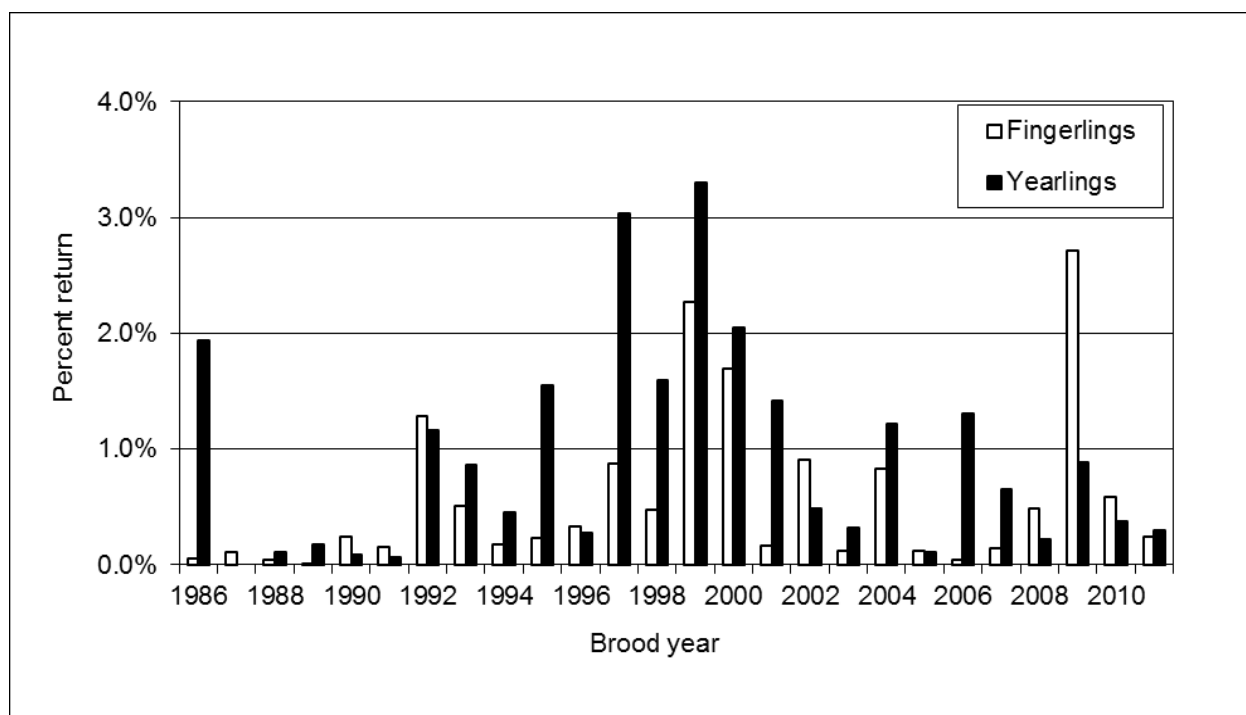


Figure 8. Percent return of Trinity River Hatchery produced, coded-wire tagged, spring Chinook Salmon above Junction City weir, brood years 1986-2011.

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 2016-17 season.<sup>a</sup>

CWT code b/	BY c/	Age	TRH	Run- size	Expanded run-size e/	Angler harvest	Expanded	Spawning escapement					
			angler harvest				TRH f/	Expanded TRH	River	Expanded River	Escapement Total	Expanded total	
Spring Chinook													
Adults													
068838	11	5	4.76	2.34	11.12	0.14	0.65	2.01	9.57	0.19	0.90	2.20	10.47
068839	11	5	4.42	2.34	10.33	0.14	0.61	2.01	8.88	0.19	0.83	2.20	9.72
068846	11	5	4.51	13.98	63.06	0.82	3.71	12.03	54.26	1.13	5.09	13.16	59.35
Total 5 year olds				18.65	84.50	1.10	4.97	16.05	72.71	1.51	6.82	17.56	79.53
060490	12	4	4.18	26.81	112.07	1.58	6.59	23.07	96.43	2.17	9.05	25.24	105.48
060491	12	4	4.17	23.33	97.27	1.37	5.72	20.07	83.69	1.88	7.86	21.95	91.55
090492	12	4	4.21	31.47	132.50	1.85	7.79	27.08	114.01	2.54	10.70	29.62	124.71
090497	12	4	4.31	89.90	387.45	5.29	22.78	77.35	333.38	7.26	31.29	84.61	364.67
068843	12	4	4.15	2.35	9.74	0.14	0.57	2.02	8.38	0.19	0.79	2.21	9.17
Total 4 year olds				173.85	739.04	10.22	43.46	149.59	635.89	14.04	59.69	163.63	695.58
060605	13	3	4.22	122.60	517.38	7.21	30.42	105.49	445.17	9.90	41.79	115.39	486.95
060606	13	3	4.15	62.97	261.32	3.70	15.37	54.18	224.85	5.09	21.11	59.27	245.95
060607	13	3	4.15	45.51	188.87	2.68	11.11	39.16	162.51	3.68	15.25	42.84	177.77
060612	13	3	4.22	51.37	216.78	3.02	12.75	44.20	186.52	4.15	17.51	48.35	204.03
068848	13	3	4.18	2.32	9.72	0.14	0.57	2.00	8.36	0.19	0.78	2.19	9.14
068849	13	3	4.18	1.16	4.86	0.07	0.29	1.00	4.18	0.09	0.39	1.09	4.58
Total 3 year olds				285.94	1,198.93	16.81	70.50	246.03	1,031.60	23.09	96.83	269.12	1,128.43
TOTAL ADULT				478.44	2,022.46	28.13	118.92	411.67	1,740.20	38.64	163.35	450.31	1,903.54
Jacks													
060689	14	2	4.27	29.69	126.9	0.96	4.10	21.07	90.07	7.66	32.76	28.73	122.83
060690	14	2	4.27	31.16	132.9	1.01	4.29	22.11	94.31	8.04	34.30	30.15	128.61
060691	14	2	4.14	15.64	64.7	0.51	2.09	11.10	45.91	4.04	16.70	15.14	62.61
060696	14	2	4.27	7.07	30.2	0.23	0.98	5.02	21.46	1.83	7.80	6.85	29.26
068772	14	2	4.23	2.85	12.0	0.09	0.39	2.02	8.54	0.73	3.11	2.75	11.64
TOTAL JACK				86.41	366.80	2.79	11.85	61.32	260.28	22.30	94.67	83.62	354.95
TOTAL SPRING CHINOOK				564.86	2,389.26	30.92	130.77	472.99	2,000.48	60.95	258.01	533.94	2,258.49

a/ Estimate is for upstream of Junction City weir.

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

c/ BY=brood year.

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

e/ Run-size times TRH expansion factor.

f/ TRH=Trinity River Hatchery.

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

Estimated contribution of TRH-origin spring Chinook to the total Trinity River run-size estimate upstream of JCW was 2,389 fish. This represents 67.3% (367/545) of jacks, 60.2% (2,022/3,359) of adults, and 61.2% (2,389/3,904) overall (Table 4).

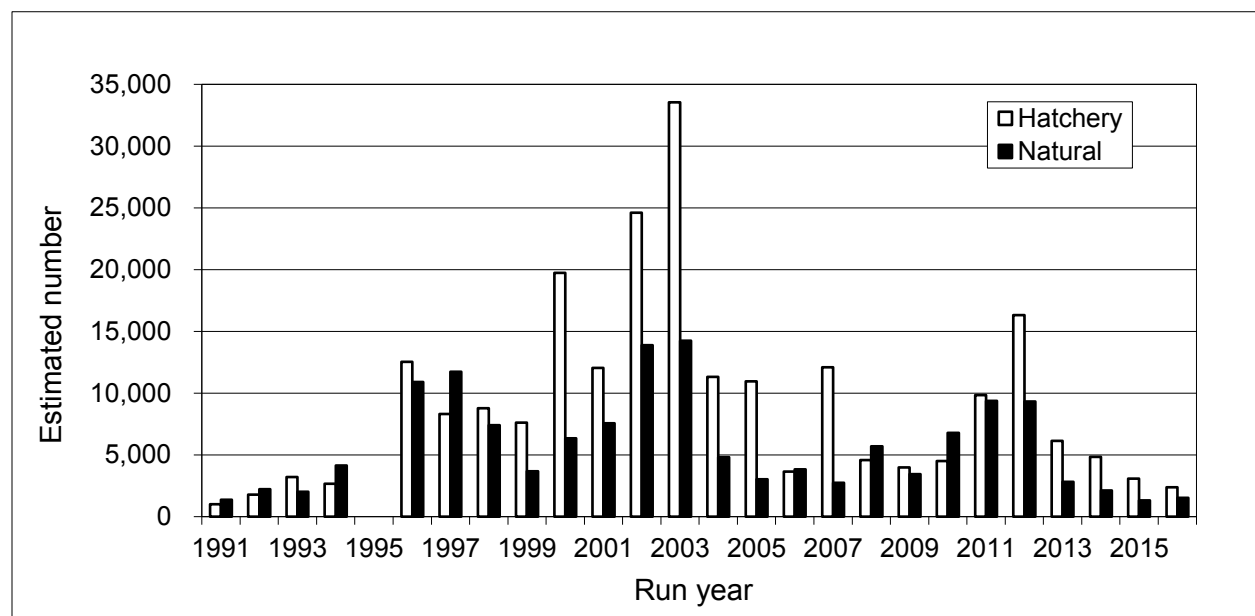
Of the 2,022 TRH-origin adult spring Chinook in the run-size estimate, 1,740 escaped to TRH, 164 escaped to natural spawning areas and 119 were estimated to have been harvested. The contribution of TRH-origin spring Chinook (at 61.2%) to the total run-size is just above the 25 year mean of 59.1% (Table 5 and Figure 9).

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

An estimated 3,904 (95% CI 3,013 – 5,158) spring Chinook, composed of 545 jacks and 3,359 adults, migrated into the Trinity River basin upstream of JCW in 2016 (Appendix 8). Based on expansions of the tags returned by anglers, we estimate angler harvest of 18 jacks and 198 adult spring Chinook during the 2016 season. Spawning escapement above JCW was an estimated 3,689 fish, including the 2,107 spring Chinook that entered TRH and 1,582 natural area spawners (Appendix 9). The escapement of 1,258 natural-origin adult spring Chinook was 21.0% of the TRRP goal of 6,000 (Appendix 10.). This year's run-size estimate is approximately 23.8% of the 37-year average of 16,404. Estimated spring Chinook run-size has ranged from 2,381 fish in 1991 to 62,692 fish in 1988 (Appendix 11 - 13).

**Table 5. Estimated contributions of Trinity River Hatchery (TRH)-produced spring Chinook to total estimated run-size above Junction City weir, 1991-2016 seasons.**

Year	Run-size	TRH component	Natural component	% TRH composition
1991	2,381	1,016	1,365	42.7%
1992	4,030	1,794	2,236	44.5%
1993	5,232	3,206	2,026	61.3%
1994	6,788	2,659	4,129	39.2%
1995	No estimate	No estimate	No estimate	No estimate
1996	23,416	12,524	10,892	53.5%
1997	20,039	8,303	11,736	41.4%
1998	16,167	8,774	7,393	54.3%
1999	11,293	7,616	3,677	67.4%
2000	26,083	19,730	6,353	75.6%
2001	19,622	12,051	7,571	61.4%
2002	38,485	24,599	13,886	63.9%
2003	47,795	33,546	14,249	70.2%
2004	16,147	11,324	4,823	70.1%
2005	13,984	10,966	3,018	78.4%
2006	7,483	3,649	3,834	48.8%
2007	14,835	12,099	2,736	81.6%
2008	10,283	4,577	5,706	44.5%
2009	7,426	3,973	3,453	53.5%
2010	11,285	4,505	6,780	39.9%
2011	19,219	9,846	9,373	51.2%
2012	25,617	16,306	9,311	63.7%
2013	8,961	6,146	2,815	68.6%
2014	6,959	4,828	2,131	69.4%
2015	4,408	3,085	1,323	70.0%
2016	3,904	2,389	1,515	61.2%
Means:	14,874	9,180	5,693	59.1%



**Figure 9. Hatchery and natural contributions to total spring Chinook run-size, upstream of Junction City weir, 1991 – 2016.**

## **Fall Chinook Trapping and Tagging**

Willow Creek weir was installed on August 19, 2016 and started trapping August 24th (JW 34). The number of fall Chinook captured at WCW peaked during JW 39, with 24.0 fish per night (Table 6, Figure 10). Trinity River Project personnel pulled conduit October 12th to ready the weir for a forecasted rain event. Continued high flows precluded any further trapping in 2016.

A total of 324 fall Chinook were trapped at WCW. Of those 324 fish, 10 were not tagged due to poor condition, and two had their tags removed by catch-and-release anglers, leaving 312 (88 jack and 224 adult) effectively tagged (Appendix 14). There were no observed tagging mortalities. Ad-clipped fish comprised 8.6% of the fall Chinook captured (28 of 324) at WCW. Through CWT analysis (and entry date of tagged WCW fish to TRH), only fish trapped after JW 36 were assumed to be fall Chinook at WCW. The 132 Chinook trapped in JWs 34 – 36 were not included in the fall run-size estimate because they were presumed to be spring run.

### **Size and Age of Trapped Fish**

Fall Chinook trapped at WCW and TRH averaged 64.4 and 64.6 cm FL, respectively, with a combined average of 64.5 cm FL (Figure 11). Preliminarily using fork length distribution analysis, the nadir separating jacks from adults was between 58 and 59 cm FL. That size break was used for harvested fish throughout our analysis. Data from known age, hatchery-marked fall Chinook that entered TRH supported the minimum adult fork length of 59 cm. As with spring Chinook, there was some overlap between sizes of age 2 and age 3 fish (Appendix 15), but, also like spring Chinook, the mean FL for the two age classes was distinctly different. We used scales collected at WCW and TRH and aged by HVTF to estimate proportions of jacks at 26.8% and 25.9% at WCW and TRH, respectively. The HVTF age proportions were used to divide jacks from adults in the final run-size estimates.



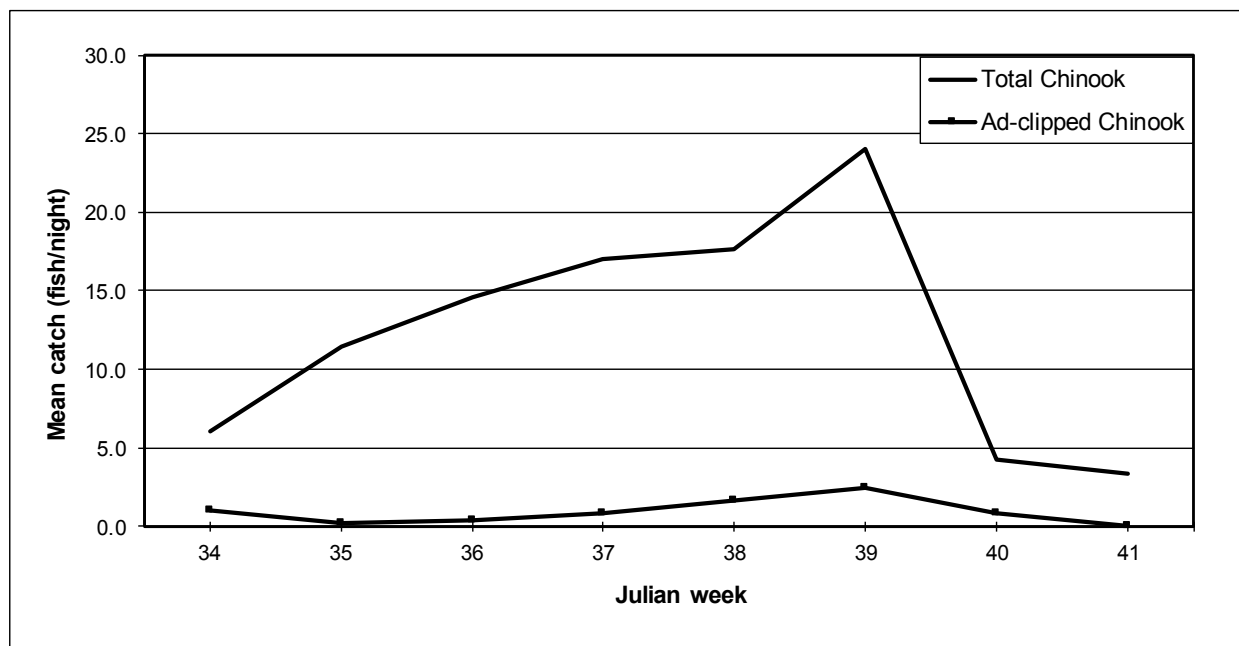
**Table 6. Weekly summary of Chinook trapped in the Trinity River at Willow Creek weir during 2016.<sup>a</sup>**

Julian week	Inclusive dates	Nights trapped	Number trapped					Ad-clip total	Fish/night
			Jacks <sup>b</sup>	Ad-clip <sup>c</sup> Jacks	Adults	Ad-clip Adults	Total		
34	20-Aug - 26-Aug	1	2	1	4	0	6	1	6.0
35	27-Aug - 2-Sep	5	5	1	52	0	57	1	11.4
36	3-Sep - 9-Sep	5	14	0	59	2	73	2	14.6
37	10-Sep - 16-Sep	5	20	1	65	3	85	4	17.0
38	17-Sep - 23-Sep	5	22	3	66	5	88	8	17.6
39	24-Sep - 30-Sep	5	42	2	78	10	120	12	24.0
40	1-Oct - 7-Oct	5	8	3	13	1	21	4	4.2
41	8-Oct - 14-Oct	3	2	0	8	0	10	0	3.3
Total:		34	115	11	345	21	460	32	
Mean:									13.5

a/ Trapping at Willow Creek weir took place August 25 - October 12, 2016 (Julian weeks 34-41). Season was short due to storm events.

b/ Fall Chinook <59 cm FL were considered jacks in 2016.

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, 2016.**

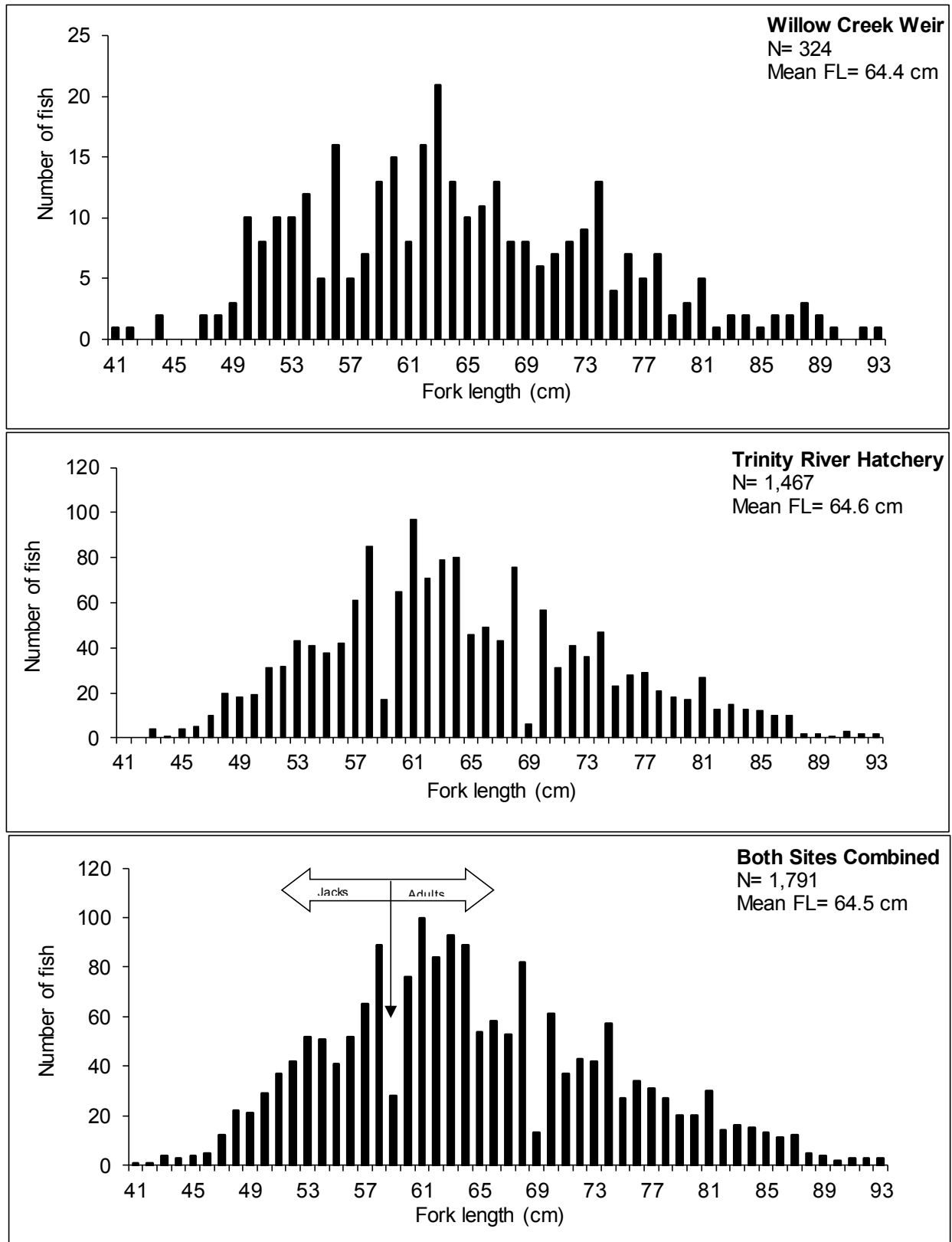


Figure 11. Fork length frequency distribution of fall Chinook at Willow Creek weir and Trinity River Hatchery, 2016.

## **Fall Chinook Recovery**

### **Angler Tag Recovery**

Zero TRP-tagged jack fall Chinook and only two TRP-tagged adult fall Chinook were reported harvested in 2016 (Appendix 14), representing an estimated harvest of 40 adults across the total fall run. The total harvest rate of TRP-tagged fall Chinook upstream of WCW was 0.0% for jacks, 0.89% for adults. There were two tag returns from fall Chinook in the catch and release fishery, and one tag found loose, no fish attached, returned by an angler or other river user.

### **Spawner Survey Recovery**

A single TRP-tagged fall Chinook was recovered during spawner surveys in 2016.

### **Tagging Mortalities**

There were no observed fall Chinook tagging mortalities at WCW in 2016.

### **Trinity River Hatchery Recovery**

A single CWT fall Chinook entered TRH during JW 39, while the rest arrived JW 43 through JW 49 (Table 7). Recovery of fall Chinook peaked in JW 43 when 327 fish entered (Appendix 5), which coincided with the arrival of the highest number of fall CWT Chinook to TRH as well. Of the 312 fall Chinook effectively tagged at WCW, 77 (24.7%) were recovered at TRH. Based on run-timing (from CWT analysis) an estimated 1,543 (454 jack and 1,089 adult) fall Chinook were recovered at TRH, from which 328 readable CWTs were recovered.

**Table 7. Recoveries at Trinity River Hatchery, by Julian week, of TRH-origin coded-wire tagged fall Chinook during the 2016-17 season.**

CWT number and release type <sup>c</sup>	Brood year	Number of fall Chinook entering TRH, by Julian week <sup>ab</sup>												Totals
		39	40	41	42 <sup>d</sup>	43	44	45	46	47	48	49	50	
068844-f	2011					1								1
068847-y	2011							1						1
060493-f	2012					1	1							2
060495-f	2012							1						1
060496-f	2012											1		1
060499-f	2012					1								1
060504-y	2012	1				36	13	10	9	18	3			90
060608-f	2013					7	3	1	2		1			14
060609-f	2013					5	1	3	1	2	1			13
060610-f	2013						1	1	1		1			4
060611-f	2013					1	1			2	2			6
060613-y	2013					43	16	8	16	14	6	3		106
060614-f	2013							1						1
068850-f	2013					1								1
060692-f	2014					13	4		4	2	1			24
060693-f	2014					8	8	4	7	5	2			34
060694-f	2014						1	4	2	5	3			15
060697-f	2014					2	2	2		1	3	1		11
068829-f	2014								1		1			2
No CWT <sup>f</sup>						4	1	2	1	1				9
Weekly totals:		1	0	0	0	123	52	38	44	50	24	5	0	337

a/ Trapping occurred at Trinity River Hatchery September 9, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

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

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

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

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

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

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

Based on estimated total fall Chinook run-size above WCW, the ad-clip rate at WCW, estimated angler harvest rate, and recovery of fall-run CWT fish at TRH, we estimate 519 (155 jack and 364 adult) CWT fall Chinook returned to the Trinity River above WCW during the 2016 season, and zero jack and three adult CWT fall fish were harvested by anglers (Figure 8). Escapement of CWT fall Chinook was divided between 330 fish recovered at TRH and 186 estimated available to spawn in natural areas. Age composition derived from known age CWT recoveries in 2016 indicate the fall Chinook run was composed of 155 (29.8%) age 2; 218 (42.1%) age 3; 143 (27.6%) age 4; and 3 (0.6%) age 5 fish.

