

Juvenile Salmonid Monitoring in the Mainstem Trinity River, California, 2018

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February 2026



Funding for this study was provided by the U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office and the Trinity River Restoration Program.

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Keywords: Trinity River, salmon, downstream migrant trapping, Chinook Salmon, Coho Salmon, Steelhead, abundance index, juvenile salmon, rotary screw trap.

The correct citation for this report is:

Martel, C. M., Z. S. Reinstein, and A. M. Masse-Bachelier. 2026. Juvenile salmonid monitoring in the mainstem Trinity River, California, 2018. Hoopa Valley Tribal Fisheries Department, Yurok Tribal Fisheries Program, and U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office. Arcata Fisheries Data Series Report Number DS 2026-72, Arcata, California.

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Executive Summary — This report presents juvenile salmonid emigration monitoring data collected in 2018 at both the Pear Tree rotary screw trap site (PTRST; river kilometer [rkm] 118) and the Willow Creek rotary screw trap site (WCRST; rkm 34) near Willow Creek, California, on the mainstem Trinity River. Information collected from this project contributes to assessing the effectiveness of the Trinity River Restoration Program's habitat and flow management actions in restoring salmonid populations of the Trinity River. Monitoring at PTRST is conducted to estimate juvenile salmonid population size passing the site during the sampling season. Monitoring at WCRST is conducted to estimate juvenile salmonid population size and emigration timing during the monitoring period. In 2018, one rotary screw trap was operated at PTRST from January 9 through September 1, with successful sampling for 159 days of the 235-day sampling period. At WCRST, three rotary screw traps were operated from March 16 through August 16, with successful sampling for 84 days of the 144-day sampling period.

Age of salmonid outmigrants, mean length by week, migration rates, and hatchery contributions were estimated. Catch data were used to calculate proportional discharge-based abundance indices for juvenile Coho Salmon (*Oncorhynchus kisutch*) and steelhead (*O. mykiss*). Efficiency estimates and catch data were used to estimate weekly and seasonal outmigration abundance of both naturally and hatchery-produced sub-populations of age-0 juvenile Chinook Salmon (*O. tshawytscha*) migrating downstream past PTRST and WCRST using a Bayesian time-stratified population estimation method. At PTRST an estimated 1,121,302 (95% Credible Interval (CI): [736,655, 1,666,229]) naturally produced age-0 Chinook Salmon and 643,306 (95% CI: [460,072, 903,816]) age-0 hatchery Chinook Salmon passed the site between January 7 and September 1. At WCRST between March 16 and August 16, an estimated 1,404,751 (95% Credible Interval (CI): [1,114,346, 1,770,109]) naturally produced age-0 Chinook Salmon and 147,272 (CI: [97,980, 220,094]) age-0 hatchery Chinook Salmon passed the site. Catch data of other fishes are also presented.

Juvenile salmonid emigration target dates to assess at what date 80% of the juvenile salmonid population had reached Willow Creek (WC80), and to help manage water temperatures in the mainstem Trinity River. The WC80 estimate of the week in which, as inferred from the Bayesian time-stratified population estimation was Week of the Year WOY 24 (June 12–18), which occurred after the TRRP management target date of July 4. The estimate of WC80 for natural Coho Salmon age-1+, as inferred from the proportional discharge-based abundance index, was WOY 18 (May 1–7). The WC80 for natural steelhead age-1+, as inferred from the proportional discharge-based abundance index, was WOY 19 (May 8–14).

Introduction

This report presents annual data collected to: (1) evaluate the production of juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) from the upper 65 kilometers of the mainstem Trinity River below Lewiston Dam, the primary restoration reach of the Trinity River Restoration Program (TRRP); and (2) provide data to enable evaluation of the production and outmigrant timing of juvenile salmonids through the lower Trinity River in response to managed flow releases, thermal regimes, and restoration efforts. Information collected by this project is needed to address TRRP Integrated Assessment Plan objective 3, and sub-objective 3.2 (TRRP and ESSA 2009):

Objective 3: Restore and maintain the natural production of anadromous fish populations.

Sub-objective 3.2: Increase freshwater production of anadromous fish.

Juvenile salmonid emigration from the mainstem Trinity River has been monitored since 1989 with rotary screw traps. This data series report summarizes the outmigrant monitoring data collected in 2018 cooperatively by the U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Hoopa Valley Tribal Fisheries Department, and Yurok Tribal Fisheries Program at Pear Tree (PTRST) and Willow Creek (WCRST) on the mainstem Trinity River (Figure 1). This data series report intends to provide timely dissemination of data to local managers, for inclusion in agency databases, and provide basic biological information to evaluate the effectiveness of habitat restoration and flow management actions undertaken by the TRRP to restore the fishery resources of the Trinity River (USDOI 2000). In addition to quantifying salmonid outmigrant production and timing, fish condition and hatchery/natural composition of the outmigrant populations are assessed.