### **2011 Brood Year**

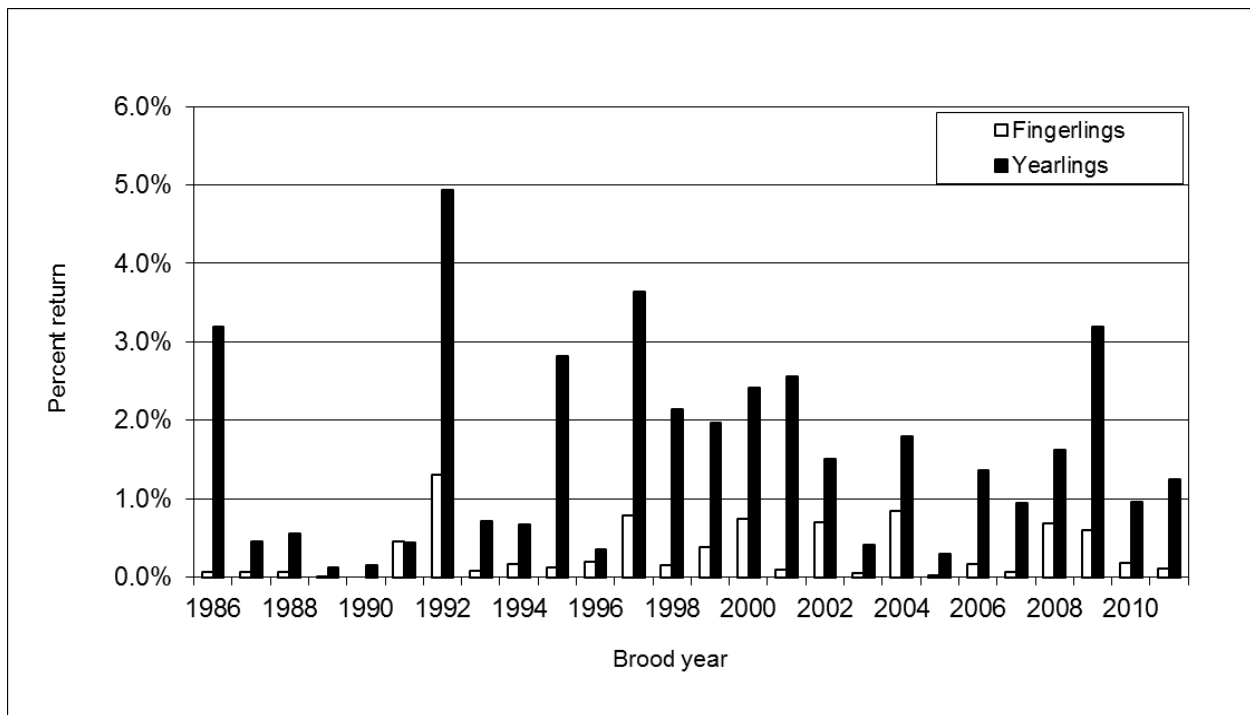
The 2016 spawning season was the last year for returns of the 2011 BY. Total contribution of the six (five fingerling and one yearling) 2011 BY tag code release groups that returned to the Trinity River ranged from 0.08% (a fingerling group) to 1.24% (the yearling group) (Appendix 16). Percent return of the 2011 BY fingerlings release type was 0.11%, and 1.24% for the yearlings (Figure 12), with a combined final total return rate for all 2011 BY fall Chinook release groups of approximately 0.49%, which is below the mean return rate of 0.80% since 1986 (Appendix 17).

**Table 8. Run-size, angler harvest and spawner escapement estimates for Trinity River Hatchery-produced coded-wire tagged fall Chinook returning to the Trinity River during the 2016-17 season.**

Run-size estimates	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
Fall Chinook (WCW)	1,661	4,535	0.00%	0.89%	97.3%	9.57%	8.26%	155	364	519

CWT code	BY	Age	TRH Total No.	% of total	run-size	Angler harvest	Spawning escapement		
							TRH	Natural	Total
<b>Fall Chinook salmon</b>									
<b>Adults</b>									
068844	11	5	1.00	0.41%	1.50	0.01	1.00	0.48	1.48
068847	11	5	1.03	0.42%	1.54	0.01	1.03	0.50	1.53
060493	12	4	2.02	0.83%	3.02	0.03	2.02	0.98	3.00
060495	12	4	1.03	0.42%	1.54	0.01	1.03	0.50	1.53
060496	12	4	1.00	0.41%	1.50	0.01	1.00	0.48	1.48
060499	12	4	1.00	0.41%	1.50	0.01	1.00	0.48	1.48
060504	12	4	90.55	37.19%	135.56	1.21	90.55	43.80	134.35
060608	13	3	14.09	5.79%	21.09	0.19	14.09	6.82	20.91
060609	13	3	13.10	5.38%	19.61	0.18	13.10	6.34	19.44
060610	13	3	4.05	1.66%	6.06	0.05	4.05	1.96	6.01
060611	13	3	6.02	2.47%	9.01	0.08	6.02	2.91	8.93
060613	13	3	106.54	43.76%	159.50	1.42	106.54	51.53	158.07
060614	13	3	1.03	0.42%	1.54	0.01	1.03	0.50	1.53
068850	13	3	1.00	0.41%	1.50	0.01	1.00	0.48	1.48
Totals:			243.46	100.0%	364.48	3.25	243.46	117.76	361.22
<b>Jacks</b>									
060692	14	2	24.08	27.82%	43.02	0.00	24.08	18.94	43.02
060693	14	2	34.27	39.59%	61.23	0.00	34.27	26.96	61.23
060694	14	2	15.13	17.48%	27.03	0.00	15.13	11.90	27.03
060697	14	2	11.09	12.81%	19.81	0.00	11.09	8.72	19.81
068829	14	2	2.00	2.31%	3.57	0.00	2.00	1.57	3.57
Totals:			86.57	100.0%	154.67	0.00	86.57	68.10	154.67
Fall Totals:			330.03		519.14	3.25	330.03	185.86	515.89



**Figure 12. Percent return of Trinity River Hatchery produced, coded-wire tagged, fall Chinook Salmon, brood years 1986-2011.**

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

Estimated contribution of hatchery-origin fall Chinook to the total Trinity River run-size estimate upstream of WCW was 2,188 fish. This represents 38.5% (640/1,661) of jacks, 34.1% (1,548/4,535) of adults, and 35.3% (2,188/6,196) overall (Table 9). Of the 2,188 TRH adult fall Chinook in the run-size estimate 1,392 escaped to TRH, 782 escaped to natural areas, and 14 were estimated as harvested. The contribution of TRH-origin fall Chinook (35.3%) to the total run-size is below the 25 year mean of 49.9% (Table 10 and Figure 13).

**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 2016-17 season.<sup>a</sup>**

CWT code b/			TRH		Run- size	Expanded run-size e/	Angler harvest	Expanded angler harvest	Spawning escapement				
			expansion factor d/	Expanded TRH f/					Expanded TRH	River	Expanded River	Escapement Total	Expanded total
Adults													
068844	11	5	4.30	1.50	6.45	0.01	0.06	1.00	4.30	0.49	2.09	1.49	6.40
068847	11	5	4.32	1.54	6.65	0.01	0.06	1.03	4.45	0.50	2.14	1.53	6.59
Total 5 year olds				3.04	13.11	0.03	0.12	2.03	8.75	0.98	4.24	3.01	12.99
060493	12	4	4.43	3.02	13.38	0.03	0.12	2.02	8.95	0.97	4.31	2.99	13.26
060495	12	4	4.49	1.54	6.91	0.01	0.06	1.03	4.62	0.50	2.23	1.53	6.85
060496	12	4	4.53	1.50	6.79	0.01	0.06	1.00	4.53	0.49	2.20	1.49	6.73
060499	12	4	4.94	1.50	7.42	0.01	0.07	1.00	4.94	0.49	2.41	1.49	7.35
060504	12	4	4.44	135.56	602.27	1.21	5.38	90.55	402.30	43.80	194.59	134.35	596.90
Total 4 year olds				143.12	636.77	1.28	5.69	95.60	425.34	46.24	205.74	141.84	631.08
060608	13	3	4.10	21.09	86.47	0.19	0.77	14.09	57.77	6.81	27.93	20.90	85.70
060609	13	3	4.12	19.61	80.79	0.18	0.72	13.10	53.97	6.33	26.10	19.43	80.07
060610	13	3	4.08	6.06	24.72	0.05	0.22	4.05	16.52	1.96	7.98	6.01	24.50
060611	13	3	4.08	9.01	36.76	0.08	0.33	6.02	24.56	2.91	11.87	8.93	36.43
060613	13	3	4.12	159.50	657.14	1.42	5.87	106.54	438.94	51.54	212.33	158.08	651.27
060614	13	3	4.11	1.54	6.33	0.01	0.06	1.03	4.23	0.50	2.04	1.53	6.27
068850	13	3	4.10	1.50	6.15	0.01	0.05	1.00	4.10	0.49	2.00	1.49	6.10
Total 3 year olds				218.31	898.37	1.95	8.02	145.83	600.10	70.53	290.24	216.36	890.35
TOTAL ADULT				364.47	1,548.24	3.25	13.82	243.46	1,034.20	117.76	500.22	361.22	1,534.42
Jacks													
060692	14	2	4.09	43.02	176.0	0.00	0.00	24.08	98.49	18.94	77.46	43.02	175.95
060693	14	2	4.08	61.23	249.8	0.00	0.00	34.27	139.82	26.96	110.00	61.23	249.82
060694	14	2	4.28	27.03	115.7	0.00	0.00	15.13	64.76	11.90	50.93	27.03	115.69
060697	14	2	4.18	19.81	82.8	0.00	0.00	11.09	46.36	8.72	36.45	19.81	82.81
068829	14	2	4.21	3.57	15.0	0.00	0.00	2.00	8.42	1.57	6.61	3.57	15.03
TOTAL JACK				154.66	639.29	0.00	0.00	86.57	357.84	68.09	281.45	154.66	639.29
TOTAL FALL CHINOOK				519.13	2,187.54	3.25	13.82	330.03	1,392.04	185.85	781.67	515.88	2,173.71

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.

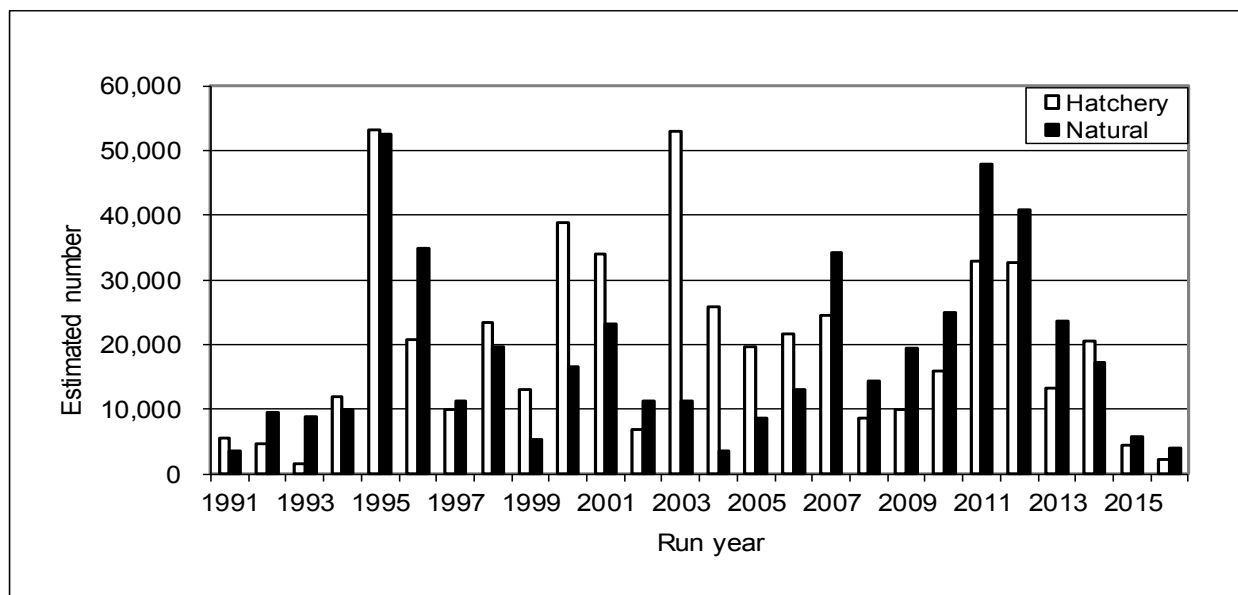
f/ TRH=Trinity River Hatchery.

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

An estimated 6,196 (95% CI 5,007 – 7,823) fall Chinook, composed of 1,661 jacks and 4,535 adults, migrated into the Trinity River basin upstream of WCW in 2016 (Appendix 8). Trinity River fall Chinook spawner escapement was estimated at 6,156 (1,661 jack and 4,495 adult) fish, including 1,543 fall Chinook that entered TRH and 4,613 natural area spawners (Appendix 9). Harvest rates generated from tags applied at WCW were used to estimate 0 jack and 40 adult fall Chinook harvested by anglers. The estimated total fall Chinook run-size, upstream of WCW, has ranged from this year's all-time low of 6,196 fish to 147,888 fish in 1986 (Appendix 18, Appendix 19 and Appendix 20). This year's fall Chinook estimated run-size is approximately 14.8% of the 41,839 mean run-size since 1977. The 2,961 natural-origin adult fall Chinook component of the spawning escapement was 4.8% of the 62,000 TRRP goal (Appendix 10).

**Table 10. Estimated contributions of Trinity River Hatchery (TRH)-produced fall Chinook to total estimated run-size above Willow Creek weir, 1991-2016.**

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	20,463	17,366	54.1%
2015	10,365	4,531	5,834	43.7%
2016	6,196	2,188	4,008	35.3%
Means:	37,927	19,604	18,323	49.9%



**Figure 13. Hatchery and natural contributions to total fall Chinook run-size, upstream of Willow Creek weir, 1991 - 2016.**



## **Coho Salmon Trapping and Tagging**

A total of three Coho (two jacks and one adult) were trapped and tagged at WCW during the 2016 season. Coho were trapped in JWs 37 and 41 only (Table 11, Figure 14); all three fish were right-maxillary clipped [RM (TRH-origin)].

### **Size and Age of Trapped Fish**

Coho trapped at WCW and TRH averaged 48.7 and 63.0 cm FL, respectively, with a combined average of 62.9 cm FL (Figure 15). Using FL distribution analysis of Coho trapped at TRH, the nadir separating jack from adult Coho was between 51 and 52 cm FL. Based on the nadir, jacks comprised 8.5% at TRH.

## **Coho Salmon Recovery**

### **Angler Tag Recovery**

There was no reported harvest of TRP-tagged Coho in 2016 (Appendix 21), and no tags were returned from the catch and release fishery.

### **Spawner Survey Recovery**

During the spawner surveys, one adult TRP-tagged Coho was recovered.

### **Tagging Mortalities**

We observed zero Coho mortalities at WCW in 2016.

### **Trinity River Hatchery Recovery**

The first Coho entered TRH during JW 43 and they continued returning through JW 51 (Appendix 5). The run peaked in JW 48 when 185 Coho entered TRH. A total of 527 Coho (45 jack and 482 adults) were recovered at TRH during the season. Of the three Coho effectively tagged at WCW, none were recaptured at TRH.

Of the 527 Coho that entered TRH in 2016, we observed 453 (86.0%) with right-maxillary (RM) clips, indicating TRH-origin; 74 (14.0%) had no clip. Unclipped fish are assumed to be natural-origin Coho.

Based on length frequency analysis, TRH-origin RM-clipped Coho were assigned into two brood years (Table 12). The 45 Coho measuring less than 52 cm FL were considered jacks (age 2, from the 2014 BY), and the 408 greater than 51 cm FL were considered adults (age 3, from the 2013 BY). The 74 Coho without RM clips that entered the hatchery were also considered jacks or adults based on those lengths.

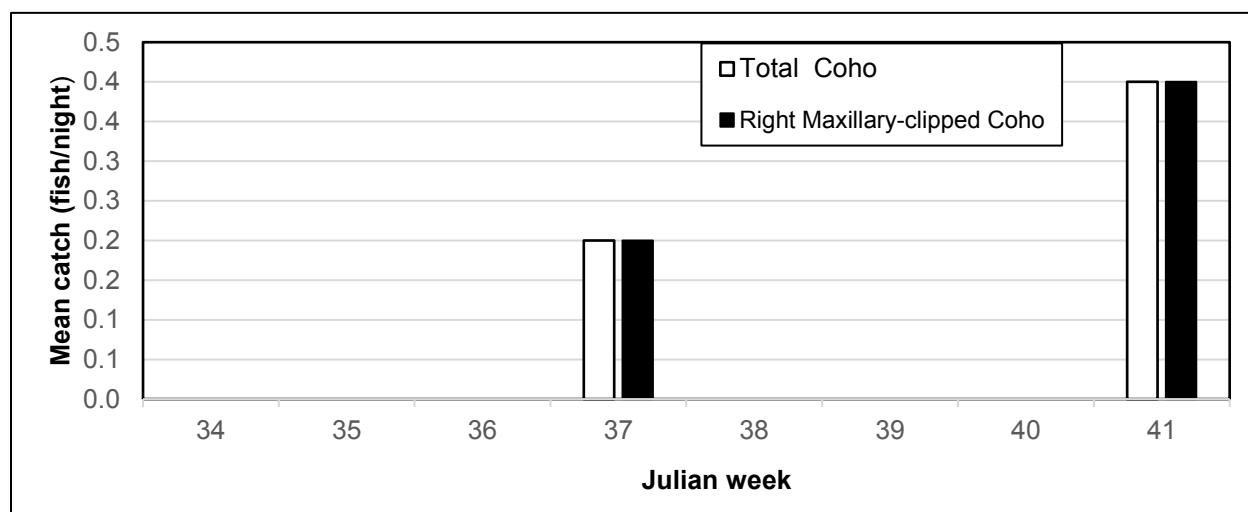
**Table 11. Weekly summary of Coho trapped in the Trinity River at Willow Creek weir during 2016.<sup>a</sup>**

Julian week	Inclusive dates	Nights trapped	Number trapped						Fish / night
			Jacks <sup>b</sup>	RM clip <sup>c</sup> Jacks	Adults	RM clip Adults	Total trapped	Total RM clips	
34	20-Aug - 26-Aug	1	0	0	0	0	0	0	0.0
35	27-Aug - 2-Sep	5	0	0	0	0	0	0	0.0
36	3-Sep - 9-Sep	5	0	0	0	0	0	0	0.0
37	10-Sep - 16-Sep	5	1	1	0	0	1	1	0.2
38	17-Sep - 23-Sep	5	0	0	0	0	0	0	0.0
39	24-Sep - 30-Sep	5	0	0	0	0	0	0	0.0
40	1-Oct - 7-Oct	5	0	0	0	0	0	0	0.0
41	8-Oct - 14-Oct	5	1	1	1	1	2	2	0.4
Total:		35	2	2	1	1	3	3	
Mean:									0.1

a/ Trapping at Willow Creek weir took place August 25 -October 12, 2016 (Julian weeks 34-41).

b/ Coho <52cm FL were considered jacks in 2016.

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, 2016.**

**Table 12. Release and recovery data for right maxillary-clipped Coho Salmon recovered at Trinity River Hatchery (TRH) during the 2016-17 season.**

Release data						TRH Recovery data				Number recovered	
Egg source	Brood year	Date	Number	Site		Males		Females		Total No.	Tagging site
						No.	FL <sup>a</sup>	No.	FL <sup>a</sup>		
RM <sup>b</sup>	TRH	2013	03/15-23/15	287,720	TRH	186	65.2	222	64.3	408	--
RM <sup>b</sup>	TRH	2014	3/15-21/16	230,834	TRH	44	43.0	1	47.0	45	--
Total coho:						230		223		453	0

a/ FL = Mean fork length in cm.

b/ Since 1996, all coho produced at TRH have received a right maxillary clip (RM). Coho <52 cm FL were classified as brood year 2014 and coho >51 cm FL were classified as brood year 2013. Age cutoff based on fork length distribution.

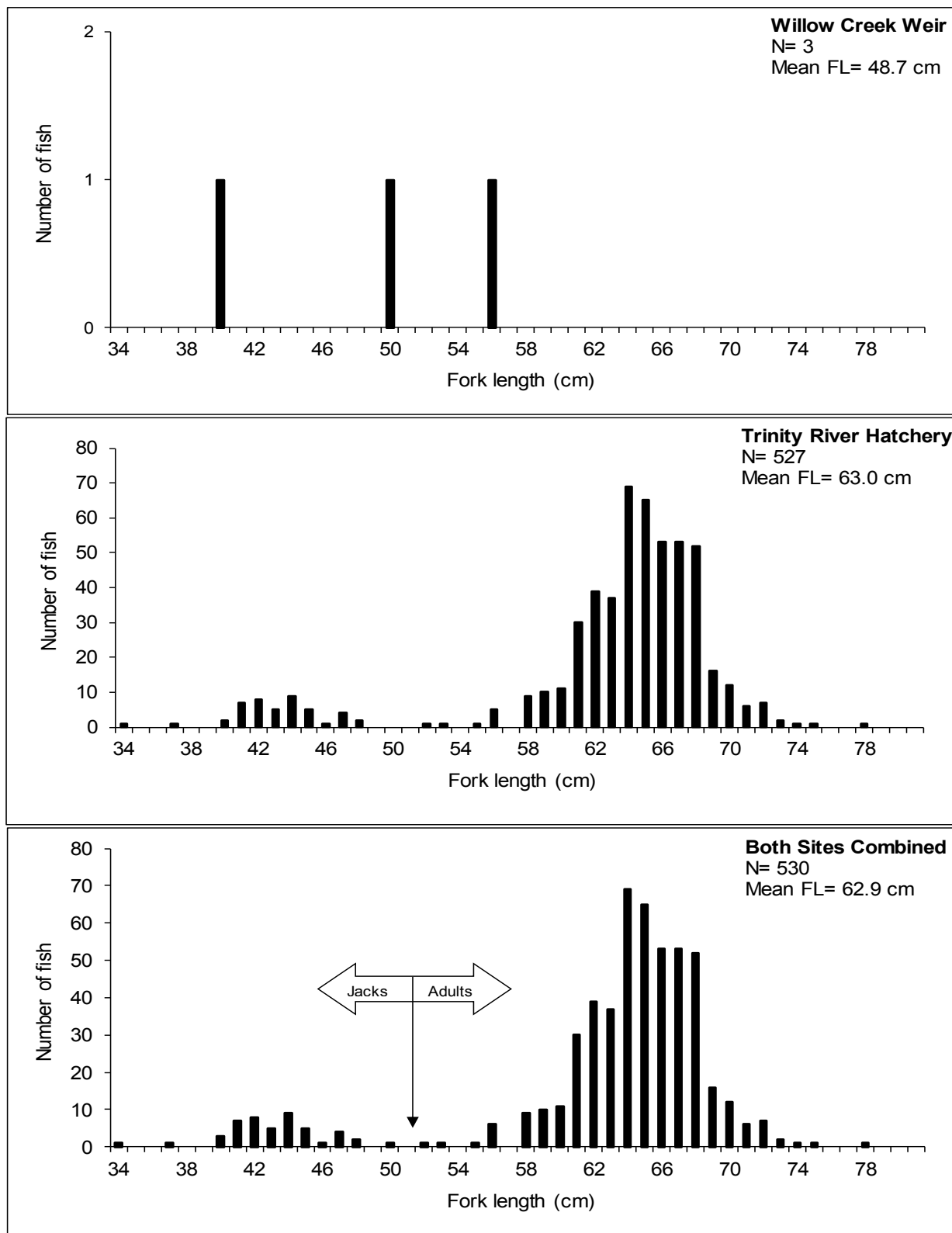
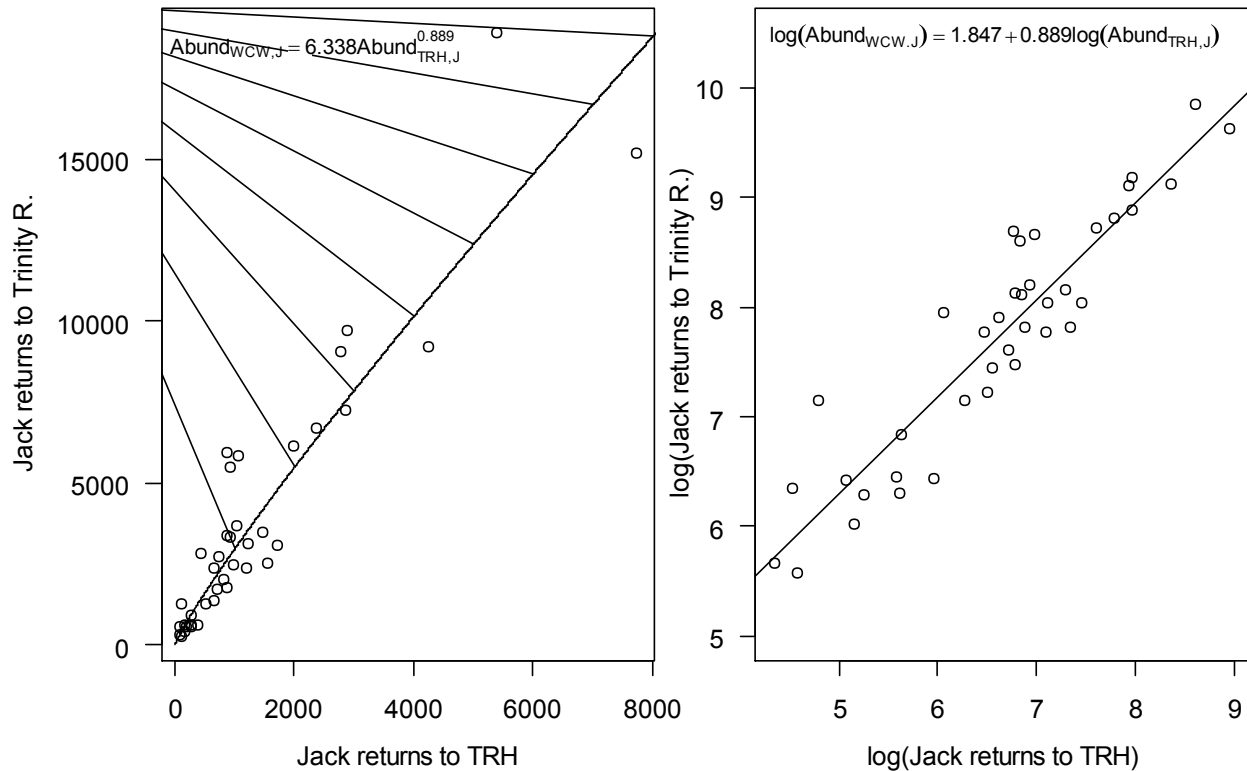


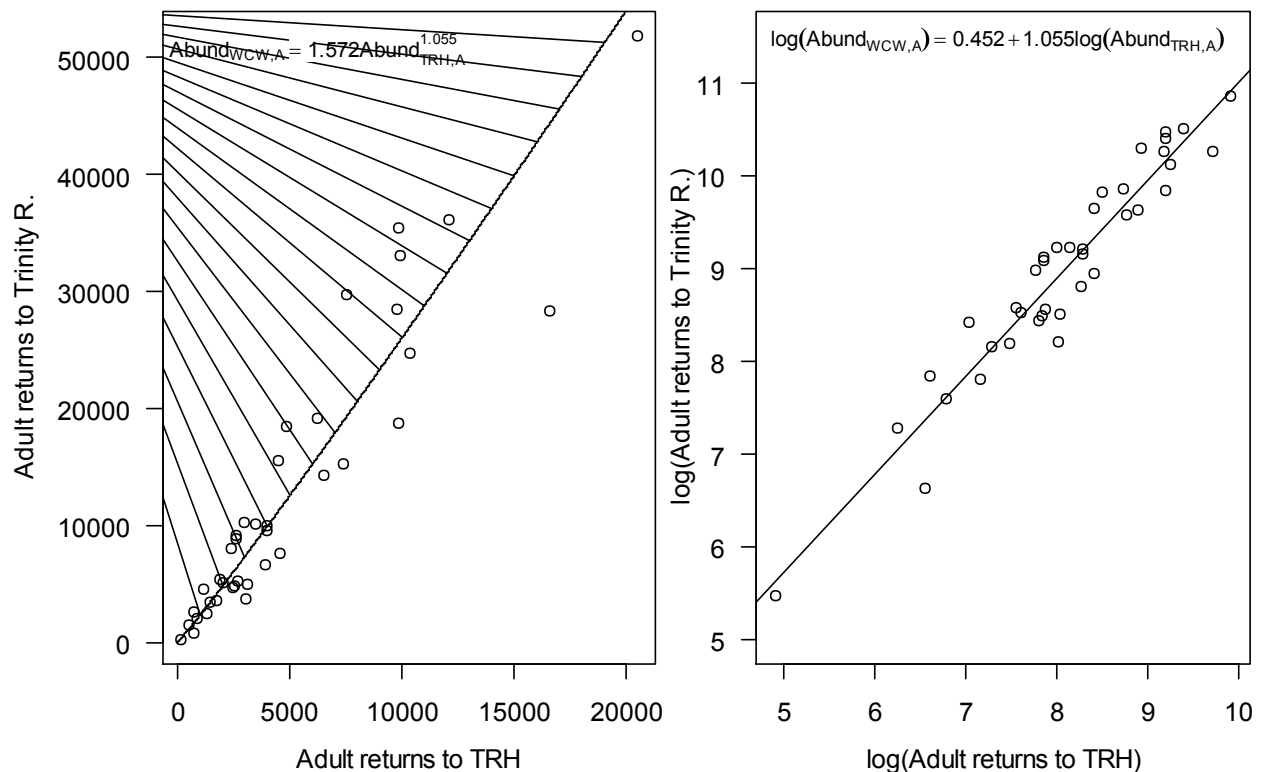
Figure 15. Coho Salmon fork lengths (cm) observed at Willow Creek weir, Trinity River Hatchery and both sites combined during the 2016-17 season. The arrow denotes the size used to separate jacks and adults for analysis.

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

The estimated return of jack Coho upstream of WCW, including returns to TRH, was 208 (95% CI 181 – 239). The fitted model in the original variable space (abundance) was  $Abund_{WCW,J} = 6.338Abund_{TRH,J}^{0.889}$ , and the adjusted  $R^2$  in log-log space was 0.858. An estimated 1,117 adult Coho migrated upstream of WCW in 2016 (95% CI 1,003 – 1,245). The fitted model in the original variable space was  $Abund_{WCW,A} = 1.572Abund_{TRH,A}^{1.055}$ , and the adjusted  $R^2$  in log-log space was 0.918. The estimated total number of Coho returning upstream of WCW was 1,325 (95% CI 1,183 – 1,484) (Appendix 8). Residuals of the log-log model for both jacks and adults met assumptions of independence, normality, and constant variance. The data and fitted regression lines in log-log and the original variable spaces for jacks and adults are presented in Figure 16 and Figure 17, respectively.



**Figure 16. Regressions of returns of jack Coho Salmon to the Trinity River upstream of Willow Creek Weir (WCW) and returns of jacks to Trinity River Hatchery (TRH) in original variable space (left panel) and log-log space (right panel). The fitted regression lines and equations from the log-log model are provided in each panel.**



**Figure 17. Regressions of returns of adult Coho Salmon to the Trinity River upstream of Willow Creek Weir (WCW) and returns of adults to Trinity River Hatchery (TRH) in original variable space (left panel) and log-log space (right panel). The fitted regression lines and equations from the log-log model are provided in each panel.**

With a run-size estimate of 1,325 and a count of 527 (45 jacks and 482 adults) entered TRH (Appendix 9) and we estimate 798 (163 jacks and 635 adults) escaped to natural areas. There were no TRP tags returned by anglers who reported harvest, therefore we assume no Coho harvest for 2016.

Because of the very low sample size of Coho at WCW we were unable to estimate age composition or the proportion of natural-origin to hatchery origin fish escapement to natural areas. We do know that 74 un-marked (assumed to be natural-origin) Coho adults escaped to TRH, however, so we can assume a *minimum* of 5.3% of the TRRP goal of 1,400 natural-origin adult Coho (Appendix 10). Estimated Coho run-size upstream of WCW has ranged from 852 fish in 1994 to 59,079 fish in 1987 (Appendix 22 - Appendix 25). This year's run-size of 1,325 is ranked 39th of the 40 years on record, and is 8.1% of the 16,361 fish average.

### **Coho Salmon Brood Year Performance**

Coho adults returning in 2016 were from the 2013 BY, and jacks returning in 2016 were from the 2014 BY. The estimated 2016 adult escapement of TRH BY 2013 Coho entering TRH was 408 fish, and the jack escapement of TRH BY 2014 was 45. Using those estimates as the *minimum* contribution, total percent return for RM-clipped TRH-

origin Coho from BY 2013 was 0.47% (Table 13). Since 1994 the BY total return rate has ranged from 0.47% to 6.60% (Appendix 26 and Appendix 27).

**Table 13. Run-size, percent return, in-river angler harvest and spawner escapement estimates for Trinity River Hatchery (TRH) Coho Salmon returning to the Trinity River upstream of WCW during the 2016-17 season.**

Release data					Return data						
Clip <sup>a</sup>	Brood year	Date	Number <sup>b</sup>	Site	Age <sup>c</sup>	Run-size	% of release	In-river harvest	Spawner TRH <sup>d</sup>	Escapement Natural	Total
RM	2013	3/15-23/15	287,720	TRH	2	870	0.30%	0	270	600	870
					3	482	0.17%	0	408	74	482
					Totals:	1,352	0.47%	0	678	674	1,352
RM	2014	3/15/-21/16	230,834	TRH	2	45	0.02%	0	45	0	45

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

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

c/ Age classes are determined using length frequency analysis.

d/ TRH= Trinity River Hatchery, actual count.

### **Juvenile Coho Marking at Trinity River Hatchery**

The RM clipping of all BY 2015 Coho (age 1) at TRH was completed by February 13, 2017. Approximately 2% of these fish (5,205) were sampled for RM clip quality and FL prior to the start of their volitional release. We estimate 248,102 of the 248,722 yearling Coho released from TRH were effectively marked with a RM clip (Table 14).

The pre-release FL measurements of BY 2015 production ranged from 66 mm to 236 mm with a mean across all raceways of 140.1 mm.

Based on the quality control sampling, an estimated 99.75% of the BY 2015 production was effectively RM clipped.

**Table 14. Production, marking totals, and quality control data for BY 2015 TRH Coho Salmon volitionally released beginning March 15, 2017.**

Raceway	Net marked	QC # checked	Estimated % unmarked	Effectively marked <sup>a</sup>	Estimated Unmarked releases	Marked releases	<b>Total released</b>
M3-M4	36,044	768	0.13%	36,045	47	36,040	<b>36,087</b>
N3-N4	50,323	1,063	0.19%	50,325	95	50,323	<b>50,418</b>
N1-N2	51,871	1,100	0.36%	51,875	189	51,863	<b>52,052</b>
O3-O4	54,677	1,144	0.44%	54,682	239	54,672	<b>54,911</b>
O1-O2	55,231	1,130	0.09%	55,232	49	55,204	<b>55,253</b>
Total	248,146	5,205	0.25%	248,159	620	248,102	<b>248,722</b>

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

### **Fall Adult Steelhead Trapping and Tagging**

Four half-pounder (<42 cm FL) and 59 adult steelhead were trapped at JCW in 2016; 41 of the adults were ad-clipped, indicating TRH-origin. Counts of steelhead captured at JCW exceeded 10 or more individuals in JWs 30, 35, and 38. Ad-clipped fish were tagged, but because the run-size estimate for steelhead is above WCW, results of this tagging are purely qualitative in nature and not included in run-size estimates.

We trapped 568 steelhead at WCW in 2016 (Table 15, Figure 18); 50 half-pounders and 518 adults. The steelhead run peaked in JW 35 when we averaged 25.0 steelhead per night.

Of the 518 adult steelhead trapped during the season, 512 were tagged (Appendix 28). There was no observed tagging mortality, and 46 fish were reported as caught and released (their tags removed) by anglers, leaving 466 effective tags. Hatchery-origin adult fish comprised 56.6% (293 of 518) of the adult steelhead captured at WCW, and 98.9% (1,557 of 1,574) of the adult steelhead at TRH.

### **Size of Trapped Fish**

Steelhead trapped at WCW and TRH averaged 58.4 and 62.5 cm FL, respectively, with a combined average of 61.2 cm FL (Figure 19). Adult steelhead (>41 cm FL) made up 92.0% and 97.6% of the steelhead trapped at WCW and TRH respectively.

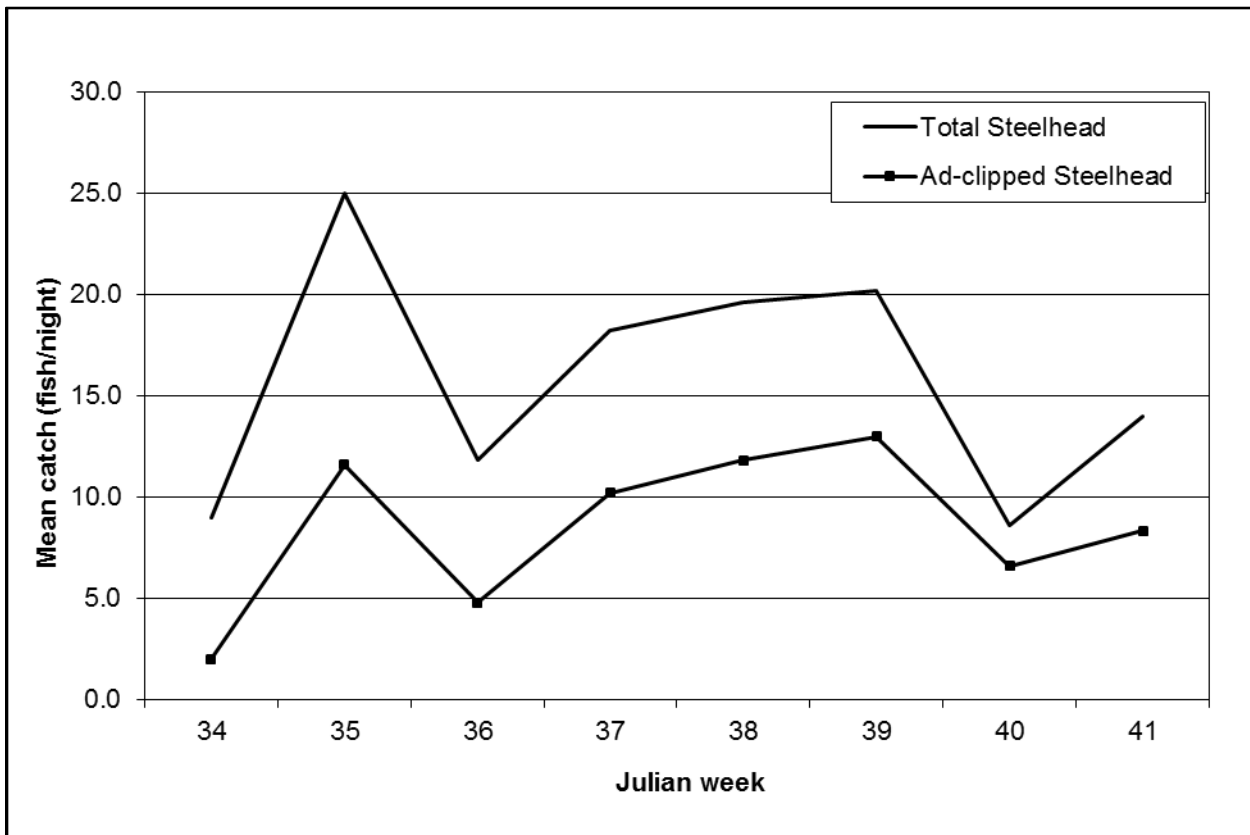
**Table 15. Weekly summary of fall-run steelhead trapped in the Trinity River at Willow Creek weir during 2016.<sup>a</sup>**

Julian week	Inclusive dates	Nights trapped	Number trapped						Fish/night
			1/2 lbers	Ad-clipped 1/2 lbers <sup>c</sup>	Ad-clipped Adults	Ad-clipped Adults	Total	Ad-clip total	
34	22-Aug - 26-Aug	1	0	0	9	2	9	2	9.0
35	27-Aug - 2-Sep	5	3	0	122	58	125	58	25.0
36	3-Sep - 9-Sep	5	10	0	49	24	59	24	11.8
37	10-Sep - 16-Sep	5	1	6	90	45	91	51	18.2
38	17-Sep - 23-Sep	5	10	4	88	55	98	59	19.6
39	24-Sep - 30-Sep	5	11	4	90	61	101	65	20.2
40	1-Oct - 7-Oct	5	5	6	38	27	43	33	8.6
41	8-Oct - 14-Oct	3	10	4	32	21	42	25	14.0
Total:		34	5	24	518	293	568	317	
Mean:									16.7

a/ Trapping at Willow Creek weir took place August 25 - October 12, 2016 (Julian weeks 34-41). Season was short due to storm events.

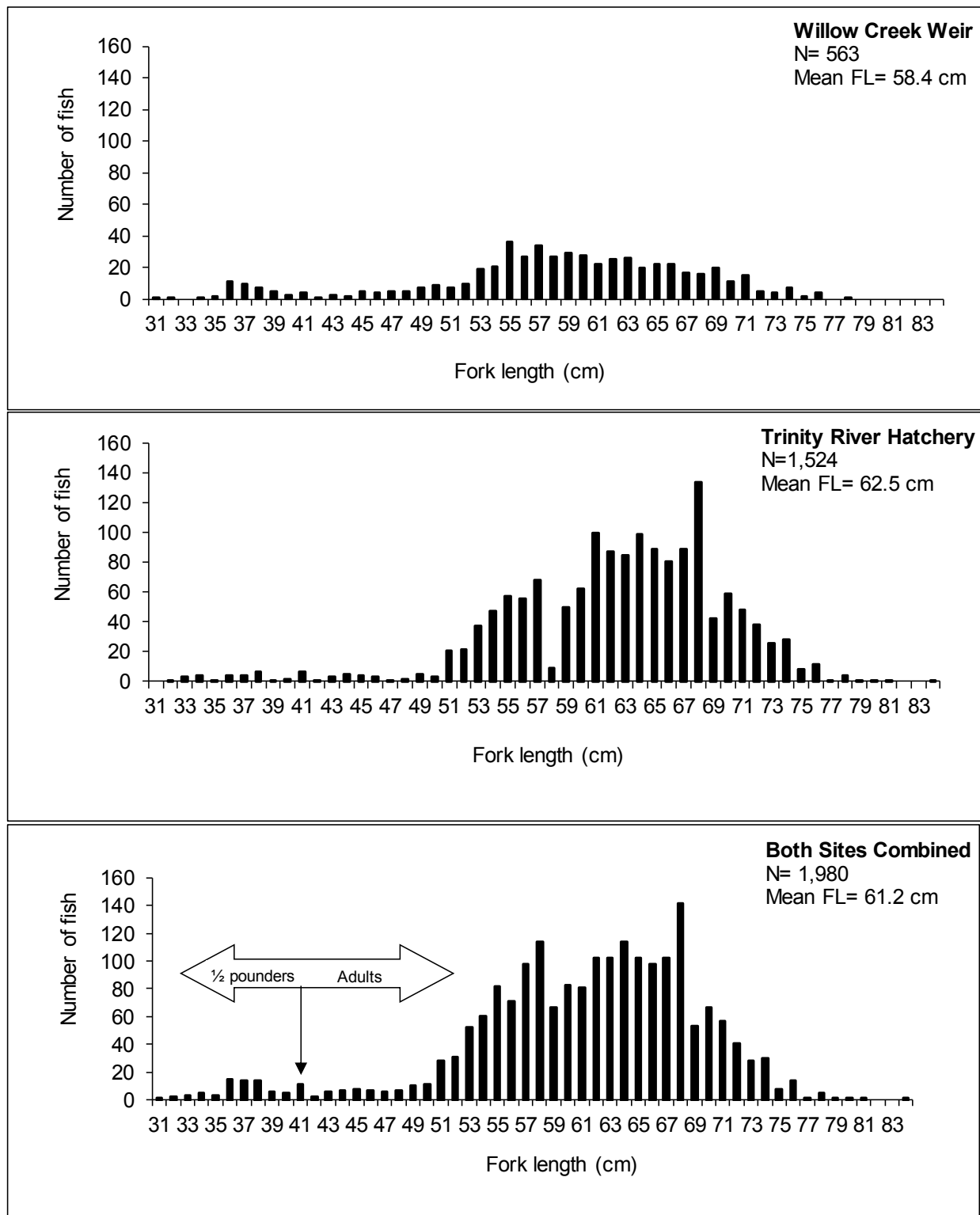
b/ Steelhead <42 cm FL were considered 1/2 lbers (half-pounders).

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



**Figure 18. Mean catch of fall-run steelhead in the Trinity River at Willow Creek weir, 2016.**





**Figure 19. Steelhead fork lengths (cm) observed at Willow Creek weir, Trinity River Hatchery and both sites combined during the 2016-17 season. Arrow denotes the size used to separate 1/2 pounders (sub-adults) and adults for analysis.**

## **Fall-Run Steelhead Recovery**

### **Angler Tag Recovery**

There were nine TRP-tagged steelhead reported as harvested in 2016 (Appendix 28), and two tags found on the riverbank and returned by anglers or other river users. There were 46 tags returned from the catch and release fishery.

### **Spawner Survey Recovery**

There were no Project-tagged steelhead recovered during spawner surveys in 2016.

### **Tagging Mortalities**

There were no steelhead mortalities identified as a result of tagging stress at WCW in 2016.

### **Trinity River Hatchery Recovery**

Steelhead entered TRH during every week the fish ladder was open (Appendix 29). Julian week 51 was the peak of the run, when 223 steelhead entered TRH. A total of 1,574 adult steelhead (plus 34 half pounders) were recovered at TRH during the season. Of the 466 steelhead effectively tagged at WCW, 161 (34.5%) were recaptured at TRH.

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

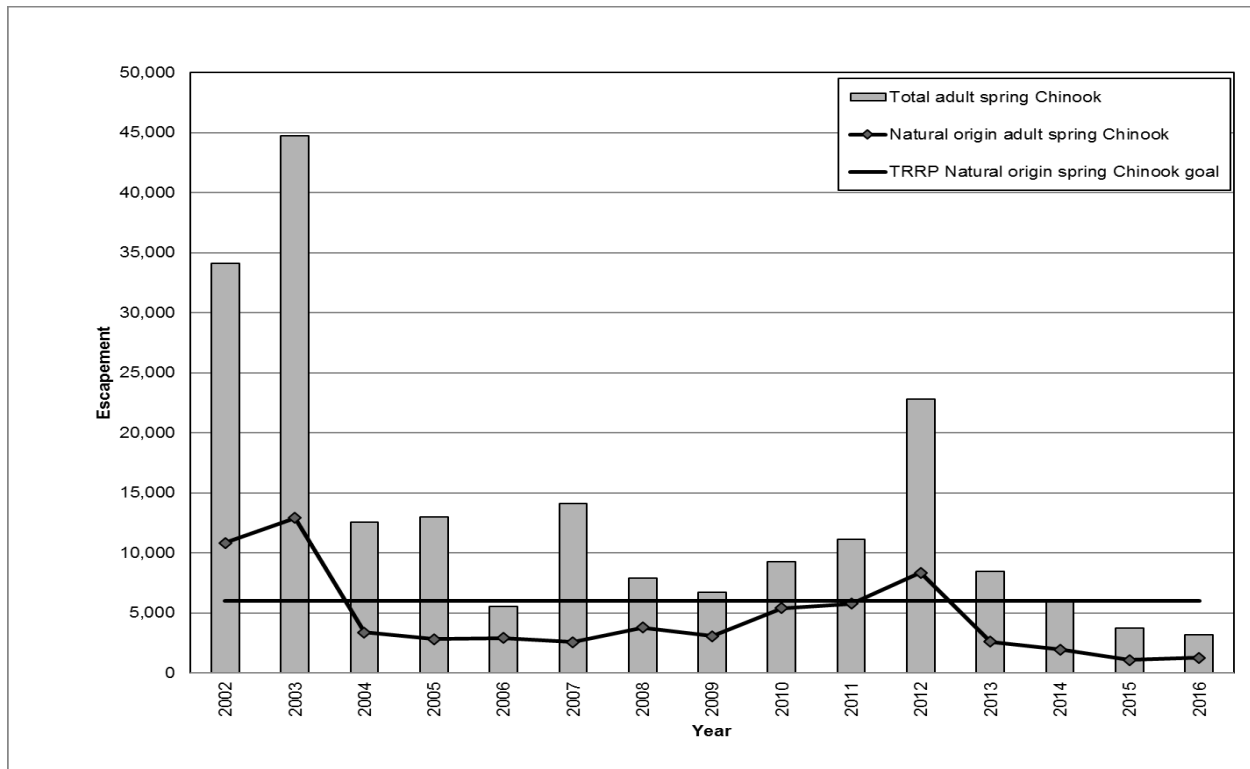
An estimated 4,540 adult steelhead (95% CI 3,903 – 5,229) migrated upstream of WCW this season (Appendix 8). Of those, 96 were estimated to have been harvested by anglers (28 natural-origin and 68 TRH-origin). Of the estimated 4,444 fish that escaped the fishery, 1,574 (17 natural-origin and 1,557 hatchery-origin) entered TRH, and 2,870 (1,927 natural-origin, and 943 hatchery-origin) escaped to natural spawning areas (Appendix 9).

In the 33 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). Mean estimated run-size for fall adult steelhead in the Trinity River above WCW across the period of record is 14,701 fish. This year's run was 30.9% of the average. The natural-origin spawner escapement above WCW of 1,944 is 4.9% of the TRRP goal of 40,000 natural-origin steelhead (Appendix 10.).

## DISCUSSION

### Spring Chinook

Results from the 2016 mark-recapture study indicate the total run-size of 3,904 (95% CI 3,013 – 5,158) spring Chinook is a decline of approximately 500 fish from the 2015 estimate (Appendix 11), and ranks 35<sup>th</sup> lowest of 37 years of monitoring. While the estimated contribution of natural-origin adults showed a slight increase from last year, it remains well below the TRRP annual escapement goal of 6,000 natural-origin adult spring Chinook (Figure 20).

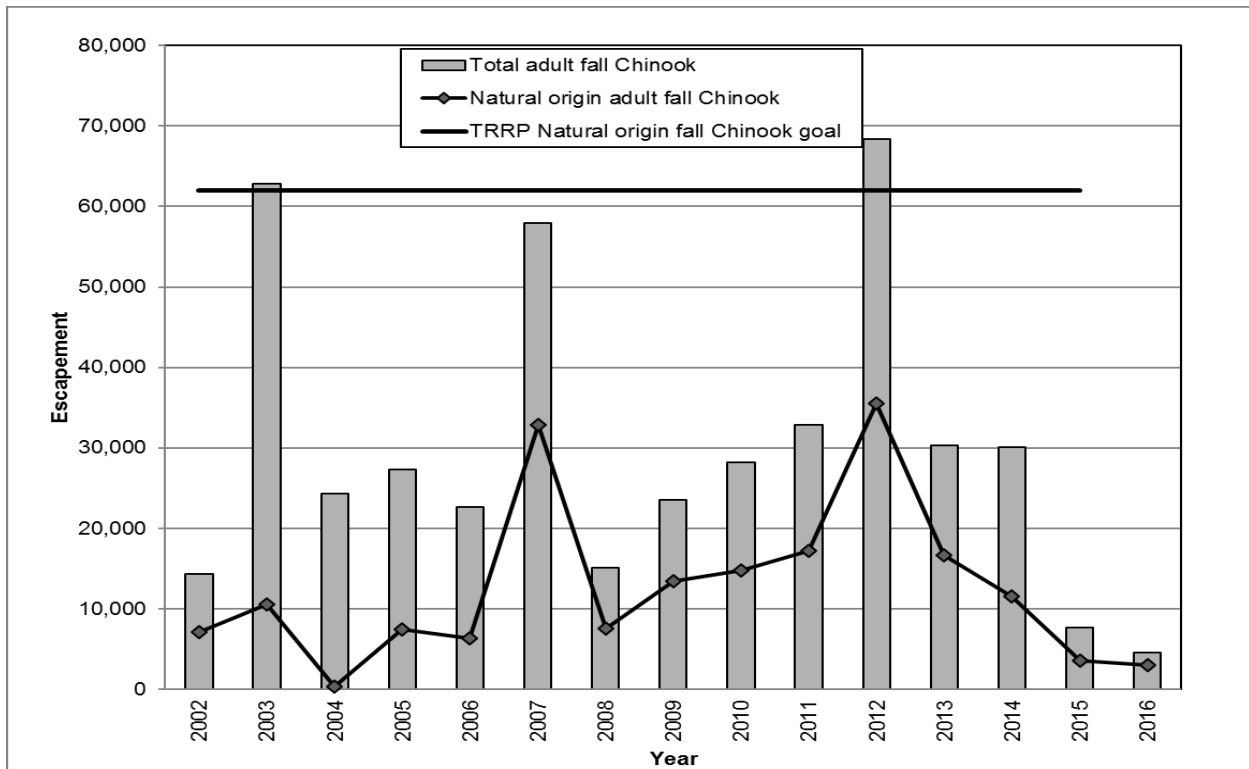


**Figure 20. Total adult escapement, and escapement of natural origin spring Chinook to the Trinity River above Junction City weir, 2002-2016.**

The reasons for the recent precipitous decline of the spring Chinook run in the Trinity River is not entirely known. We do know the water was warmer and there was less of it during out migration of spring Chinook smolts during the California drought from 2012 – 2016, and that poor in-river conditions contributed to an increase in the incidence of disease and related mortality of juveniles in the lower Klamath River (True, et al, 2016). Moyle, et al. (in press) believe the drought in California dramatically reduced the cold water habitat needed during critical over-summering periods for adult spring Chinook in the Trinity River basin.

## Fall Chinook

The 2016 total run-size estimate for Fall Chinook of 6,196 (95% CI 5,007 – 7,823), is the lowest run-size estimate of the 40-year period of record (Appendix 18 - 20) and is 14.8% of the average run-size across years. The 2016 escapement of 2,961 natural-origin adult fall Chinook returning to the Trinity basin is well below the 62,000 TRRP goal, a decline of approximately 18% from the 2015 estimate (Figure 21), though natural-origin fish did comprise 65% of the total adult fall Chinook escapement in Trinity basin in 2016, 20% higher than the average since 2002.



**Figure 21. Total adult escapement, and escapement of natural origin fall Chinook to the Trinity River above Willow Creek weir, 2002-2016.**

Although we likely missed tagging the last of the fall run at WCW (when storm-produced high water ended our season on October 12th) our evaluation of run timing from previous years indicates most of the fall Chinook traditionally would have passed the weir by that date. Additionally, we had TRP tagged Chinook entering TRH through roughly the same period as a year when we would have been able to maintain weir operations into mid-November, which leads us to believe the portion of the run we may have missed was small.

## Coho Salmon

The 2016 run-size of 1,325 Coho is the 39th lowest in 40 years (Appendix 23) and just 28% of the 2015 estimate (another very low run). Coho jacks comprised only 15.7% of the 2016 run, which suggests that next year's run will also be small. The percentage of jacks in the run has ranged from 1.5 - 80.5% since 1977, with a median of 17.8%. Again, because of the small sample size at WCW we were unable to estimate the proportion of hatchery- to natural-origin fish there, and we cannot, therefore, estimate the hatchery composition of the 2016 Coho spawning escapement (Figure 22).

Due to a consent decree (EPIC v. Lehr, et al 2014) Coho production at TRH was decreased in 2014, from 500,000 to 300,000. This year's Coho run included the first year of that 40% reduction in hatchery production, which can at least partially explain the decreased run size.

In 2016 the Hoopa Valley Tribe built a weir across the Trinity River near the southern boundary of the Hoopa Valley Reservation (near Tish Tang creek confluence), downstream of WCW. It was a pilot project intended to harvest hatchery Coho. The effects of both the multi-day construction of the weir during the fall Chinook run (potentially "spooking" fish during their migration) and the level of harvest upon hatchery Coho are unknown.

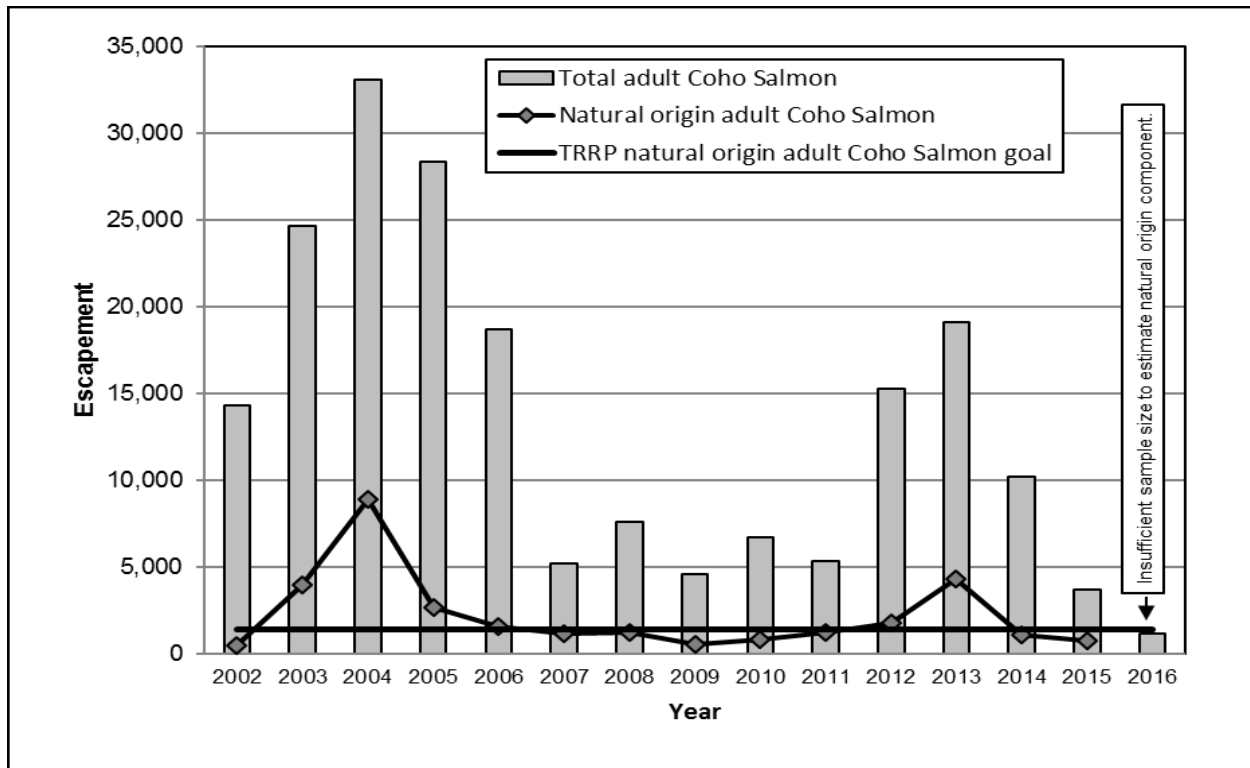
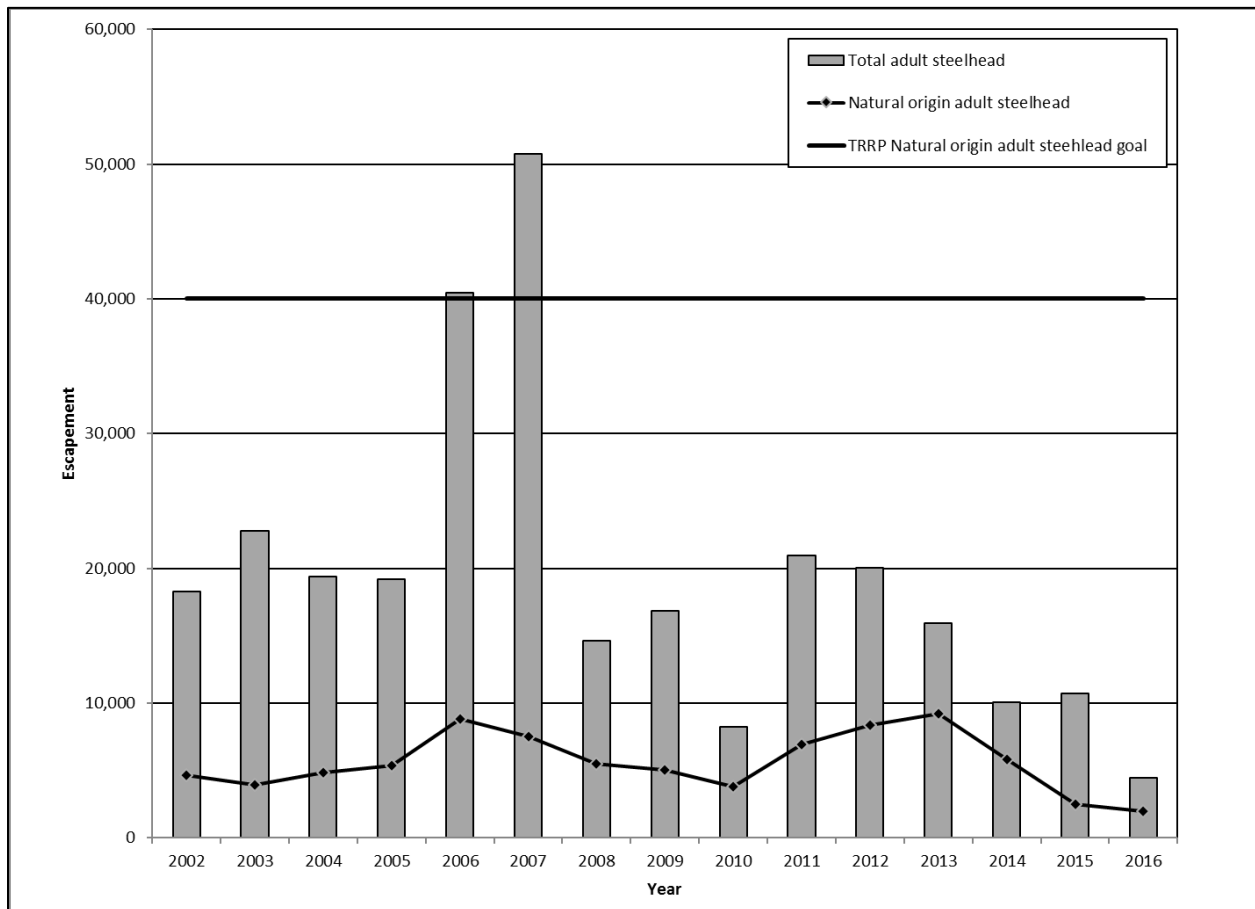


Figure 22. Total adult escapement, and escapement of natural origin Coho Salmon to the Trinity River above Willow Creek weir, 2002-2016.

## Fall-Run Steelhead

The 2016 run-size estimate for adult steelhead of 4,540 (95% CI 3,903 – 5,229) is 30.9% of the average run-size of 14,701 over the 33-year period of record (Appendix 30). The 2016 total escapement of 4,444 adult steelhead is 41% of the 2015 estimate, with a 20% decline in natural-origin fish and a 70% decline in hatchery-origin fish compared to the previous year (Figure 23). Natural-origin adult steelhead comprised 67% of the natural area (in-river) adult steelhead escapement in 2016, as compared to 33% in 2015.

The same lawsuit and consent decree that curtailed production of Coho at TRH likewise affected production of the steelhead at TRH. In 2014 production was decreased from 800,000 to no more than 448,000 steelhead. This decrease appears to be evident in the 2016 TRH returns.



**Figure 23. Total adult escapement, and escapement of natural origin steelhead to the Trinity River above Willow Creek weir, 2002-2016.**

## Factors Influencing Run-Size, Harvest and Escapement Estimates

Attaining salmonid production goals while providing dependent tribal and non-tribal harvests are fundamental objectives of the TRRP. Factors that directly affect salmonid run-size and, therefore, progress toward TRRP goals, include availability and quality of habitat for all life stages, natural mortality and the amount of ocean and in-river harvest. Additionally, environmental conditions are a concern, including, ocean-atmospheric climate variability over the North Pacific basin which result in inter-annual and inter-decadal changes that affect Pacific salmon survival (Beamish, et. al 2009).

This year's sampling, and therefore our run-size and escapement estimates, were less affected by the Lewiston Dam flow release schedules than they have been for the last few years. Water year designation in 2016 was "Wet" (Reclamation, 2016a); and because it was an even-numbered year there was no ceremonial (Boat Dance) flow water allocation. A "Wet" year release, under the Record of Decision (Interior, 2000) allocates 701,000 acre-feet of water for release to the river. The receding arm on the releases from Lewiston Dam did not allow the river to drop enough to put JCW in until July 19, 2016.

Anticipating fish health problems due to overcrowding of adult fall Chinook near cold water refugia in the lower Klamath River, Reclamation once again released extra water (fall augmentation flows) from Lewiston Dam designed to maintain a target up to 2,800 cfs in the Klamath (Reclamation, 2016b). We installed WCW August 19, ahead of the augmentation flows, then we had to wait nearly a week for the water temperature to decrease before we could set the trap (because we do not trap in water temperatures above 21°C [69.8°F]).

We lost no trapping days at either weir during the near-month-long augmentation flows; in fact we were able to trap at both weirs through those flows for the first time [up to 1,200 cfs at the Douglas City gage (Appendix 32), and up to 1,410 cfs at the Hoopa Valley gage (Appendix 33)].

At WCW we removed the conduit (leaving the framework and traps in-river) and prepared the weir for high flows produced by the first big rain event of the season (October 12), anticipating that we would resume trapping after the flows receded. However, we were unable to resume trapping for the rest of the season due to sustained high flows. The weir framework and traps rolled onto the river-right bar by the end of October, and we were able to retrieve most of the hardware. Not since 1989 had we been limited to only 34 trap days at WCW.

Interruption in trapping, or missing part of the run, may lead to a violation of the assumption that fish trapped and released at the weir are a random sample representative of the population. Our goal is to trap and tag between 5 – 10% of each run at the weir; in 2016 we sampled an estimated 2.6% of the spring Chinook at JCW and 5.2% of the fall Chinook run at WCW.

The amount of sport and commercial ocean harvest, in-river sport harvest, and tribal harvest affect salmon and steelhead run-size and escapement. Ocean and in-river harvest quotas are determined by the Pacific Fisheries Management Council (PFMC) only for fall Chinook. Total annual harvest allocation of Klamath/Trinity Basin fall Chinook determined by the PFMC can range from no harvest up to two-thirds of the projected run-size to the basin, thus dependent fisheries may have a large impact on fall Chinook escapement to the basin and Trinity River. In 2016 approximately 25% of the Klamath-Trinity Basin fall Chinook run was reported harvested (CDFW 2017a). Harvest of spring Chinook also occurs in the ocean and in-river fisheries. Reported in-river harvests of spring Chinook for 2016 comprised 28% of the estimated Klamath/Trinity basin run-size (CDFW 2017b). Coho are protected from sport harvest entirely, and only hatchery marked steelhead are allowed for sport harvest.

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

We take steps to minimize tagging-associated mortality through our operational protocol at the weirs. In the past we observed most tagging mortalities when water temperatures were high (near 22° C), therefore trapping is suspended if water temperatures exceed 21°C. In addition, fish are not tagged if deemed in poor condition or if they have already spawned. We account for tagging mortalities through recovery of tagged fish found dead during surveys conducted near the weir sites throughout the trapping season, as well as checking any TRP-tagged carcasses washed back on the weir for signs of spawning. Tagged fish that are judged to have died due to the stress of handling and tagging are removed from the tagged population for purposes of estimating total escapement. Reliance on experienced crew and adherence to protocol contributes to a relatively small number of tagging mortalities.

Our harvest estimates are based on TRP tags returned by anglers and other river users. Unreported angler harvest of tagged fish results in an under-estimate of harvest rate and a corresponding over-estimate in escapement. Although the number of TRP tags returned is usually 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 likely explanations for the disproportion include the longer steelhead season and the fact that emigrating steelhead are typically more active feeders than Chinook. We continue to work toward calculating confidence intervals around our harvests estimates.



Hankin and Bradford (2012) recommend using a high-value tag to increase tag returns and lay the groundwork to test the assumptions upon 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 TRP tags to determine the reward level at which 100% of the tags are returned (one of our harvest estimate assumptions). Early analysis seemed to show that anglers tend to return tags with greater rewards at higher rates than tags with lessor or no value. However, small sample size in the past few years continues to complicate drawing robust conclusions for the study overall. We intend to continue this study for at least an additional year.

We know splitting the run into jacks and adults utilizing a hard point cutoff will have some fish assigned to the wrong age class, but when we have used mixture distribution analyses to estimate proportions at age [mixdist package (R Core Team, 2016)] in the R statistical computing environment in the past, and compared it to our fork length distribution analysis, it suggested that bias associated with using the nadir appears insignificant (Kier and Hileman, 2016).

Because the estimates of the CWT contribution to the total run-size 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 the accuracy of reported CWT expansion factors. The impact of any bias would be most relevant to the number of natural-origin fish estimated spawned in natural areas because 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 run-size estimate.

Three spring CWT Chinook arrived after the spawning break, while only one fall CWT Chinook arrived before the spawning break. The 2016 augmentation flows released from Lewiston Dam increased river flows and reduced water temperatures in much of the river during the fall spawning migration but they don't seem to have influenced migration timing. We did note again in 2016 that some spring Chinook arrived at the hatchery with their eggs in an immature state, possibly due to the cooler river temperatures.

Assumptions of the CWT analysis rely on accurate estimates of expansion factors. If the reported expansion factor is greater or less than the true proportion of hatchery-origin fish with CWTs, total hatchery returns would be over- or under-estimated, respectively. In addition, we assume the CWT fish that enter the hatchery are representative of the entire CWT population, but if an age or release type of hatchery-produced Chinook is more likely to stray than others, then the estimated proportions of hatchery-origin fish, based on fish recovered at TRH, will be biased. The sample (n=9) of TRH-origin Chinook recovered during the 2016 carcass surveys appeared consistent with TRH recoveries, representing tag groups across the range of those that entered TRH.

## **RECOMMENDATIONS**

- Run-size and escapement estimates of naturally- and hatchery-produced spring and fall Chinook, Coho, and adult fall-run 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.
- 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 the TRRP and TRH should be coordinated to ensure that objectives for natural fish production and hatchery management goals are synchronized across restoration and mitigation programs.

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## APPENDICES

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

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

\* Eight day Julian week only during leap years

\*\*Eight day Julian week every year

**Appendix 2. Release and recovery data for adipose fin-clipped spring and fall Chinook recovered at Trinity River Hatchery (TRH) during the 2016-17 season.**

Release data						TRH Recovery data					Number recovered	
CWT <sup>a</sup> code	Egg source	Brood year	Date	Number	Site	Males		Females		Total No.	Tagging site	
						No.	FL <sup>b</sup>	No.	FL <sup>b</sup>		JCW	WCW
<b>SPRING CHINOOK</b>												
068838	TRH	2011	06/01-15/12	59,877	TRH	2	81.5	0	--	2		
068839	TRH	2011	06/01-15/12	35,222	TRH	0	--	2	74.5	2		
068846	TRH	2011	10/01-17/12	97,771	TRH	3	86.0	9	75.3	12		
060490	TRH	2012	06/01-15/13	94,284	TRH	5	76.8	18	68.9	23		
060491	TRH	2012	06/01-15/13	67,661	TRH	8	75.5	12	72.0	20		
060492	TRH	2012	06/01-15/13	88,310	TRH	11	74.5	16	68.0	27		
060497	TRH	2012	10/01-14/13	101,471	TRH	23	72.6	54	67.8	77		
068843 <sup>f</sup>	TRH	2012	03/15-06/06/13	9,850	River	1	82.0	1	71.0	2		
060605	TRH	2013	06/01-04/14	80,615	TRH	44	64.9	61	60.8	105	3	
060606	TRH	2013	06/01-04/14	69,846	TRH	32	66.0	22	59.2	54		
060607	TRH	2013	06/01-04/14	89,761	TRH	23	64.3	16	59.5	39	1	
060612	TRH	2013	10/01-22/14	103,872	TRH	19	57.7	25	57.4	44	1	
068848 <sup>f</sup>	TRH	2013	03/14-06/26/14	10,065	River	0	--	2	59.5	2	1	
068849 <sup>f</sup>	TRH	2013	03/14-06/26/14	8,474	River	1	59.0	0	--	1		
060689	TRH	2014	06/01-15/15	55,275	TRH	20	49.3	1	53.0	21	2	1
060690	TRH	2014	06/01-15/15	85,278	TRH	22	47.3	0	--	22	1	1
060691	TRH	2014	06/01-15/15	88,724	TRH	11	49.4	0	--	11	1	
060696	TRH	2014	10/01-15/15	102,032	TRH	5	41.2	0	--	5		
068772	TRH	2014	03/11-06/10/15	17,668	River	2	47.5	0	--	2		
Lost CWT <sup>c,e</sup>						1	64.0	1	65.0	2		
No CWT <sup>d,e</sup>						4	51.0	4	62.3	8		
Spring Chinook totals:						237		244		481	10	2
<b>FALL CHINOOK</b>												
068844	TRH	2011	06/06-15/12	112,093	TRH	0	--	1	79.0	1		
068847	TRH	2011	10/01-17/12	200,337	TRH	0	--	1	82.0	1		
060493	TRH	2012	06/01-15/13	105,581	TRH	0	--	2	69.0	2		
060495	TRH	2012	06/01-15/13	67,315	TRH	0	--	1	77.0	1		
060496	TRH	2012	06/01-15/13	103,825	TRH	0	--	1	73.0	1		
060499 <sup>f</sup>	TRH	2012	05/29-0/29/13	13,752	River	0	--	1	80.0	1		
060504	TRH	2012	10/01-14/13	221,247	TRH	43	76.6	47	72.6	90	1	6
060608	TRH	2013	06/01-04/14	128,061	TRH	8	61.8	6	64.3	14		1
060609	TRH	2013	06/01-04/14	124,107	TRH	7	64.1	6	64.2	13		1
060610	TRH	2013	06/01-04/14	127,893	TRH	4	62.0	0	--	4		1
060611	TRH	2013	06/01-04/14	128,022	TRH	1	66.0	5	62.0	6		
060613	TRH	2013	10/01-22/14	239,886	TRH	53	61.2	53	61.0	106		6
060614	TRH	2013	06/01-04/14	9,305	TRH	0	--	1	62.0	1		
068850 <sup>f</sup>	TRH	2013	05/16-8/28/14	9,372	River	1	60.0	0	--	1		
060692	TRH	2014	06/01-15/15	94,892	TRH	23	54.0	1	56.0	24		1
060693	TRH	2014	06/01-15/15	93,755	TRH	32	55.3	2	55.0	34	1	1
060694	TRH	2014	06/01-15/15	92,404	TRH	15	53.3	0	--	15		1
060697	TRH	2014	10/01-15/15	236,204	TRH	11	48.7	0	--	11		
068829	TRH	2014	06/01-15/15	48,962	TRH	2	49.5	0	--	2		
Lost CWT <sup>c,e</sup>						1	76.0	1	70.0	2		
No CWT <sup>d,e</sup>						6	78.2	3	62.3	9		
Fall Chinook totals:						207		132		339	2	18

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 2016-17 season.<sup>a</sup>**

FL (cm)	JCW		RECOVERIES							Total Recoveries	% Recoveries
	Total Trapped and Tagged <sup>b</sup>	Ad-clips <sup>c</sup>	Tag Morts <sup>d</sup>	Angler Harvest <sup>e</sup>	TRH <sup>f</sup> Recoveries	Carcass <sup>g</sup> Recoveries	Found Tags <sup>h</sup>	Angler Released <sup>i</sup>			
37	1								0	0.0	
38									0	--	
39									0	--	
40									0	--	
41									0	--	
42									0	--	
43	5	1			5				5	100.0	
44	2	1							0	0.0	
45	4				4				4	100.0	
46	1				1				1	100.0	
47	3	1			3				3	100.0	
48	2	1			1				1	50.0	
49	7				6				6	85.7	
50	6	1		1	5				6	100.0	
51									0	--	
52	3	2			2				2	66.7	
53	2				2				2	100.0	
54	1	1			1				1	100.0	
55	4	2			1				1	25.0	
56	1								0	0.0	
57	2	1			2				2	100.0	
58	3				2				2	66.7	
59	2				2				2	100.0	
60	6	1			1			1	2	33.3	
61	6				1				1	16.7	
62	4			1	2				3	75.0	
63	5	2		1	2				3	60.0	
64	2				1				1	50.0	
65	1								0	0.0	
66	2				1				1	50.0	
67	5	1		1	2				3	60.0	
68	2			1					1	50.0	
69	2								0	0.0	
70	2				2				2	100.0	
71	1								0	0.0	
72	2				1				1	50.0	
73	2				1				1	50.0	
74									0	--	
75									0	--	
76	1				1				1	100.0	
77									0	--	
78	1				1				1	100.0	
79	1								0	0.0	
80									0	--	
81	1								0	0.0	
82	2								0	0.0	
83	1								0	0.0	
84	1								0	0.0	
85	1								0	0.0	
Totals:	100	15	0	5	53	0	0	1	59	59.0%	
Mean FL:	59.0	54.0	--	62.0	55.0	--	--	60.0	55.7		
Total jacks: <sup>j</sup>	31	5	0	1	25	0	0	0	26	83.9%	
Total adults:	69	10	0	4	28	0	0	1	33	47.8%	

a/ Trapping at JCW took place July 7 - September 30, 2016 (Julian weeks 29-39). Chinook trapped after JW37 in 2016 were considered fall Chinook.

b/ All Chinook trapped at Junction City weir in 2016 were 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 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys.

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

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

j/ Spring Chinook <52 cm FL were considered jacks in 2016.



**Appendix 4. Fork length distribution of coded-wire tagged Trinity Rivery Hatchery-produced spring Chinook recovered at TRH during the 2016-17 season.<sup>a</sup>**

FL (cm)	2011			2012					2013						2014					Total
	068838-f	068839-f	068846-y	060490-f	060491-f	060492-f	068843-f	060497-y	060605-f	060606-f	060607-f	068848-f	068849-f	060612-y	060689-f	060690-f	060691-f	068772-f	060696-y	
38																				0
39																			1	0
40																1			1	0
41																			1	0
42																				0
43															1		2		2	0
44															1	1				0
45															1	2				0
46																3	1			0
47															2	7	2	1		0
48															3	2	1	1		0
49															1	1				0
50														1	4	3				1
51														1	2	1	1			1
52									1						3		1			1
53										1				3	2	1	1			4
54									1	1	1			5						8
55									5	3	1			5	1		1			14
56									2	3	1			4						10
57									8	3	3			2						16
58									2	3	5			5			1			15
59									7	1	4		1	1	5					19
60				1					6	4	1		1	6						19
61								1	11	2	3			3						20
62						1			8	3	3			1						16
63				2		2			15	4	1			1						30
64					1	1			5	4	6	4								21
65				1	1	1			4	8	4	4		1						24
66				1		2			6	5		1								15
67				1		2			10	9	1	1								24
68			1	3		1			11	5	3									24
69		1				1			4	4	2	2								14
70			1	4	5	1			10	1	3	3								28
71				2	1	5	1		5	1	3			1						19
72				1	1	1			2		1									6
73			1			2					1									4
74			1	4	2	1			2	1	1									12
75					4	2			2	1										9
76					1	2			4		1									8
77			1		2															3
78			2						1											3
79			1	1					1		1									4
80		1							1				1							2
81	1		1						2											4
82	1						1													2
83				1	1	1														3
84			1	1																2
85			1		1	1														3
86								1												1
87																				0
88																				0
89			1																	1
90																				0
91																				0
92																				0
Totals:	2	2	12	23	20	27	2	77	105	54	39	2	1	44	21	22	11	2	5	471
Mean	81.50	74.50	78.00	70.61	73.40	70.63	76.50	69.25	62.52	63.24	62.31	59.50	59.00	57.55	49.43	47.27	49.36	47.50	41.20	

a/ Trapping occurred at Trinity River Hatchery September 7, 2016 - March 8, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

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

**Appendix 5. Total number and numbers of Junction City weir (JCW) and Willow Creek weir (WCW) tagged Chinook and Coho that entered Trinity River Hatchery (TRH) during the 2016-17 season.<sup>a</sup>**

Julian week <sup>b</sup>	Inclusive dates	Chinook					Coho		
		Total entering	Spring run tagging site		Fall run tagging site		Total entering	Tagging site	
		TRH	JCW	WCW	JCW	WCW	TRH	JCW	WCW
36	3-Sep - 9-Sep	260	2						
37	10-Sep - 16-Sep	461	9						
38	17-Sep - 23-Sep	599	28	3					
39	24-Sep - 30-Sep	427	9						
40	1-Oct - 7-Oct	360	5	3					
41	8-Oct - 14-Oct	--							
42	15-Oct - 21-Oct	--							
43	22-Oct - 28-Oct	327		1	13	47	12		
44	29-Oct - 4-Nov	283				14	11		
45	5-Nov - 11-Nov	296				11	16		
46	12-Nov - 18-Nov	271				2	52		
47	19-Nov - 25-Nov	196				2	117		
48	26-Nov - 2-Dec	127					185		
49	3-Dec - 9-Dec	39					58		
50	10-Dec - 16-Dec	1					73		
51	17-Dec - 23-Dec	3					3		
52	24-Dec - 31-Dec								
1	1-Jan - 7-Jan								
2	8-Jan - 14-Jan								
3	15-Jan - 21-Jan								
4	22-Jan - 28-Jan								
5	29-Jan - 4-Feb								
6	5-Feb - 11-Feb								
7	12-Feb - 18-Feb								
8	19-Feb - 25-Feb								
9	26-Feb - 4-Mar								
10	5-Mar - 11-Mar								
Totals:		3,650	53	7	13	76	527	0	0

a/ Trapping occurred at Trinity River Hatchery September 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

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

**Appendix 6. Run-size, percent return, in-river sport catch and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, spring Chinook returning to the Trinity River basin upstream of Junction City weir during the period 2012 through 2016.**

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 <sup>f</sup>
068838	2011	06/01-15/12	59,877	TRH	2	7	0.01	0.0	4	3	7
068838	2011				3	107	0.18	3.6	72	32	104
068838	2011				4	80	0.13	3.9	42	33	76
068838	2011				5	2	0.00	0.1	2	0	2
Totals: d/						196	0.33	7.6	120	68	188
Total adults: e/						189	0.32	7.6	116	65	181
068839	2011	06/01-15/12	35,222	TRH	2	4	0.01	0.0	2	2	4
068839	2011				3	33	0.09	1.1	22	10	32
068839	2011				4	44	0.12	2.1	23	18	41
068839	2011				5	2	0.01	0.1	2	0	2
Totals: d/						83	0.23	3.4	49	30	79
Total adults: e/						79	0.22	3.4	47	28	76
068840	2011	06/01-15/12	72,106	TRH	2	11	0.01	0.0	6	5	11
068840	2011				3	63	0.09	2.1	43	19	61
068840	2011				4	53	0.07	2.6	28	22	50
068840	2011				5	0	0.00	0.0	0	0	0
Totals: d/						127	0.18	4.7	77	46	122
Total adults: e/						116	0.16	4.7	71	41	112
068846	2011	10/01-17/12	97,771	TRH	2	9	0.01	0.0	5	4	9
068846	2011				3	79	0.08	2.6	53	23	76
068846	2011				4	191	0.19	9.2	101	80	181
068846	2011				5	14	0.01	0.8	12	1	13
Totals: d/						292	0.30	12.7	171	108	279
Total adults: e/						283	0.29	12.7	166	104	271
060490	2012	06/01-15/13	94,284	TRH	2	55	0.06	1.3	29	24	54
060490	2012				3	100	0.11	4.9	53	42	95
060490	2012				4	27	0.00	1.6	23	2	25
060491	2012	06/01-15/13	67,661	TRH	2	29	0.04	0.7	15	13	28
060491	2012				3	40	0.06	1.9	21	17	38
060491	2012				4	23	0.03	1.4	20	2	22
060492	2012	06/01-15/13	88,310	TRH	2	13	0.01	0.3	7	6	13
060492	2012				3	23	0.03	1.1	12	10	22
060492	2012				4	31	0.04	1.9	27	3	30
068843	2012	03/15-06/06/13	9,850	RIVER	2	0	0.00	0.0	0	0	0
068843	2012				3	0	0.00	0.0	0	0	0
068843	2012				4	2	0.02	0.1	2	0	2
060497	2012	10/01-14/13	101,471	TRH	2	28	0.03	0.7	15	12	28
060497	2012				3	66	0.07	3.2	35	28	63
060497	2012				4	90	0.09	5.3	77	7	85
060605	2013	06/01-04/14	80,615	TRH	2	36	0.04	0.0	21	15	36
060605	2013				3	123	0.15	7.2	105	10	115
060606	2013	06/01-04/14	69,846	TRH	2	22	0.03	0.0	13	9	22
060606	2013				3	63	0.09	3.7	54	5	59
060607	2013	06/01-04/14	89,761	TRH	2	14	0.02	0.0	8	6	14
060607	2013				3	46	0.05	2.7	39	4	43
060612	2013	10/01-22/14	103,872	TRH	2	2	0.00	0.0	1	1	2
060612	2013				3	51	0.05	3.0	44	4	48
068848	2013	03/14-6/26/14	10,065	TRH	2	2	0.02	0.0	1	1	2
068848	2013				3	2	0.02	0.1	2	0	2
068849	2013	03/14-6/26/14	8,474	RIVER	2	0	0.00	0.0	0	0	0
068849	2013				3	1	0.01	0.1	1	0	1
060689	2014	06/01-15/15	55,275	TRH	2	30	0.35	1.0	21	8	29
060690	2014	06/01-15/15	85,278	TRH	2	31	0.37	1.0	22	8	30
060691	2014	06/01-15/15	88,724	TRH	2	16	0.18	0.5	11	4	15
060696	2014	10/01-15/15	102,032	TRH	2	7	0.08	0.2	5	2	7
068772	2014	03/11-06/15/15	17,668	RIVER	2	3	0.03	0.1	2	1	3

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 2011. 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 1986-2011.<sup>a</sup>**

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 <sup>a</sup>	196,211	450	0.23%	101,934	1,581	1.55%
1996	222,950	743	0.33%	112,464	312	0.28%
1997	209,155	1,834	0.88%	147,507	4,471	3.03%
1998	176,968	845	0.48%	137,602	2,186	1.59%
1999	148,380	3,372	2.27%	129,919	4,288	3.30%
2000	261,193	4,422	1.69%	99,304	2,029	2.04%
2001	253,248	412	0.16%	104,627	1,480	1.41%
2002	244,754	2,217	0.91%	106,139	514	0.48%
2003	265,556	310	0.12%	104,974	339	0.32%
2004	253,830	2,095	0.83%	104,478	1,269	1.21%
2005	263,108	317	0.12%	107,607	111	0.10%
2006	486,833	229	0.05%	104,019	1,354	1.30%
2007	180,083	252	0.14%	96,803	626	0.65%
2008	229,956	1,107	0.48%	104,078	231	0.22%
2009	161,053	4,364	2.71%	108,824	959	0.88%
2010	168,702	994	0.59%	97,128	361	0.37%
2011	167,205	406	0.24%	97,771	292	0.30%
Means						
:	214,832	1,140	0.57%	104,150	1,059	0.96%

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 Salmon, Coho Salmon and adult fall-run steelhead during the 2016-17 season.**

Species/ race	Area of Trinity River basin for run-size estimate	Stratum <sup>a</sup>	Number effectively tagged <sup>b</sup>	Trinity River Hatchery recoveries		Run-size estimate <sup>d</sup>	Confidence limits 1-p= 0.95	Confidence limit estimator
				Number examined for tags <sup>c</sup>	Number of tags in sample			
Spring Chinook	Upstream of Junction City weir	Jacks	31	277	25	545	3,013 - 5,158	Poisson Approximation
		Adults	68	1,830	28	3,359		
		Total	99	2,107	53	3,904		
Fall Chinook	Upstream of Willow Creek weir	Jacks	88	454	17	1,661	5,007 - 7,823	Poisson Approximation
		Adults	224	1,089	60	4,535		
		Total	312	1,543	77	6,196		
Coho	Upstream of Willow Creek weir	Jacks	2	45	0	208	1,183 - 1,484	
		Adults	1	482	0	1,117		
		Total	3	527	0	1,325		
Fall-run steelhead	Upstream of Willow Creek weir	Adults	466	1,574	161	4,540	3,903 - 5,229	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 run Chinook were estimated from expansion of coded wire tag recoveries at Trinity River Hatchery; Coho and steelhead numbers were actual recoveries.

d/ The run size estimate for jack and adult spring Chinook was based on the proportion of jact to adults observed at Junction City weir and Trinity River Hatchery (TRH) combined. The fall Chinook run was based on scale ageing proportions. Coho run estimated by linear regression of returns to TRH (due to inadequate tagged sample size in-river) with Coho age based on fork length analysis.

**Appendix 9. Estimates of Trinity River basin spring and fall Chinook Salmon, Coho Salmon, and adult fall-run steelhead run-size, angler harvest, and spawner escapement during the 2016-17 season.**

Species/ race	Area of Trinity River basin for run-size estimate	Stratum <sup>a</sup>	Run-size estimate	Angler Harvest		Spawner Escapement		
				Harvest rate <sup>b</sup>	Number of fish <sup>c</sup>	Natural area spawners <sup>d</sup>	Trinity River Hatchery	Total
Spring Chinook	Upstream of Junction City weir	Jacks	545	3.2%	18	250	277	527
		Adults	3,359	5.9%	198	1,331	1,830	3,161
		Total	3,904		215	1,582	2,107	3,688
Fall Chinook	Upstream of Willow Creek weir	Jacks	1,661	0.0%	0	1,260	401	1,661
		Adults	4,535	0.9%	40	3,353	1,142	4,495
		Total	6,196		40	4,613	1,543	6,156
Coho	Upstream of Willow Creek weir	Jacks	208	0.0%	0	163	45	208
		Adults	1,117	0.0%	0	635	482	1,117
		Total	1,325		0	798	527	1,325
Fall-run adult steelhead	Upstream of Willow Creek weir	Natural	1,972	1.4%	28	1,927	17	1,944
		Hatchery	2,568	2.7%	68	943	1,557	2,500
		Total	4,540		96	2,870	1,574	4,444

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 natural-origin 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 2016-17 season.**

Species/ race	Area of Trinity River	Produced	Total Spawner Escapement			Natural-origin contribution to escapement	
			Natural area spawners <sup>a</sup>	Trinity River Hatchery	Total	TRRP Goal	% of Goal
Spring Chinook	Upstream of Junction City weir	Naturally	1,168	90	1,258	6,000	21.0%
		Hatchery	163	1,740	1,903		
		Total	1,331	1,830	3,161		
Fall Chinook	Upstream of Willow Creek weir	Naturally	2,853	108	2,961	62,000	4.8%
		Hatchery	500	1,034	1,534		
		Total	3,353	1,142	4,495		
Coho	Upstream of Willow Creek weir	Naturally	Unknown <sup>b</sup>	74	74	1,400	5.3%
		Hatchery		408	408		
		Total	635	482	1,117		
Fall-run steelhead	Upstream of Willow Creek weir	Naturally	1,927	17	1,944	40,000	4.9%
		Hatchery	943	1,557	2,500		
		Total	2,870	1,574	4,444		

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.

b/ Unable to estimate due to low sample size.

**Appendix 11. Spring Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Junction City weir, 1977 - 2016.**

Year	Run-size estimate					Spawner escapements						Angler harvest			
						Natural Area Spawners <sup>a</sup>			Trinity River Hatchery						
						Jacks	Adults	Total	Jacks	Adults	Total				
	Jacks <sup>d</sup>		Adults		Total	Jacks	Adults	Total	Jacks	Adults	Total	Jacks	Adults	Total	
	Number	Percent	Number	Percent											
1977			no estimates				no estimates			385	1,124	1,509	no estimates		
1978	190	1.0	18,816	99.0	19,006	29	14,384	14,413	153	3,680	3,833	8	752	b/ 760	
1979	113	1.4	7,964	98.6	8,077	0	5,008	5,008	113	1,658	1,771	0	1,298	1,298	
1980	1,949	45.9	2,301	54.1	4,250	1,312	1,614	2,926	353	547	900	284	140	424	
1981	347	4.2	7,913	95.8	8,260	242	3,362	3,604	95	2,405	2,500	10	2,146	2,156	
1982	656	10.3	5,731	89.7	6,387	387	3,868	4,255	150	1,226	1,376	119	637	756	
1983			no estimates				no estimates			385	930	1,315	no estimates		
1984	255	9.4	2,465	90.6	2,720	140	1,354	1,494	76	736	812	39	375	414	
1985	1,434	14.8	8,278	85.2	9,712	799	4,897	5,696	508	2,645	3,153	127	736	c/ 863	
1986	7,018	23.1	23,403	76.9	30,421	4,335	13,371	17,706	1,461	7,083	8,544	1,222	2,949	4,171	
1987	4,858	9.5	46,016	90.5	50,874	2,577	29,083	31,660	1,387	8,466	9,853	894	8,467	9,361	
1988	720	1.1	61,972	98.9	62,692	241	39,329	39,570	377	13,905	14,282	102	8,738	8,840	
1989	502	1.9	25,804	98.1	26,306	435	18,241	18,676	17	4,983	5,000	50	2,580	2,630	
1990	265	4.1	6,123	95.9	6,388	126	2,880	3,006	104	2,433	2,537	35	810	845	
1991	190	8.0	2,191	92.0	2,381	92	1,268	1,360	71	614	685	27	309	336	
1992	1,671	41.5	2,359	58.5	4,030	944	942	1,886	533	1,313	1,846	194	104	c/ 298	
1993	68	1.3	5,164	98.7	5,232	37	2,111	2,148	31	2,630	2,661	0	423	c/ 423	
1994	1,793	26.4	4,995	73.6	6,788	550	2,897	3,447	944	1,943	2,887	299	155	c/ 454	
1995			no estimates				no estimates			385	8,722	9,107	no estimates		
1996	489	2.1	22,927	97.9	23,416	370	16,283	16,653	119	5,131	5,250	0	1,513	c/ 1,513	
1997	768	3.8	19,271	96.2	20,039	543	13,049	13,592	225	4,892	5,117	0	1,330	c/ 1,330	
1998	802	5.0	15,365	95.0	16,167	567	9,057	9,624	184	4,679	4,863	51	1,629	c/ 1,680	
1999	1,028	9.1	10,265	90.9	11,293	440	5,968	6,408	547	3,671	4,218	41	626	c/ 667	
2000	2,159	8.3	23,923	91.7	26,082	1,264	10,846	12,110	571	11,594	12,165	324	1,483	c/ 1,807	
2001	2,065	10.5	17,556	89.5	19,621	1,178	10,284	11,462	629	6,366	6,995	258	906	1,164	



**Appendix 11 (continued). Spring Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Junction City weir, 1977 - 2016.**

Year	Run-size estimate					Spawner escapements						Angler harvest		
	Jacks <sup>d</sup>		Adults		Total	Natural Area Spawners <sup>a</sup>			Trinity River Hatchery			Jacks	Adults	Total
						Jacks	Adults	Total	Jacks	Adults	Total			
	Number	Percent	Number	Percent		Jacks	Adults	Total	Jacks	Adults	Total			
2002 NATURAL	1,238	10%	11,398	90%	12,636	1,109	10,097	11,206	87	722	809	41	579	620
2002 TRH	1,337	5%	24,512	95%	25,849	774	13,577	14,351	530	9,718	10,248	34	1,217	1,251
2002 TOTAL	2,575	7%	35,910	93%	38,485	1,883	23,674	25,557	617	10,440	11,057	75	1,796	1,871
2003 NATURAL	740	5%	13,509	95%	14,249	729	11,490	12,219	11	1,432	1,443	0	587	587
2003 TRH	299	1%	33,247	99%	33,546	180	18,721	18,901	119	13,080	13,199	0	1,446	1,446
2003 TOTAL	1,039	2%	46,756	98%	47,795	909	30,211	31,120	130	14,512	14,642	0	2,033	2,033
2004 NATURAL	1,266	26%	3,556	74%	4,822	1,009	2,966	3,975	154	410	564	103	180	283
2004 TRH	1,663	15%	9,662	85%	11,325	699	4,348	5,047	831	4,841	5,672	133	473	606
2004 TOTAL	2,929	18%	13,218	82%	16,147	1,708	7,314	9,022	985	5,251	6,236	236	653	889
2005 NATURAL	-14	0%	3,032	100%	3,018	-2	2,028	2,026	-11	799	788	0	206	206
2005 TRH	69	1%	10,897	99%	10,966	32	3,975	4,007	36	6,167	6,203	0	755	755
2005 TOTAL	55	0%	13,929	100%	13,984	30	6,003	6,033	25	6,966	6,991	0	961	961
2006 NATURAL	914	24%	2,911	76%	3,825	792	2,418	3,210	114	494	608	8	0	8
2006 TRH	1,049	29%	2,609	71%	3,658	335	537	872	705	2,071	2,776	9	0	9
2006 TOTAL	1,963	26%	5,520	74%	7,483	1,127	2,955	4,082	819	2,565	3,384	17	0	17
2007 NATURAL	56	2%	2,680	98%	2,736	67	1,705	1,772	-11	862	851	0	113	113
2007 TRH	79	1%	12,020	99%	12,099	13	6,449	6,462	66	5,119	5,185	0	452	452
2007 TOTAL	135	1%	14,700	99%	14,835	80	8,154	8,234	55	5,981	6,036	0	565	565
2008 NATURAL	1,846	32%	3,860	68%	5,706	1,614	3,210	4,824	108	571	679	123	79	202
2008 TRH	372	8%	4,205	92%	4,577	127	1,260	1,387	221	2,866	3,087	25	79	104
2008 TOTAL	2,218	22%	8,065	78%	10,283	1,741	4,470	6,211	329	3,437	3,766	148	158	306
2009 NATURAL	175	5%	3,278	95%	3,453	155	2,672	2,827	20	404	424	0	202	202
2009 TRH	85	2%	3,888	98%	3,973	36	1,052	1,088	49	2,596	2,645	0	240	240
2009 TOTAL	260	4%	7,166	96%	7,426	191	3,724	3,915	69	3,000	3,069	0	442	442
2010 NATURAL	1,020	15%	5,756	85%	6,776	959	5,066	6,025	61	321	382	0	368	368
2010 TRH	534	12%	3,975	88%	4,509	350	1,744	2,094	184	2,136	2,320	0	95	95
2010 TOTAL	1,554	14%	9,731	86%	11,285	1,309	6,810	8,119	245	2,457	2,702	0	463	463
2011 NATURAL	3,592	38%	5,781	62%	9,373	3,350	5,577	8,927	193	204	397	50	0	50
2011 TRH	4,495	46%	5,351	54%	9,846	1,867	1,732	3,599	2,565	3,619	6,184	62	0	62
2011 TOTAL	8,087	42%	11,132	58%	19,219	5,217	7,309	12,526	2,758	3,823	6,581	112	0	112
2012 NATURAL	251	3%	9,060	97%	9,311	116	7,569	7,685	31	788	819	105	703	808
2012 TRH	562	3%	15,744	97%	16,306	426	8,548	8,974	78	5,924	6,002	58	1,273	1,331
2012 TOTAL	813	3%	24,804	97%	25,617	542	16,117	16,659	109	6,712	6,821	163	1,976	2,139
2013 NATURAL	146	5%	2,669	95%	2,815	127	2,487	2,614	19	116	135	0	67	67
2013 TRH	135	2%	6,011	98%	6,146	58	3,469	3,527	77	2,366	2,443	0	176	176
2013 TOTAL	281	3%	8,680	97%	8,961	185	5,956	6,141	96	2,482	2,578	0	243	243
2014 NATURAL	132	6%	1,998	94%	2,130	49	1,559	1,608	80	372	452	3	66	211
2014 TRH	528	11%	4,300	89%	4,828	233	1,274	1,507	282	2,883	3,165	13	144	15
2014 TOTAL	660	9%	6,298	91%	6,958	282	2,833	3,115	362	3,255	3,617	16	210	226
2015 NATURAL	177	13%	1,146	87%	1,323	123	817	940	55	273	327	0	56	56
2015 TRH	313	10%	2,772	90%	3,085	127	1,163	1,290	185	1,475	1,661	0	134	134
2015 TOTAL	490	11%	3,918	89%	4,408	250	1,980	2,230	240	1,748	1,988	0	190	190
2016 NATURAL	178	12%	1,337	88%	1,515	155	1,168	1,323	17	90	107	6	79	85
2016 TRH	367	15%	2,022	85%	2,389	95	163	258	260	1,740	2,000	12	119	131
2016 TOTAL	545	14%	3,359	86%	3,904	250	1,331	1,581	277	1,830	2,107	18	198	216

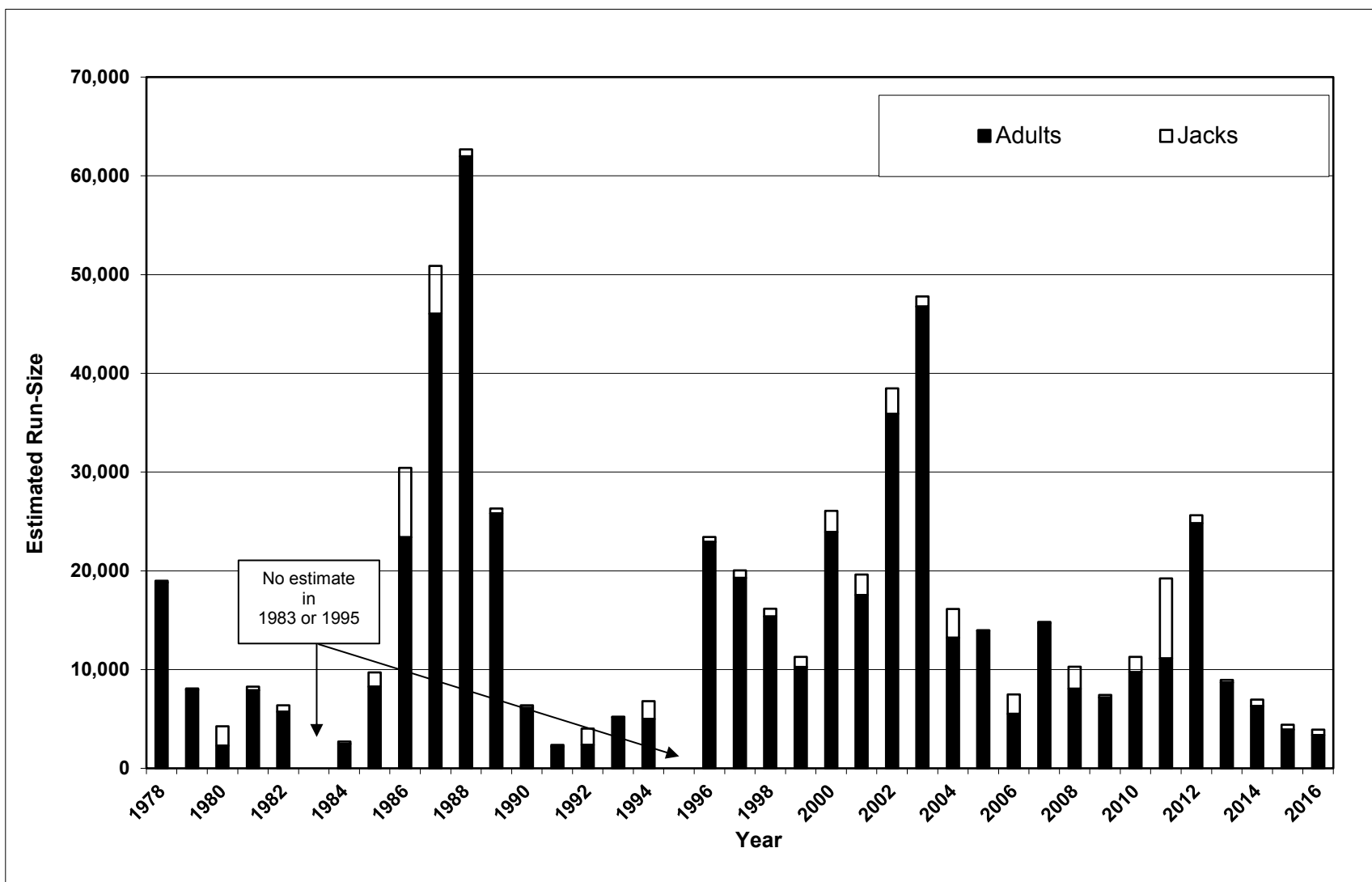
a/ Natural area spawners includes both wild and hatchery fish that spawn in areas outside Trinity River Hatchery.

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

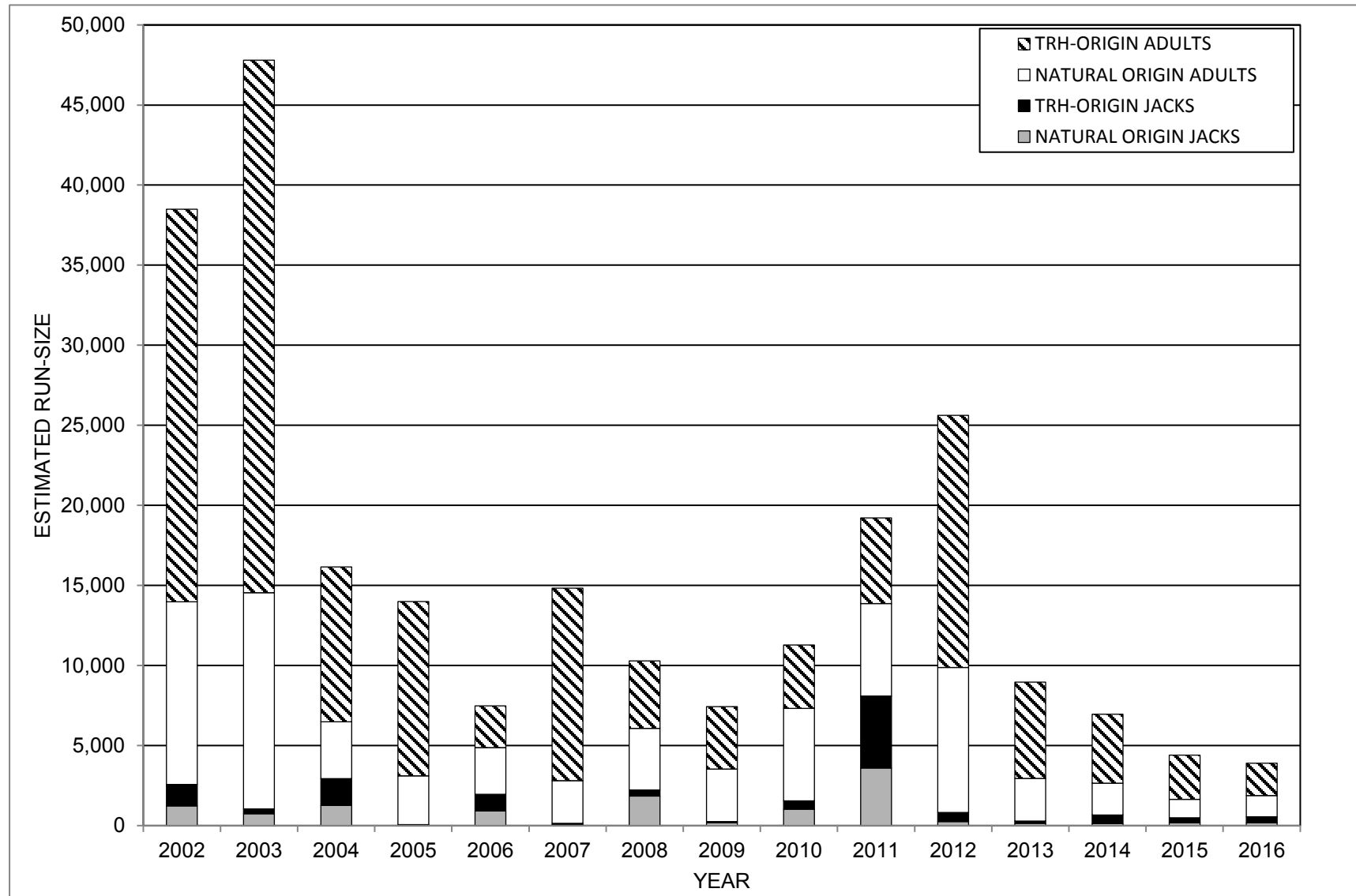
c/ The sport harvest of adult spring Chinook was subject to seasonal and size limit restrictions.

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, 1978 - 2016. No estimate in 1983 or 1995.



**Appendix 13. Spring Chinook estimated run-size for the Trinity River upstream of Junction City weir, 2002 – 2016, 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 2016-17 season.<sup>a</sup>**

FL (cm)	WCW			RECOVERIES							
	Total Trapped	Total Tagged <sup>b</sup>	Ad-clips <sup>c</sup>	Tag Morts <sup>d</sup>	Angler Harvest <sup>e</sup>	TRH <sup>f</sup> Recoveries	Carcass <sup>g</sup> Recoveries	Found Tags <sup>h</sup>	Angler Released <sup>i</sup>	Total Recoveries	% Recoveries
41	1	1								0	0.0
42	1	1								0	0.0
43										0	--
44	2	2								0	0.0
45										0	--
46										0	--
47	2	2								0	0.0
48	2	2								0	0.0
49	3	3								0	0.0
50	10	8								0	0.0
51	8	8	1			2			1	3	37.5
52	10	8								0	0.0
53	10	10	3			1				1	10.0
54	12	11	2			2				2	18.2
55	5	5				2				2	40.0
56	16	16	1			6				6	37.5
57	5	5				1	1			2	40.0
58	7	7	2			3				3	42.9
59	13	13	1			2				2	15.4
60	15	15				4				4	26.7
61	8	8	1			5				5	62.5
62	16	16			1	3				4	25.0
63	21	21	1		1	7				8	38.1
64	13	13	4			4			1	5	38.5
65	10	10				2				2	20.0
66	11	11	2			2				2	18.2
67	13	13				3				3	23.1
68	8	8	1			2				2	25.0
69	8	7	1			1				1	14.3
70	6	6	1			2				2	33.3
71	7	7	1			2				2	28.6
72	8	8	2			6				6	75.0
73	9	8	1			3		1		4	50.0
74	13	13				3				3	23.1
75	4	3	1							0	0.0
76	7	6	1			1				1	16.7
77	5	5				3				3	60.0
78	7	7				1				1	14.3
79	2	2								0	0.0
80	3	3								0	0.0
81	5	5				2				2	40.0
82	1	1								0	0.0
83	2	2	1			1				1	50.0
84	2	2								0	0.0
85	1	1								0	0.0
86	2	2				1				1	50.0
87	2	2								0	0.0
88	3	3								0	0.0
89	2	2								0	0.0
90	1	1								0	0.0
91										0	--
92	1	1								0	0.0
93	1									0	--
Totals:	324	314	28	0	2	77	1	1	2	83	26.4
Mean FL:	64.4	64.4	63.9	--	62.5	65.3	57.0	73.0	57.5	65.0	
Total jacks: <sup>j</sup>	94	89	9	0	0	17	1	0	1	19	21.3
Total adults:	230	225	19	0	2	60	0	1	1	64	28.4

a/ Trapping at Willow Creek weir took place August 25 - October 12, 2016 (Julian weeks 34-41). Chinook trapped after JW 36 were considered fall Chinook.

b/ Ten (5 jack and 5 adult) fall Chinook were not tagged due to poor condition.

c/ Ad-clip = Adipose fin clipped fish.

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

e/ Fish reported as harvested by anglers.

f/ Trapping occurred at Trinity River Hatchery September 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys.

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

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

j/ Fall Chinook <59 cm FL were considered jacks in 2016.

**Appendix 15. Fork length distribution of coded-wire tagged, Trinity River Hatchery-produced fall Chinook recovered at TRH during the 2016-17 season.<sup>a</sup>**

FL (cm)	2011		2012					2013							2014					TOTALS
	068844-f	068847-y	060493-f	060495-f	060496-f	060499-f	060504-y	060608-f	060609-f	060610-f	060611-f	060613-y	060614-f	068850-f	060692-f	060693-f	060694-f	060697-y	068829-f	
43												1								1
44												1								1
45																		1		1
46																		1		1
47															1				1	1
48															1					4
49																	1			4
50																2	2	1		5
51												1			2	4	1	1		9
52															2	2	4		1	9
53															6	5		1		12
54												2			2	5	2			11
55												1			5		2			8
56									1		1	1			2	1				7
57								1				8			2	5	1			17
58								1	1			12			2	5	2			23
59								2				4								6
60								1			1	11		1						17
61									3			15				3				19
62							1	1	1			9	1			1				13
63							1	1	1		1	9								13
64							2	3	1	3	1	15								25
65								1	1			3				1				6
66							2				1	5								8
67							2	1			1	2								6
68			1				6	1				3								11
69							2													2
70			1				7	1	2			2								13
71							7		1			1								9
72							4		1											5
73					1		7													8
74							9													9
75							6													6
76							6													6
77				1			3													4
78							4													4
79	1						3													4
80						1	2													3
81							3													3
82		1					1													2
83							2													2
84							3													3
85							2													2
86							2													2
87							3													3
Totals:	1	1	2	1	1	1	90	14	13	4	6	106	1	1	24	34	15	11	2	328
Mean	79.0	82.0	69.0	77.0	73.0	80.0	74.5	62.9	64.2	62.0	62.7	61.1	62.0	60.0	54.0	55.3	53.3	48.7	49.5	

a/ Trapping occurred at Trinity River Hatchery September 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).□

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

**Appendix 16. Run-size, percent return, in-river sport catch, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, fall Chinook returning to the Trinity River upstream of Willow Creek weir during the period 2011 through 2016.**

Release data						Estimated returns					
CWT <sup>a</sup> Brood						Run-	% of	River	Spawning escapement		
code	year	Date <sup>b</sup>	Number	Site	Age	size	release	harvest	TRH <sup>c</sup>	Natural	Total <sup>g</sup>
068830 <sup>f</sup>	2011	5/24-8/27/12	9,706	River	2	0	0.00	0.0	0	0	0
068830 <sup>f</sup>	2011				3	17	0.18	0.5	6	11	17
068830 <sup>f</sup>	2011				4	4	0.04	0.0	3	1	4
068830 <sup>f</sup>	2011				5	0	0.00	0.0	0	0	0
Totals: <sup>d</sup>						21	0.22	1	9	12	21
Total adults: <sup>e</sup>						21	0.22	1	9	12	21
068841	2011	06/1-15/12	86,357	TRH	2	7	0.01	0.2	5	2	7
068841	2011				3	91	0.10	2.6	32	56	88
068841	2011				4	8	0.01	0.0	6	2	8
068841	2011				5	0	0.00	0.0	0	0	0
Totals: <sup>d</sup>						106	0.12	3	43	60	103
Total adults: <sup>e</sup>						98	0.11	3	38	58	96
068842	2011	06/1-15/12	95,355	TRH	2	4	0.00	0.1	3	1	4
068842	2011				3	96	0.10	2.8	34	60	93
068842	2011				4	17	0.02	0.1	13	4	17
068842	2011				5	0	0.00	0.0	0	0	0
Totals: <sup>d</sup>						118	0.12	3	50	65	115
Total adults: <sup>e</sup>						113	0.12	3	47	63	110
068844	2011	06/6-15/12	112,093	TRH	2	9	0.01	0.3	6	3	9
068844	2011				3	119	0.11	3.4	42	74	116
068844	2011				4	9	0.01	0.0	7	2	9
068844	2011				5	2	0.00	0.0	1	0	1
Totals: <sup>d</sup>						139	0.12	3.8	56	79	135
Total adults: <sup>e</sup>						130	0.12	3.5	50	77	126
068845	2011	06/7-15/12	102,907	TRH	2	3	0.00	0.1	2	1	3
068845	2011				3	64	0.06	1.8	22	40	62
068845	2011				4	10	0.01	0.1	8	2	10
068845	2011				5	0	0.00	0.0	0	0	0
Totals: <sup>d</sup>						77	0.08	2.0	32	43	75
Total adults: <sup>e</sup>						74	0.07	1.9	30	42	72
068847	2011	10/1-17/12	200,337	TRH	2	21	0.01	0.6	14	6	21
068847	2011				3	2,140	1.07	61.6	750	1,328	2,078
068847	2011				4	327	0.16	1.5	254	71	325
068847	2011				5	2	0.00	0.0	1	0	2
Totals: <sup>d</sup>						2,489	1.24	63.7	1,019	1,407	2,425
Total adults: <sup>e</sup>						2,468	1.23	63.1	1,005	1,400	2,405

**Appendix 16 (continued). Run-size, percent return, in-river sport catch, and spawner escapement estimates for Trinity River Hatchery-produced, coded-wire tagged, fall Chinook returning to the Trinity River upstream of Willow Creek weir during the period 2011 through 2016.**

Release data					Estimated returns						
060493	2012	06/01-15/13	105,581	TRH	2	10	0.01	0.2	4	6	10
060493	2012				3	20	0.02	0.1	15	4	19
060493	2012				4	3	0.00	0.0	2	1	3
060495	2012	06/01-15/13	67,315	TRH	2	0	0.00	--	--	--	0
060495	2012				3	5	0.01	0.0	4	1	5
060495	2012				4	2	0.00	0.0	1	0	2
060496	2012	06/01-15/13	103,825	TRH	2	0	0.00	--	--	--	0
060496	2012				3	3	0.00	0.0	2	1	3
060496	2012				4	2	0.00	0.0	1	0	1
060499 <sup>f</sup>	2012	5/29-8/29/13	13,752	River	2	0	0.00	--	--	--	0
060499 <sup>f</sup>	2012				3	1	0.01	0.0	1	0	1
060499 <sup>f</sup>	2012				4	2	0.01	0.0	1	0	1
060504	2012	10/01-14/13	221,247	TRH	2	108	0.05	2.1	43	63	106
060504	2012				3	463	0.21	2.1	360	101	461
060504	2012				4	136	0.06	1.2	91	44	134
060608	2013	06/01-04/14	128,061	TRH	2	26	0.01	0.2	9	17	26
060608	2013				3	21	0.01	0.2	14	7	21
060609	2013	06/01-04/14	124,107	TRH	2	17	0.01	0.1	6	11	17
060609	2013				3	20	0.02	0.2	13	6	19
060610	2013	06/01-04/14	127,893	TRH	2	9	0.01	0.1	3	6	9
060610	2013				3	6	0.00	0.1	4	2	6
060611	2013	06/01-04/14	128,022	TRH	2	9	0.01	0.1	3	6	9
060611	2013				3	9	0.01	0.1	6	3	9
060613	2013	10/01-22/14	239,886	TRH	2	64	0.03	0.5	22	41	63
060613	2013				3	160	0.07	1.4	107	52	158
060614	2013	06/01-04/14	9,305	TRH	2	0	0.00	0.0	0	0	0
060614	2013				3	2	0.00	0.0	1	0	2
068850 <sup>f</sup>	2013	5/16-8/28/14	9,372	River	2	3	0.03	0.0	1	2	3
068850 <sup>f</sup>	2013				3	2	0.02	0.0	1	0	1
060692	2014	06/01-15/15	94,892	TRH	2	43	0.05	0.0	24	19	43
060693	2014	06/01-15/15	93,755	TRH	2	61	0.07	0.0	34	27	61
060694	2014	06/01-15/15	92,404	TRH	2	27	0.03	0.0	15	12	27
060697	2014	10/01-15/15	236,204	TRH	2	20	0.01	0.0	11	9	20
068829	2014	06/01-15/15	48,962	TRH	2	4	0.01	0.0	2	2	4

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 2011. 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 1986-2011.**

Brood year	Fingerling releases			Yearling releases		
	Number released	Number of returns	Percent return	Number released	Number of returns	Percent return
1986	393,955	292	0.07%	153,700	4,899	3.19%
1987	172,980	129	0.07%	92,300	418	0.45%
1988	194,197	138	0.07%	143,934	796	0.55%
1989	201,622	21	0.01%	143,978	174	0.12%
1990	0	0	---	103,040	166	0.16%
1991	206,416	937	0.45%	115,300	517	0.45%
1992	192,032	2,503	1.30%	108,894	5,369	4.93%
1993	201,032	158	0.08%	110,336	798	0.72%
1994	216,563	374	0.17%	113,124	756	0.67%
1995	216,051	285	0.13%	110,327	3,106	2.82%
1996	217,981	445	0.20%	112,746	394	0.35%
1997	216,772	1,707	0.79%	313,080	11,396	3.64%
1998	184,781	292	0.16%	334,726	7,173	2.14%
1999	181,301	693	0.38%	296,892	5,833	1.96%
2000	522,316	3,909	0.75%	216,593	5,245	2.42%
2001	499,919	476	0.10%	230,055	5,894	2.56%
2002	508,963	3,563	0.70%	236,319	3,561	1.51%
2003	534,219	289	0.05%	225,798	944	0.42%
2004	486,369	4,125	0.85%	218,386	3,909	1.79%
2005	488,466	157	0.03%	227,903	675	0.30%
2006	486,833	849	0.17%	238,156	3,240	1.36%
2007	446,316	324	0.07%	244,661	2,330	0.95%
2008	518,269	3,576	0.69%	259,330	4,211	1.62%
2009	496,761	2,988	0.60%	230,461	7,361	3.19%
2010	475,062	856	0.18%	231,430	2,221	0.96%
2011	406,418	461	0.11%	200,337	2,489	1.24%
Means:	333,292	1,136	0.33%	192,762	3,226	1.56%

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 – 2016.**

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

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

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

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

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

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

**Appendix 18 (continued). Fall Chinook estimated run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Willow Creek weir, 1977 – 2016.**

Year	Run-size estimate						Spawner escapements						Angler harvest		
	Jacks <sup>a</sup>			Adults			Natural Area Spawners <sup>a</sup>			Trinity River Hatchery			Jacks	Adults	Total
							Jacks	Adults	Total	Jacks	Adults	Total			
	Number	Percent	Number	Percent											
2002 NATURAL	1,314	15.1	7,367	84.9	8,681	1,231	6,549	9,019	26	523	549	57	295		352
2002 TRH	2,498	26.4	6,977	73.6	9,475	1,335	3,761	3,857	1,052	2,952	4,004	111	264		375
<b>2002 TOTAL</b>	<b>3,812</b>	<b>21.0</b>	<b>14,344</b>	<b>79.0</b>	<b>18,156</b>	<b>2,566</b>	<b>10,310</b>	<b>12,876</b>	<b>1,078</b>	<b>3,475</b>	<b>4,553</b>	<b>168</b>	<b>559</b>	<b>d/</b>	<b>727</b>
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
<b>2003 TOTAL</b>	<b>1,547</b>	<b>2.4</b>	<b>62,815</b>	<b>97.6</b>	<b>64,362</b>	<b>758</b>	<b>31,195</b>	<b>31,953</b>	<b>634</b>	<b>29,752</b>	<b>30,386</b>	<b>155</b>	<b>1,867</b>	<b>d/</b>	<b>2,022</b>
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
<b>2004 TOTAL</b>	<b>5,224</b>	<b>17.7</b>	<b>24,310</b>	<b>82.3</b>	<b>29,534</b>	<b>3,839</b>	<b>11,545</b>	<b>15,384</b>	<b>1,059</b>	<b>12,384</b>	<b>13,443</b>	<b>327</b>	<b>381</b>	<b>d/</b>	<b>708</b>
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
<b>2005 TOTAL</b>	<b>899</b>	<b>3.2</b>	<b>27,332</b>	<b>96.8</b>	<b>28,231</b>	<b>751</b>	<b>12,717</b>	<b>13,468</b>	<b>48</b>	<b>13,758</b>	<b>13,806</b>	<b>100</b>	<b>856</b>	<b>d/</b>	<b>956</b>
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
<b>2006 TOTAL</b>	<b>12,290</b>	<b>35.2</b>	<b>22,622</b>	<b>64.8</b>	<b>34,912</b>	<b>8,228</b>	<b>14,566</b>	<b>22,794</b>	<b>3,938</b>	<b>8,056</b>	<b>11,994</b>	<b>124</b>	<b>0</b>	<b>d/</b>	<b>124</b>
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
<b>2007 TOTAL</b>	<b>886</b>	<b>1.5</b>	<b>57,987</b>	<b>98.5</b>	<b>58,873</b>	<b>765</b>	<b>38,967</b>	<b>39,732</b>	<b>33</b>	<b>18,081</b>	<b>18,114</b>	<b>89</b>	<b>939</b>	<b>d/</b>	<b>1,028</b>
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
<b>2008 TOTAL</b>	<b>7,856</b>	<b>34.2</b>	<b>15,141</b>	<b>65.8</b>	<b>22,997</b>	<b>6,861</b>	<b>10,408</b>	<b>17,269</b>	<b>801</b>	<b>4,451</b>	<b>5,252</b>	<b>194</b>	<b>281</b>	<b>d/</b>	<b>475</b>
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
<b>2009 TOTAL</b>	<b>6,018</b>	<b>20.3</b>	<b>23,575</b>	<b>79.7</b>	<b>29,593</b>	<b>5,732</b>	<b>15,663</b>	<b>21,395</b>	<b>141</b>	<b>7,353</b>	<b>7,494</b>	<b>145</b>	<b>559</b>	<b>d/</b>	<b>704</b>
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
<b>2010 TOTAL</b>	<b>12,554</b>	<b>30.8</b>	<b>28,238</b>	<b>69.2</b>	<b>40,792</b>	<b>10,969</b>	<b>20,301</b>	<b>31,270</b>	<b>1,458</b>	<b>7,749</b>	<b>9,207</b>	<b>127</b>	<b>188</b>	<b>d/</b>	<b>315</b>
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
<b>2011 TOTAL</b>	<b>35,277</b>	<b>43.6</b>	<b>45,542</b>	<b>56.4</b>	<b>80,819</b>	<b>32,527</b>	<b>30,810</b>	<b>63,337</b>	<b>1,840</b>	<b>13,882</b>	<b>15,722</b>	<b>910</b>	<b>851</b>	<b>d/</b>	<b>1,761</b>
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
<b>2012 TOTAL</b>	<b>5,243</b>	<b>7.1</b>	<b>68,423</b>	<b>92.9</b>	<b>73,666</b>	<b>5,120</b>	<b>49,317</b>	<b>54,437</b>	<b>92</b>	<b>17,461</b>	<b>17,553</b>	<b>31</b>	<b>1,644</b>	<b>d/</b>	<b>2,448</b>
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
<b>2013 TOTAL</b>	<b>6,717</b>	<b>18.2</b>	<b>30,272</b>	<b>81.8</b>	<b>36,989</b>	<b>6,582</b>	<b>25,675</b>	<b>32,257</b>	<b>135</b>	<b>3,717</b>	<b>3,852</b>	<b>0</b>	<b>880</b>	<b>d/</b>	<b>880</b>
2014 NATURAL	5,553	32.0	11,814	68.0	17,367	5,492	11,528	17,020	-19	10	-9	80	276		356
2014 TRH	1,385	6.8	19,078	93.2	20,463	1,111	11,577	12,688	240	6,965	7,205	34	536		570
<b>2014 TOTAL</b>	<b>6,938</b>	<b>18.3</b>	<b>30,892</b>	<b>81.7</b>	<b>37,830</b>	<b>6,603</b>	<b>23,105</b>	<b>29,708</b>	<b>221</b>	<b>6,975</b>	<b>7,196</b>	<b>114</b>	<b>812</b>	<b>d/</b>	<b>926</b>
2015 NATURAL	2,226	38.1	3,609	61.9	5,834	2,167	3,576	5,744	41	16	57	17	17		34
2015 TRH	524	11.6	4,006	88.4	4,531	338	875	1,212	183	3,113	3,296	4	18		22
<b>2015 TOTAL</b>	<b>2,750</b>	<b>26.5</b>	<b>7,615</b>	<b>73.5</b>	<b>10,365</b>	<b>2,505</b>	<b>4,451</b>	<b>6,956</b>	<b>224</b>	<b>3,129</b>	<b>3,353</b>	<b>21</b>	<b>35</b>	<b>d/</b>	<b>56</b>
2016 NATURAL	1,022	25.5	2,987	74.5	4,008	979	2,853	3,831	43	108	151	0	26		26
2016 TRH	639	29.2	1,548	70.8	2,188	281	500	782	358	1,034	1,392	0	14		14
<b>2016 TOTAL</b>	<b>1,661</b>	<b>26.8</b>	<b>4,535</b>	<b>73.2</b>	<b>6,196</b>	<b>1,260</b>	<b>3,353</b>	<b>4,613</b>	<b>401</b>	<b>1,142</b>	<b>1,543</b>	<b>0</b>	<b>40</b>	<b>d/</b>	<b>40</b>

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

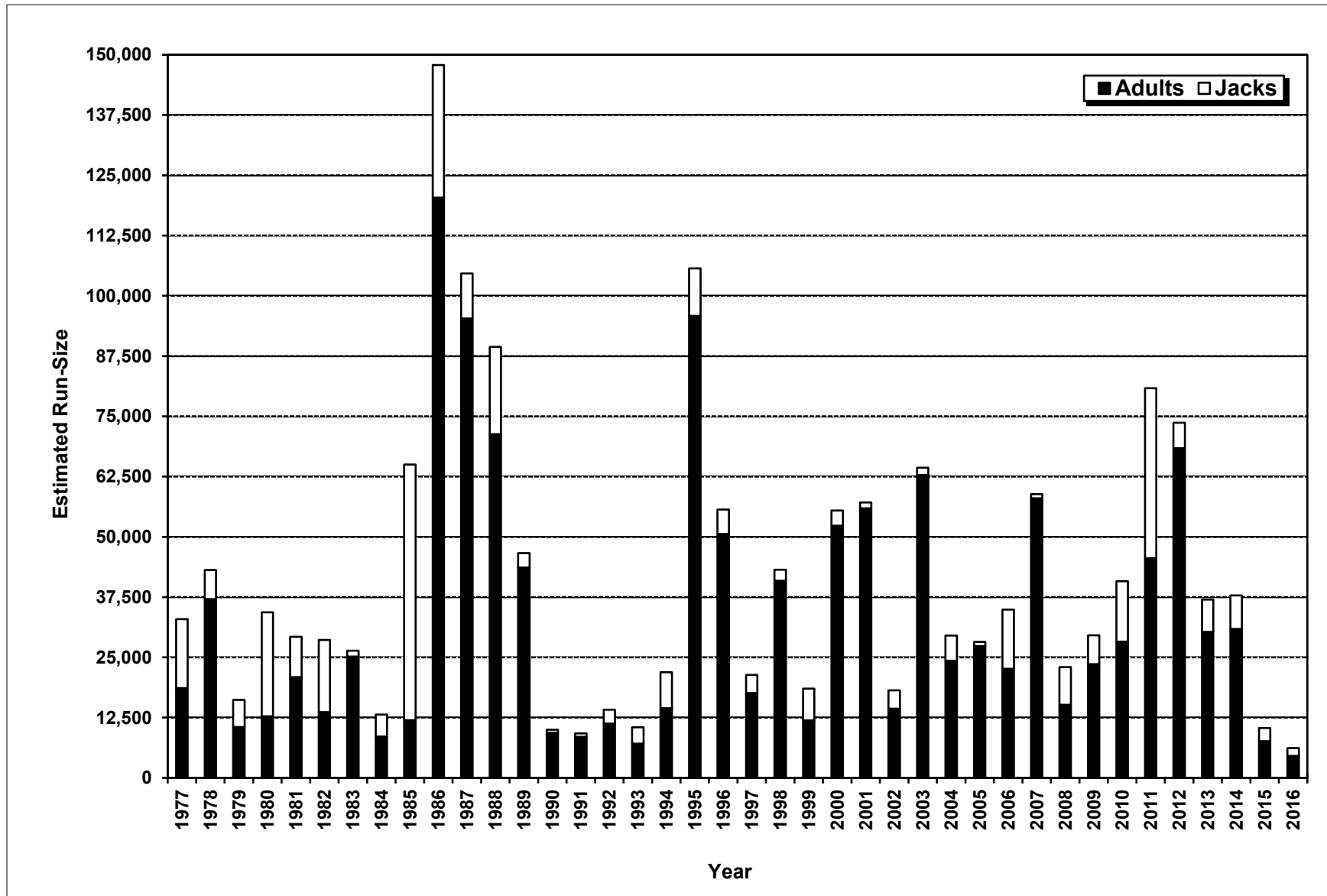
b/ The 1978 sport harvest of fall Chinook was restricted by a salmon fishing closure beginning August 25, 1978.

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

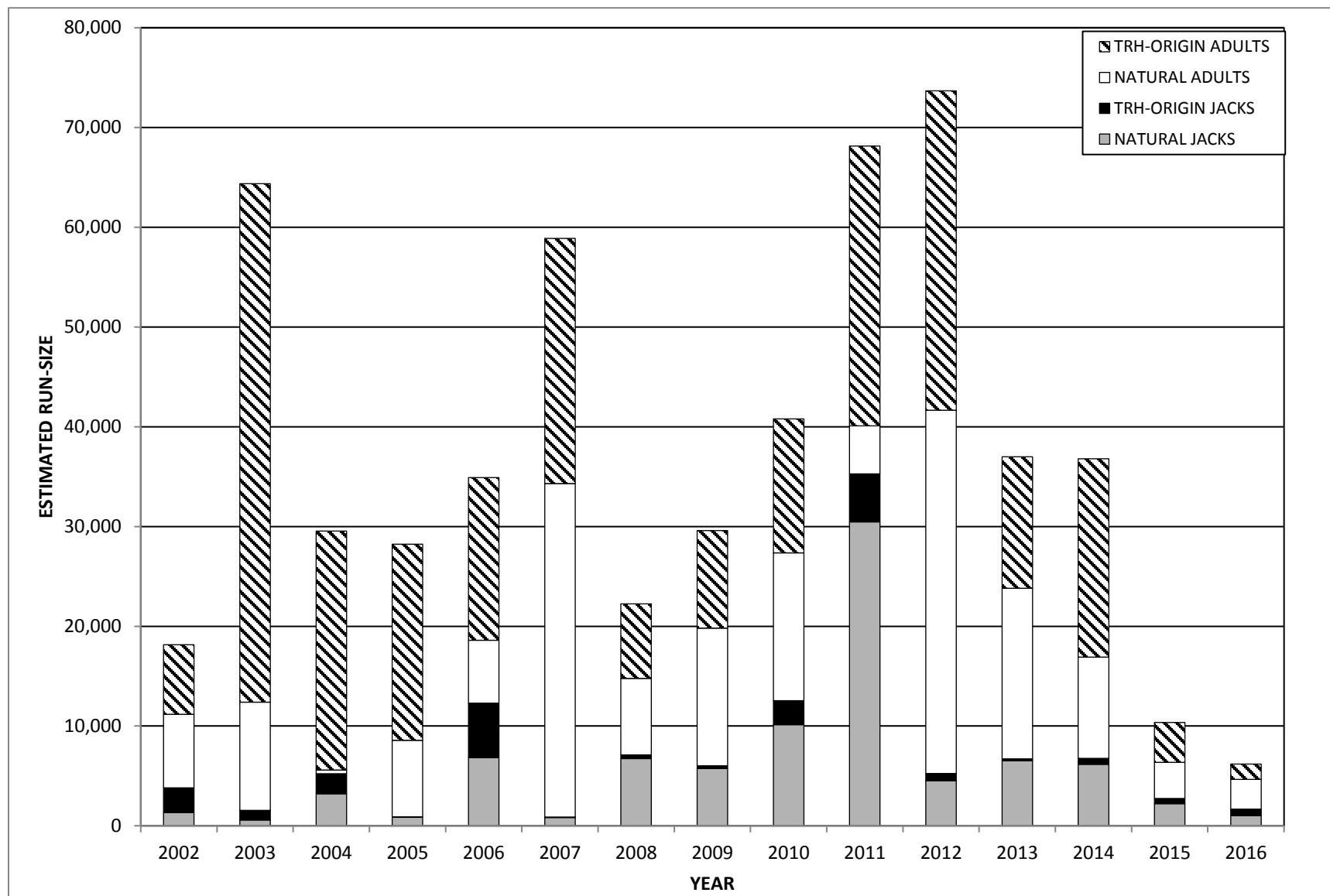
d/ The 1999-2013 sport harvest of Klamath Basin fall Chinook was managed with a quota system. The quota for adult fall Chinook was 957 in 1999; 693 in 2000; 9,834 in 2001; 6,926 in 2002; 10,800 in 2003; 4,700 in 2004; 1,262 in 2005, zero in 2006, 10,600 in 2007, 20,500 in 2008, 30,800 in 2009, 12,000 in 2010, 7,900 in 2011, 67,600 in 2012, 40,006 in 2013, 4,128 in 2014, 14,133 in 2015, and 1,110 in 2016.

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 – 2016.



**Appendix 20. Fall Chinook estimated run-size for the Trinity River upstream of Willow Creek weir, 2002 – 2016, 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 2016-17 season.<sup>a</sup>**

FL (cm)	WCW			RECOVERIES							Total Recoveries	% Recoveries
	Total Trapped	Total Tagged <sup>b</sup>	RM-clips <sup>c</sup>	Tag Morts <sup>d</sup>	Angler Harvest <sup>e</sup>	TRH <sup>f</sup> Recoveries	Carcass <sup>g</sup> Recoveries	Found Tags <sup>h</sup>	Angler Released <sup>i</sup>			
39										0	--	
40	1	1	1							0	0.0	
41										0	--	
42										0	--	
43										0	--	
44										0	--	
45										0	--	
46										0	--	
47										0	--	
48										0	--	
49										0	--	
50	1	1	1							0	0.0	
51										0	--	
52										0	--	
53										0	--	
54										0	--	
55										0	--	
56	1	1	1				1			1	100.0	
57										0	--	
58										0	--	
59										0	--	
60										0	--	
61										0	--	
62										0	--	
63										0	--	
64										0	--	
65										0	--	
66										0	--	
67										0	--	
68										0	--	
69										0	--	
70										0	--	
Totals:	3	3	3	0	0	0	1	0	0	1	33.3	
Mean FL:	48.7	48.7	48.7	--	--	--	56.0	--	--	56.0		
Total jacks: <sup>j</sup>	2	2	2	0	0	0	0	0	0	0	0	
Total adults:	1	1	1	0	0	0	1	0	0	1	100	

a/ Trapping at Willow Creek weir took place August 25 - October 12, 2016 (Julian weeks 34-41).

b/ No 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 2016.

f/ Trapping occurred at Trinity River Hatchery September 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys.

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

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

j/ Coho <52 cm FL were considered jacks in 2016.

Appendix 22. Coho run-size, spawner escapement, and angler harvest estimates for the Trinity River upstream of Willow Creek weir, 1977- 2016.

YEAR	Run-size estimate				Spawner escapements							Angler harvest		
	Number	Percent	Number	Percent	Natural Area Spawners <sup>d</sup>			Trinity River Hatchery			Jacks	Adults	Total	
	Jacks <sup>e</sup>		Adults		Total	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 <sup>b</sup>		0
1979	9,067	78.0	2,557	22.0	11,624	5,567	1,695	7,262	2,793	742	3,535	707	120	827
1980	2,499	41.0	3,595	59.0	6,094	954	1,817	2,771	1,545	1,778	3,323			0
1981	6,144	56.0	4,826	44.0	10,970	3,486	1,995	5,481	1,994	2,529	4,523	664	302	966
1982	2,021	17.5	9,508	82.5	11,529	1,158	5,097	6,255	823	3,975	4,798	40	436	476
1983	536	27.2	1,435	72.8	1,971	295	788	1,083	192	514	706	49	133	182
1984	15,208	77.2	4,486	22.8	19,694	6,188	2,971	9,159	7,727	1,134	8,861	1,293	381	1,674
1985	9,216	23.7	29,717	76.3	38,933	4,798	21,586	26,384	4,237	7,549	11,786	181	582	763 <sup>c</sup>
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	1,050	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 <sup>d</sup>
1997	5,951	75.0	1,984	25.0	7,935	5,038	1,097	6,135	871	887	1,758	42	0	42 <sup>d</sup>
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 <sup>d</sup>
1999	623	11.3	4,912	88.7	5,535	234	1,696	1,930	389	3,118	3,507	0	98	98 <sup>d</sup>
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 <sup>d</sup>
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 <sup>d</sup>
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 <sup>d</sup>
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 <sup>d</sup>
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 <sup>d</sup>
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 <sup>d</sup>
2006	1,369	6.8	18,709	93.2	20,078	708	8,870	9,578	661	9,839	10,500	0	0	0 <sup>d</sup>
2007	545	9.5	5,205	90.5	5,750	270	2,552	2,822	275	2,653	2,928	0	0	0 <sup>d</sup>
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 <sup>d</sup>
2009	1,762	27.5	4,634	72.5	6,396	888	2,157	3,045	874	2,477	3,351	0	0	0 <sup>d</sup>
2010	1,278	16.1	6,669	83.9	7,947	752	2,770	3,522	526	3,899	4,425	0	0	0 <sup>d</sup>
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 <sup>d</sup>
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 <sup>d</sup>
2013	2,819	12.9	19,087	87.1	21,906	2,382	12,883	15,275	427	6,204	6,631	0	0	0 <sup>d</sup>
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 <sup>d</sup>
2015	935	20.2	3,684	79.8	4,619	657	625	1,282	278	3,059	3,337	0	0	0 <sup>d</sup>
2016	208	15.7	1,117	84.3	1,325	163	635	798	45	482	527	0	0	0 <sup>d</sup>

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.

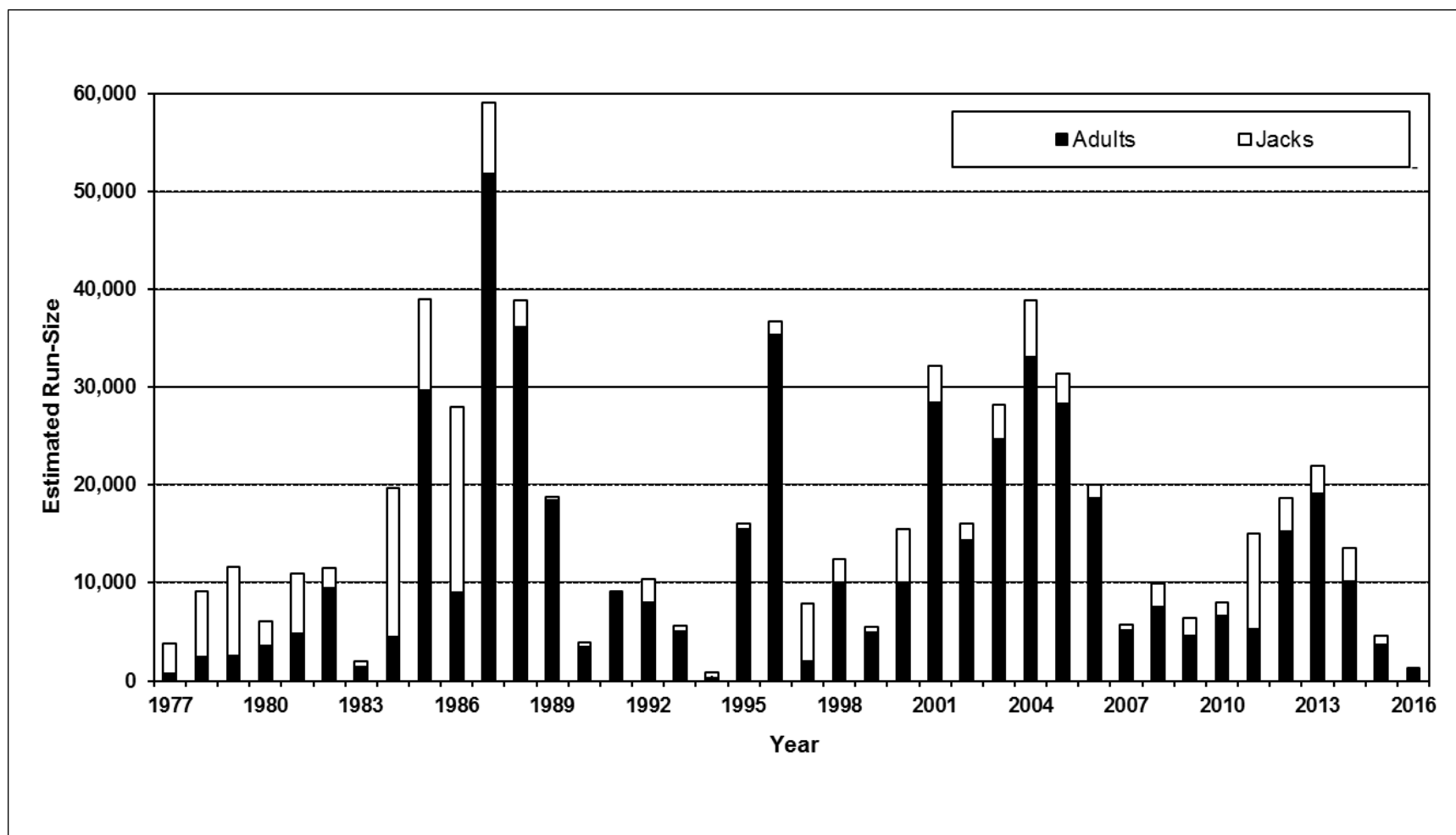
c/ The 1985 sport harvest of adult coho was limited by a closure for the taking of salmon > 55 cm total length beginning September 22, 1985.

d/ The 1996-2016 sport fishery was closed to the take of coho salmon.

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

f/ The methods used to estimate the run-size and escapement of coho in 2016 differs from those in other years due to insufficient sample marked at Willow Creek weir.

Appendix 23. Coho estimated run-size for the Trinity River upstream of Willow Creek weir, 1977- 2016.

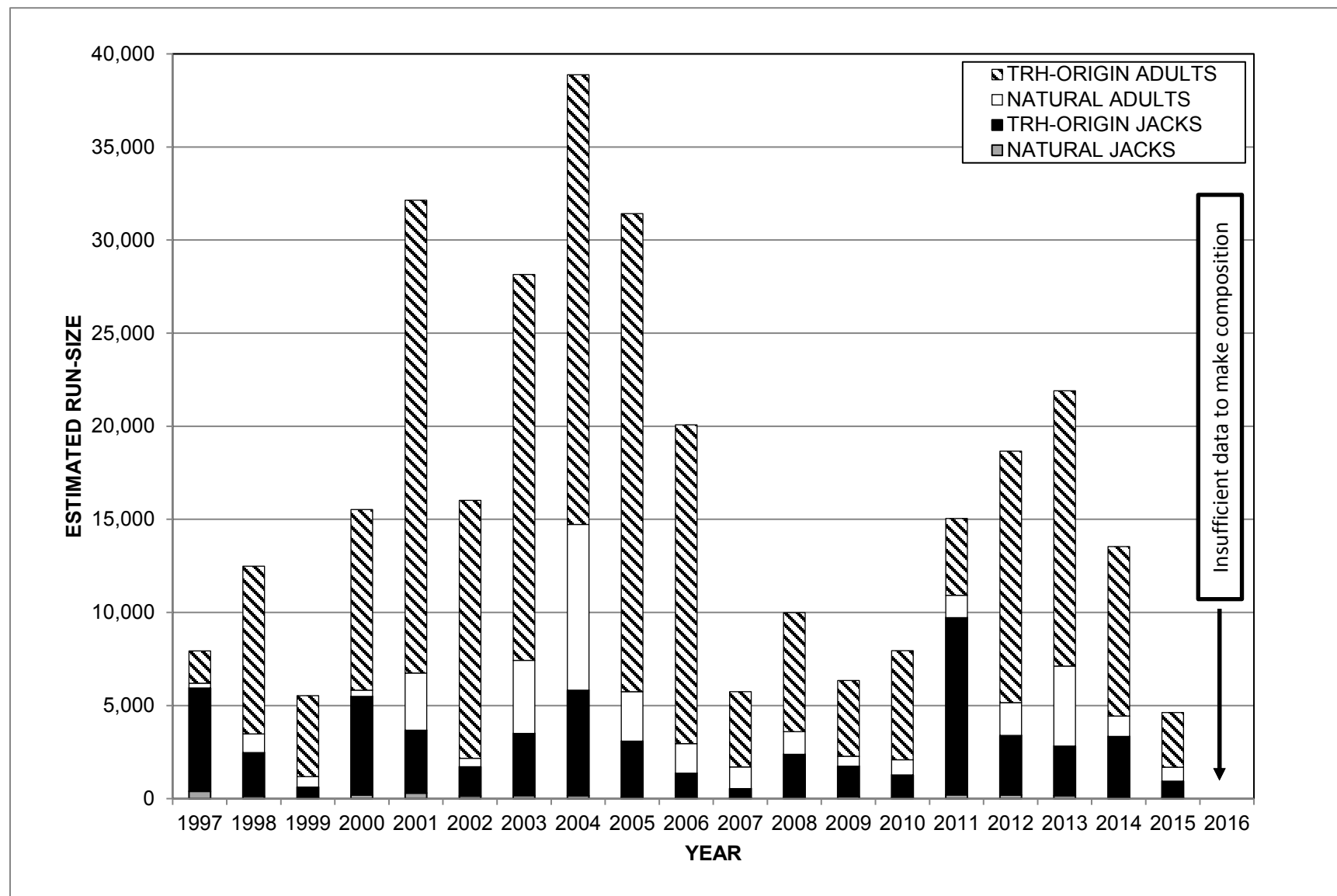


**Appendix 24. Coho Salmon estimated run-size and spawner escapement for the Trinity River upstream of Willow Creek weir, 1997 – 2016, showing natural- and TRH-origin composition.**

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
	<b>TOTAL</b>	<b>5,951</b>	<b>1,984</b>	<b>7,935</b>	<b>5,038</b>	<b>1,097</b>	<b>6,135</b>	<b>871</b>	<b>887</b>	<b>1,758</b>
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
	<b>TOTAL</b>	<b>2,471</b>	<b>10,009</b>	<b>12,480</b>	<b>1,494</b>	<b>5,995</b>	<b>7,489</b>	<b>977</b>	<b>4,014</b>	<b>4,991</b>
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
	<b>TOTAL</b>	<b>623</b>	<b>4,912</b>	<b>5,535</b>	<b>234</b>	<b>1,696</b>	<b>1,930</b>	<b>389</b>	<b>3,118</b>	<b>3,507</b>
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
	<b>TOTAL</b>	<b>5,486</b>	<b>10,046</b>	<b>15,532</b>	<b>4,560</b>	<b>6,585</b>	<b>11,145</b>	<b>926</b>	<b>3,461</b>	<b>4,387</b>
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
	<b>TOTAL</b>	<b>3,670</b>	<b>28,470</b>	<b>32,140</b>	<b>2,644</b>	<b>18,715</b>	<b>21,359</b>	<b>1,026</b>	<b>9,755</b>	<b>20,781</b>
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
	<b>TOTAL</b>	<b>1,709</b>	<b>14,307</b>	<b>16,016</b>	<b>1,006</b>	<b>7,812</b>	<b>8,818</b>	<b>703</b>	<b>6,495</b>	<b>7,198</b>
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
	<b>TOTAL</b>	<b>3,501</b>	<b>24,651</b>	<b>28,152</b>	<b>2,038</b>	<b>14,255</b>	<b>16,294</b>	<b>1,463</b>	<b>10,396</b>	<b>11,859</b>
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
	<b>TOTAL</b>	<b>5,819</b>	<b>33,063</b>	<b>38,882</b>	<b>4,742</b>	<b>23,117</b>	<b>27,859</b>	<b>1,077</b>	<b>9,906</b>	<b>10,983</b>
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
	<b>TOTAL</b>	<b>3,093</b>	<b>28,326</b>	<b>31,419</b>	<b>1,341</b>	<b>11,702</b>	<b>13,043</b>	<b>1,731</b>	<b>16,624</b>	<b>18,355</b>
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
	<b>TOTAL</b>	<b>1,369</b>	<b>18,709</b>	<b>20,078</b>	<b>708</b>	<b>8,870</b>	<b>9,578</b>	<b>661</b>	<b>9,839</b>	<b>10,500</b>
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
	<b>TOTAL</b>	<b>545</b>	<b>5,205</b>	<b>5,750</b>	<b>270</b>	<b>2,552</b>	<b>2,822</b>	<b>275</b>	<b>2,653</b>	<b>2,928</b>
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
	<b>TOTAL</b>	<b>2,379</b>	<b>7,604</b>	<b>9,983</b>	<b>1,730</b>	<b>3,065</b>	<b>4,795</b>	<b>649</b>	<b>4,539</b>	<b>5,188</b>
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
	<b>TOTAL</b>	<b>1,746</b>	<b>4,596</b>	<b>6,342</b>	<b>871</b>	<b>2,110</b>	<b>2,981</b>	<b>875</b>	<b>2,477</b>	<b>3,352</b>
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
	<b>TOTAL</b>	<b>1,277</b>	<b>6,669</b>	<b>7,946</b>	<b>751</b>	<b>2,770</b>	<b>3,521</b>	<b>526</b>	<b>3,899</b>	<b>4,425</b>
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
	<b>TOTAL</b>	<b>9,722</b>	<b>5,318</b>	<b>15,040</b>	<b>6,793</b>	<b>3,394</b>	<b>10,187</b>	<b>2,886</b>	<b>1,924</b>	<b>4,810</b>
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
	<b>TOTAL</b>	<b>3,390</b>	<b>15,268</b>	<b>18,658</b>	<b>2,511</b>	<b>7,912</b>	<b>10,423</b>	<b>879</b>	<b>7,356</b>	<b>8,235</b>
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
	<b>TOTAL</b>	<b>2,819</b>	<b>19,087</b>	<b>21,905</b>	<b>2,392</b>	<b>12,883</b>	<b>15,274</b>	<b>427</b>	<b>6,204</b>	<b>6,631</b>
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
	<b>TOTAL</b>	<b>3,338</b>	<b>10,199</b>	<b>13,537</b>	<b>2,401</b>	<b>7,228</b>	<b>9,629</b>	<b>937</b>	<b>2,971</b>	<b>3,908</b>
2015	Natural	65	748	814	57	459	517	8	289	297
	TRH	870	2,936	3,805	600	166	765	270	2,770	3,040
	<b>TOTAL</b>	<b>935</b>	<b>3,684</b>	<b>4,619</b>	<b>657</b>	<b>625</b>	<b>1,282</b>	<b>278</b>	<b>3,059</b>	<b>3,337</b>
2016	Natural	163	635	798	insufficient sample to make estimation of composition			0	74	74
	TRH	45	482	527				45	408	453
	<b>TOTAL</b>	<b>208</b>	<b>1,117</b>	<b>1,325</b>	<b>163</b>	<b>635</b>	<b>798</b>	<b>45</b>	<b>482</b>	<b>527</b>



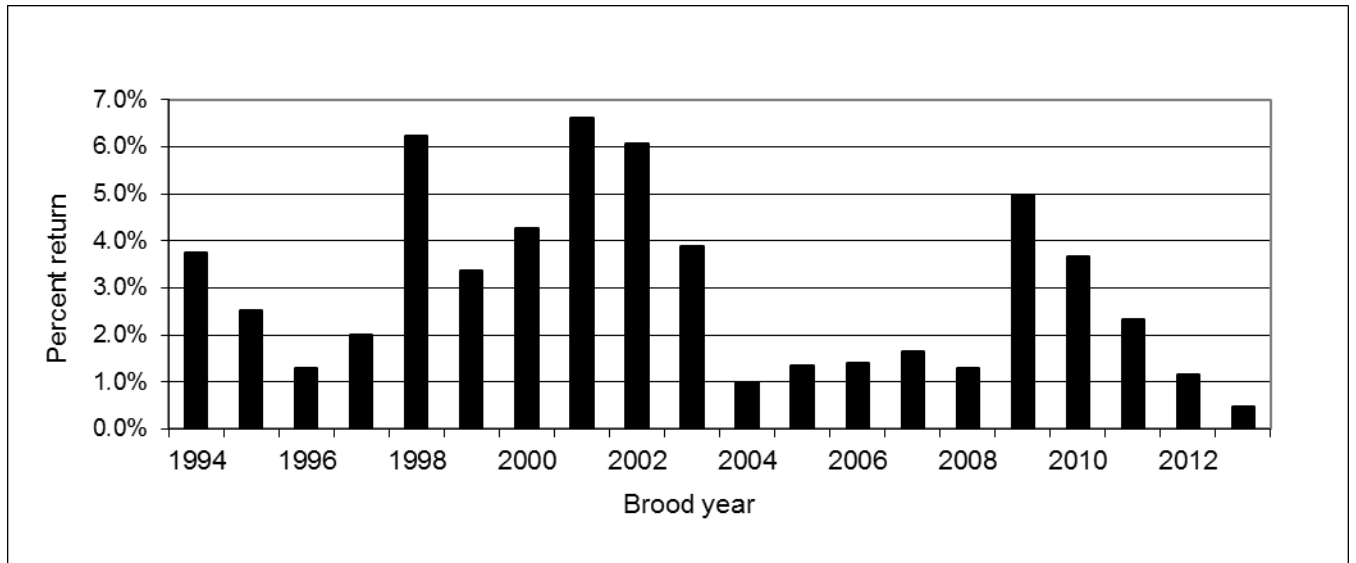
**Appendix 25. Coho estimated run-size for the Trinity River upstream of Willow Creek weir, 1997 – 2016, showing natural- and TRH-origin composition.**



**Appendix 26. Brood year performance and return data for Trinity River Hatchery Coho Salmon returning to Trinity River, upstream of Willow Creek weir, 1994 - 2013.**

Release data				Return data						
Brood year	Date	Effective Number	Site	Age	Run-size	% of release	In-river harvest	Spawner Escapement		
								TRH	Natural	Total
1994	3/17-21/96	72,311	TRH	2	970	1.34%	0	105	865	970
				3	1,732	2.40%	0	867	865	1,732
				Totals:	2,702	3.74%	0	972	1,730	2,702
1995	3/17-21/97	580,880	TRH	2	5,552	0.96%	39	858	4,655	5,513
				3	9,008	1.55%	0	3,899	5,109	9,008
				Totals:	14,560	2.51%	39	4,757	9,764	14,521
1996	3/16-20/98	513,663	TRH	2	2,340	0.46%	0	969	1,371	2,340
				3	4,357	0.85%	86	3,015	1,256	4,271
				Totals:	6,697	1.30%	86	3,984	2,627	6,611
1997	3/15-22/99	517,196	TRH	2	592	0.11%	0	381	211	592
				3	9,704	1.88%	0	3,407	6,297	9,704
				Totals:	10,296	1.99%	0	3,788	6,508	10,296
1998	3/15-20/00	493,233	TRH	2	5,289	1.07%	0	916	4,373	5,289
				3	25,395	5.15%	0	9,625	15,770	25,395
				Totals:	30,684	6.22%	0	10,541	20,143	30,684
1999	3/15-22/01	512,986	TRH	2	3,373	0.66%	0	1,024	2,349	3,373
				3	13,849	2.70%	0	6,409	7,440	13,849
				Totals:	17,222	3.36%	0	7,433	9,789	17,222
2000	3/17-19/02	524,238	TRH	2	1,571	0.30%	0	688	883	1,571
				3	20,721	3.95%	0	9,730	10,991	20,721
				Totals:	22,292	4.25%	0	10,418	11,874	22,292
2001	3/17-19/03	416,201	TRH	2	3,338	0.80%	0	1,449	1,889	3,338
				3	24,162	5.81%	40	8,835	15,287	24,122
				Totals:	27,500	6.60%	40	10,284	17,176	27,460
2002	3/15-18/04	516,906	TRH	2	5,665	1.10%	0	1,068	4,597	5,665
				3	25,678	4.97%	0	15,704	9,974	25,678
				Totals:	31,343	6.06%	0	16,772	14,571	31,343
2003	3/14-18/05	520,847	TRH	2	3,012	0.58%	21	1,269	1,721	2,990
				3	17,123	3.29%	0	7,454	9,669	17,123
				Totals:	20,135	3.90%	21	8,723	11,390	20,113
2004	3/15-20/06	545,199	TRH	2	1,331	0.24%	0	657	674	1,331
				3	4,048	0.74%	0	2,436	1,612	4,048
				Totals:	5,379	0.99%	0	3,093	2,286	5,379
2005	3/15-20/07	511,961	TRH	2	503	0.10%	0	270	233	503
				3	6,381	1.25%	0	4,177	2,204	6,381
				Totals:	6,884	1.34%	0	4,447	2,437	6,884
2006	3/15-20/08	455,482	TRH	2	2,290	0.50%	0	643	1,647	2,290
				3	4,067	0.89%	0	2,386	1,681	4,067
				Totals:	6,357	1.40%	0	3,029	3,328	6,357
2007	3/16-20/09	457,478	TRH	2	1,645	0.36%	0	871	774	1,645
				3	5,852	1.28%	0	3,706	2,146	5,852
				Totals:	7,497	1.64%	0	4,577	2,920	7,497
2008	4/6-8/10	413,178	TRH	2	1,233	0.30%	0	516	707	1,233
				3	4,113	1.00%	0	1,710	2,403	4,113
				Totals:	5,346	1.29%	0	2,226	3,110	5,336
2009	3/15-28/11	490,998	TRH	2	10,982	2.24%	0	2,862	8,120	10,982
				3	13,494	2.75%	0	7,159	6,335	13,494
				Totals:	24,476	4.98%	0	10,021	14,455	24,476
2010	3/15-26/12	489,429	TRH	2	3,198	0.65%	0	871	2,327	3,198
				3	14,782	3.02%	0	5,847	8,935	14,782
				Totals:	17,980	3.67%	0	6,718	11,262	17,980
2011	3/15-20/13	511,618	TRH	2	2,667	0.52%	0	424	2,243	2,667
				3	9,297	1.82%	0	2,892	6,405	9,297
				Totals:	11,964	2.34%	0	3,316	8,648	11,964
2012	3/15-18/14	528,016	TRH	2	3,239	0.61%	0	932	2,307	3,239
				3	2,936	0.56%	0	2,770	166	2,936
				Totals:	6,175	1.17%	0	3,702	2,473	6,175
2013	3/15-23/15	287,720	TRH	2	870	0.30%	0	270	600	870
				3	482	0.17%	0	408	74	482
				Totals:	1,352	0.47%	0	678	674	1,352

**Appendix 27. Percent return for Trinity River Hatchery-produced Coho Salmon, 1994 – 2013 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 2016-17 season.<sup>a</sup>**

FL (cm)	WCW			RECOVERIES							
	Total Trapped	Total Tagged <sup>b</sup>	Ad-clips <sup>c</sup>	Tag Morts <sup>d</sup>	Angler Harvest <sup>e</sup>	TRH <sup>f</sup> Recoveries	Carcass <sup>g</sup> Recoveries	Found Tags <sup>h</sup>	Angler Released <sup>i</sup>	Total Recoveries	% Recoveries
31	1									--	--
32	1									--	--
33										--	--
34	1		1							--	--
35	2									--	--
36	11		5							--	--
37	10		7							--	--
38	7		4							--	--
39	5		5							--	--
40	3		2							--	--
41	4									--	--
42	1	1	1							0	0.0
43	3	3	1							0	0.0
44	2	2			1					1	50.0
45	5	5	1			1				1	20.0
46	4	4								0	0.0
47	5	5								0	0.0
48	5	5	1							0	0.0
49	7	7	2			2			1	3	42.9
50	9	9	1			1			1	2	22.2
51	7	7							3	3	42.9
52	10	10	3		1	1				2	20.0
53	19	19	7			4			3	7	36.8
54	21	21	12		1	8				9	42.9
55	36	36	20			11		1	3	15	41.7
56	27	27	16			12			5	17	63.0
57	34	33	17		1	4			3	8	24.2
58	27	27	10			6			2	8	29.6
59	29	29	18		1	12			2	15	51.7
60	28	27	14			7			4	11	40.7
61	22	22	13			11				11	50.0
62	25	25	17			10				10	40.0
63	26	25	15		1	9			2	12	48.0
64	20	20	12		1	5			2	8	40.0
65	22	21	16			9			4	13	61.9
66	22	22	15		1	5			2	8	36.4
67	17	17	11			4			2	6	35.3
68	16	16	11			8			2	10	62.5
69	20	18	19		1	9		1		11	61.1
70	11	11	7			3			1	4	36.4
71	15	15	13			6			2	8	53.3
72	5	5	4			2			1	3	60.0
73	4	4	3			2				2	50.0
74	7	7	6			5				5	71.4
75	2	2	2			2				2	100.0
76	4	4	4			2			1	3	75.0
77										--	--
78	1	1	1							0	0.0
Totals:	563	512	317	0	9	161	0	2	46	218	42.6
Mean FL:	58.4	60.1	60.3	--	58.7	62.1	--	62.0	60.4	61.6	
Total 1/2lb <sup>ers</sup>	45	0	24	0	0	0	0	0	0	0	
Total adults <sup>j</sup> :	518	512	293	0	9	161	0	2	46	218	42.6

a/ Trapping at Willow Creek weir took place August 25 - October 12, 2016 (Julian weeks 34-41).

b/ Fifty one steelhead were trapped but not tagged at WCW in 2016; 45 were half-pounders (too small), and 6 adults were in 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; of which we found none in 2016.

e/ Fish reported as harvested by anglers.

f/ Trapping occurred at Trinity River Hatchery September 6, 2016 - March 7, 2017 (JWs 36-10; closed parts or all of JWs 41-43).

g/ Fish recovered in upper Trinity River spawner surveys; of which we found none in 2016.

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<sup>a</sup> (>41 cm FL) entering Trinity River Hatchery (TRH) and number recovered that were tagged at Willow Creek (WCW) or Junction City weir (JCW) during the 2016-17 season.<sup>b</sup>**

Julian Week of Entry <sup>c</sup>	Inclusive Dates			Number Entering TRH	Recoveries from	
					WCW	JCW
36	3-Sep	-	9-Sep	--		
37	10-Sep	-	16-Sep	4		
38	17-Sep	-	23-Sep	4		
39	24-Sep	-	30-Sep	3		
40	1-Oct	-	7-Oct	3		
41	8-Oct	-	14-Oct	--		
42	15-Oct	-	21-Oct	--		
43	22-Oct	-	28-Oct	99	11	10
44	29-Oct	-	4-Nov	127	25	5
45	5-Nov	-	11-Nov	59	7	2
46	12-Nov	-	18-Nov	83	15	1
47	19-Nov	-	25-Nov	66	9	2
48	26-Nov	-	2-Dec	77	11	
49	3-Dec	-	9-Dec	15	2	
50	10-Dec	-	16-Dec	42	6	2
51	17-Dec	-	23-Dec	223	17	1
52	24-Dec	-	31-Dec	38	2	
1	1-Jan	-	7-Jan	21	1	1
2	8-Jan	-	14-Jan	22	3	1
3	15-Jan	-	21-Jan	54	5	1
4	22-Jan	-	28-Jan	149	16	2
5	29-Jan	-	4-Feb	137	8	
6	5-Feb	-	11-Feb	161	14	
7	12-Feb	-	18-Feb	121	8	1
8	19-Feb	-	25-Feb	47	1	1
9	26-Feb	-	4-Mar	19		
10	5-Mar	-	11-Mar	--		
Totals:				1,574	161	30

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

b/ Trapping occurred at TRH Sep 6, 2016 - March 7, 2017 (Julian weeks 36 -10; closed all/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 - 2016.**

Year	Run-size estimate				Total	Spawner escapement						Angler harvest		
	Hatchery <sup>b</sup>		Wild <sup>c</sup>			Natural Area Spawners <sup>a</sup>			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 <sup>d</sup>			817	"		
1989			"		37,276			28,933			4,765			3,578
1990			"		5,348			3,188			930			1,230
1991			"		11,417			8,631			446			2,340
1992	1,315	43.2	1,731	56.8	3,046	759	1,540	2,299	430	25	455	126	166	292
1993	1,894	58.4	1,349	41.6	3,243	801	1,176	1,977	875	10	885	218	163	381
1994	1,477	34.8	2,767	65.2	4,244	878	2,410	3,288	403	8	411	196	349	545
1995	1,595	37.2	2,693	62.8	4,288	1,424	1,867	3,291	681	24	705	147	145	292
1996	8,598	82.4	1,837	17.6	10,435	4,127	1,703	5,830	3,964	48	4,012	507	86	593
1997	No estimates for hatchery/wild component				5,212	No estimates			4,267	No estimates		429	No estimates	
1998			"		2,972		"	2,463		"	441	"		68 <sup>e</sup>
1999			"		5,470		"	3,817		"	1,571	"		82 <sup>e</sup>
2000			"		8,042		"	7,097		"	768	"		177 <sup>e</sup>
2001			"		12,638		"	9,938		"	2,333	"		367 <sup>e</sup>
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 <sup>e</sup>
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 <sup>e</sup>
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 <sup>e</sup>
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 <sup>e</sup>
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 <sup>e</sup>
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 <sup>e</sup>
2008	9,538	64	5,477	36	15,015	6,680	5,415	12,095	2,471	24	2,495	386	38	424 <sup>e</sup>
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 <sup>e</sup>
2010	4,640	55	3,811	45	8,451	2,468	3,749	6,217	2,000	37	2,037	172	25	197 <sup>e</sup>
2011	14,969	68	6,932	32	21,901	8,344	6,850	15,194	5,700	50	5,750	925	32	957 <sup>e</sup>
2012	12,253	59	8,359	41	20,612	6,060	8,215	14,275	5,685	52	5,737	507	92	599 <sup>e</sup>
2013	7,389	45	9,205	55	16,594	4,521	9,039	13,560	2,295	80	2,375	573	86	659 <sup>e</sup>
2014	4,460	43	5,822	57	10,282	1,822	5,691	7,513	2,499	62	2,561	139	69	208 <sup>e</sup>
2015	8,713	78	2,454	22	11,167	5,043	2,417	7,460	3,235	37	3,272	436	0	436 <sup>e</sup>
2016	2,568	57	1,972	43	4,540	943	1,927	2,870	1,557	17	1,574	68	28	96 <sup>e</sup>

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

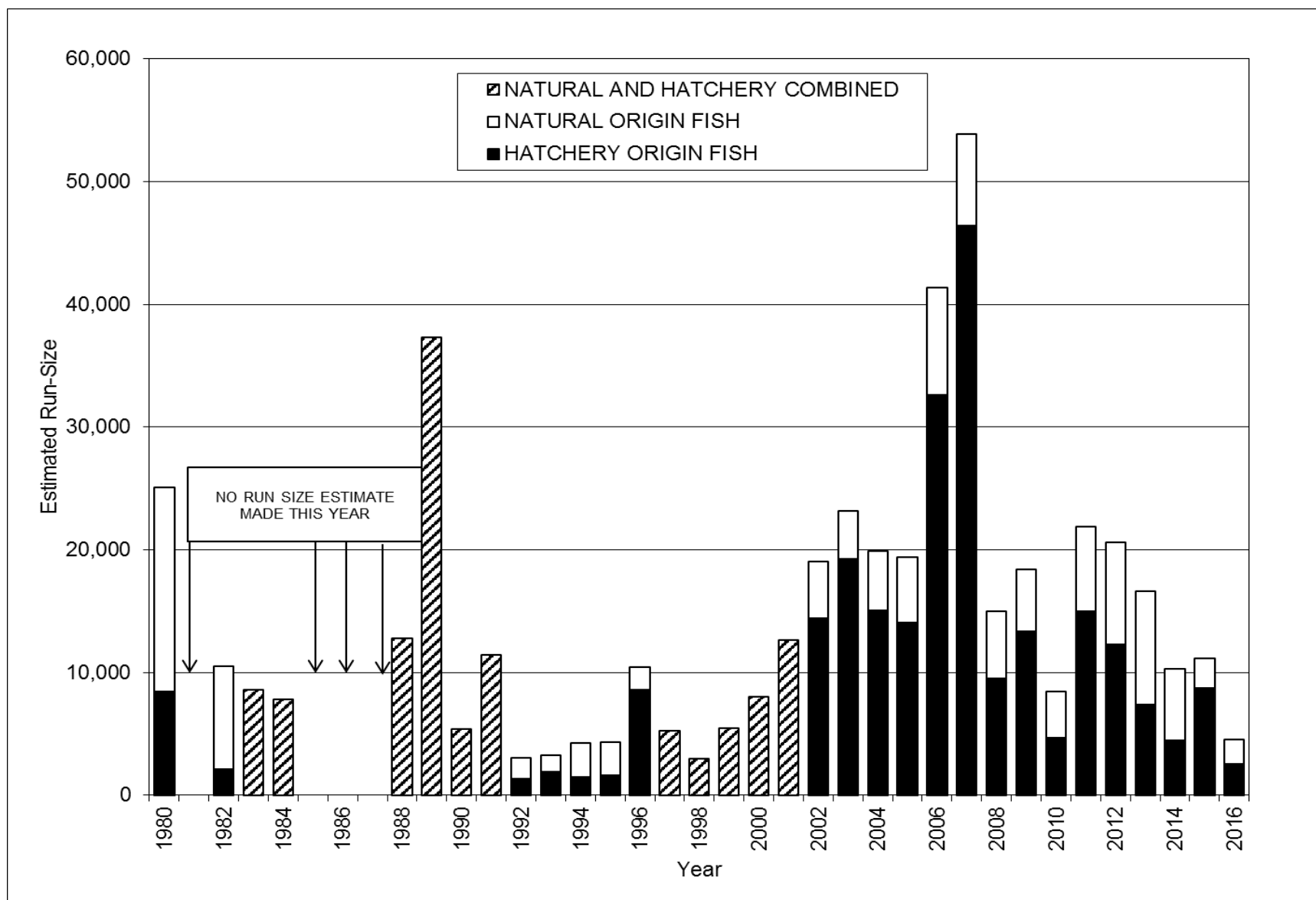
b/ Trinity River Hatchery-produced steelhead.

c/ Naturally produced steelhead.

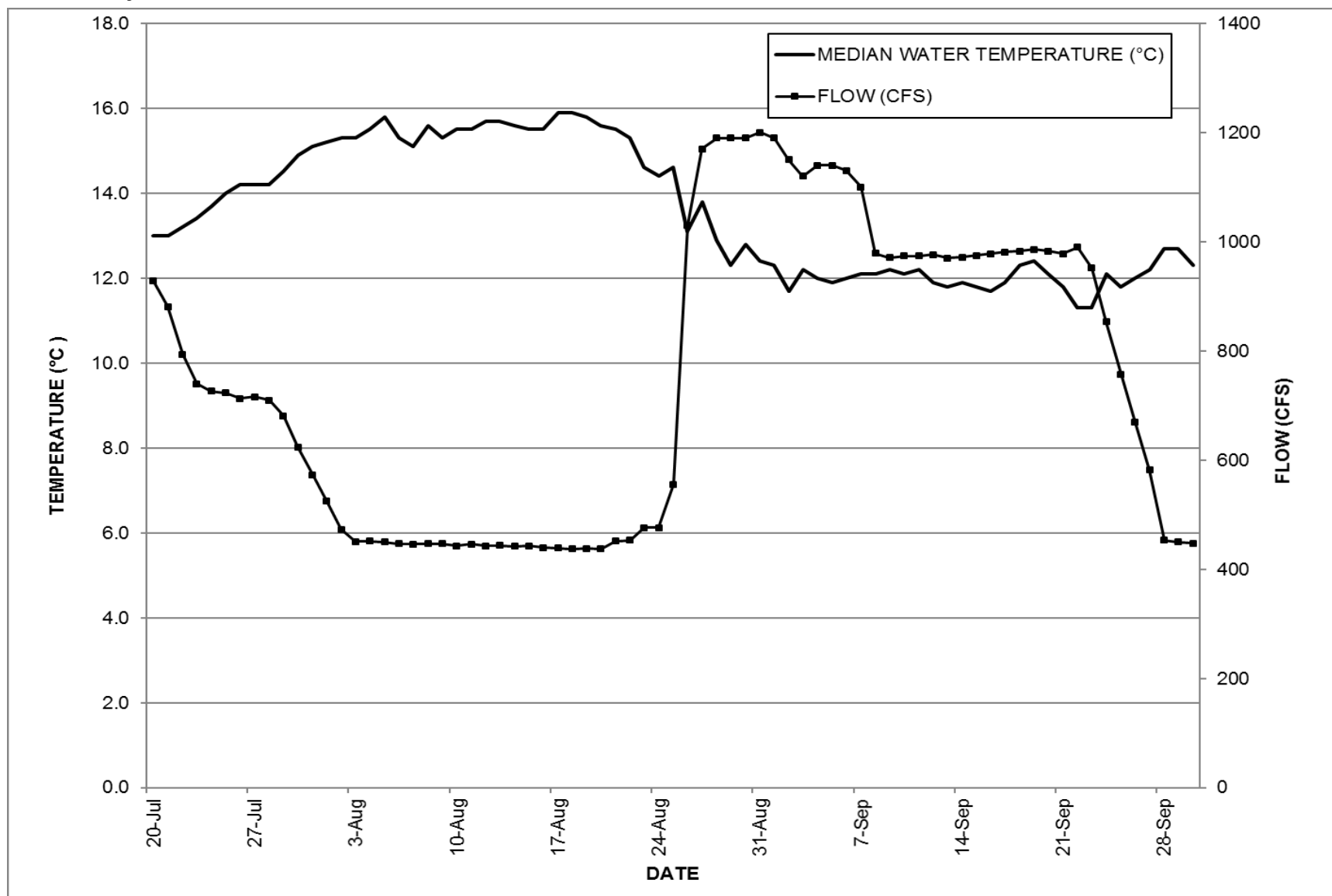
d/ The natural spawner escapement reflects an overestimate due to the unknown number of fish harvested by anglers upstream of Willow Creek Weir.

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

**Appendix 31. Fall-run adult steelhead (>41 cm FL) estimated for the Trinity River upstream of Willow Creek weir, 1977 - 2016.**



**Appendix 32. Daily mean flow (CFS) recorded at USGS gauge (11526250) and water (°C) temperature for Trinity River upstream of Junction City, 2016.**





**Appendix 33. Daily mean flow (CFS) recorded at USGS gauge (11530000) and water (°C) temperature for Trinity River near Willow Creek weir, 2016 sampling season.**