A technical report synthesizing multi-year datasets developed by this project will be periodically published to evaluate trends in outmigrant salmonid production, outmigrant timing, hatchery/natural contribution, and condition/health. Monitoring emigrating juvenile salmonid populations in conjunction with habitat availability and suitability studies is expected to provide a direct evaluation of TRRP restoration efforts because these studies focus on the early freshwater life-history phase which is directly affected by instream conditions and management actions. In addition, it is intended that this basic information will be used by the TRRP to aid in the development of a salmon production model for the Trinity River.

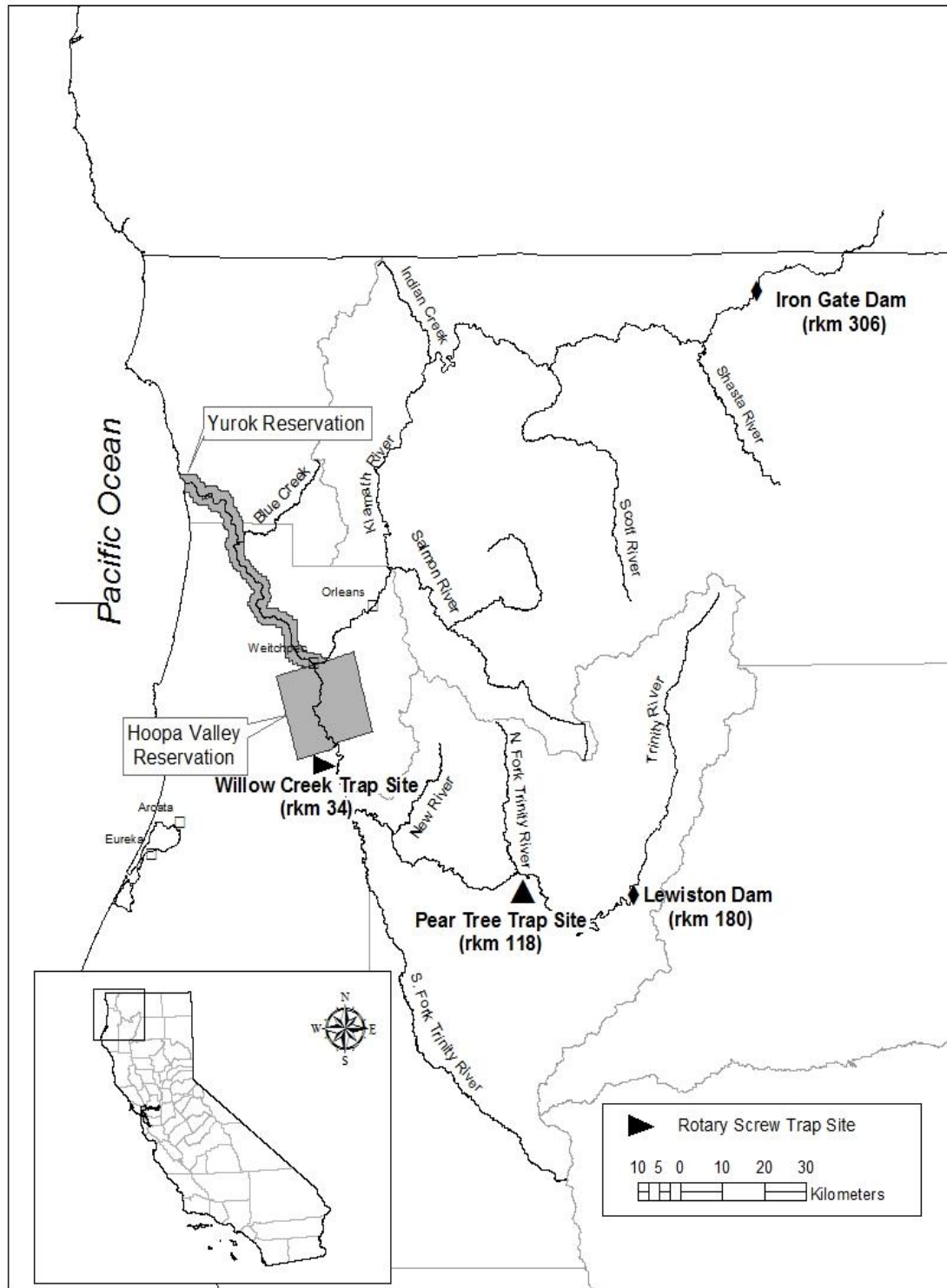


Figure 1. Location of the Trinity River Rotary Screw Trap sites near Willow Creek (rkm 34) and Pear Tree Gulch (rkm 118), California, operated by the Yurok Tribal Fisheries Program, U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, and the Hoopa Valley Tribal Fisheries Department.

Methods

Trap Design and Operation

At the Pear Tree rotary screw trap (PTRST) site, sampling was conducted using one 2.44 m diameter rotary screw trap. The trap generally operated from early January to late August in order to best observe the greatest portion of the expected emigration of naturally produced age-0 juvenile Chinook Salmon from the study reach (Green and Petros 2005, Schwarz et al. 2009, Petros 2011).

At the Willow Creek rotary screw trap (WCRST) site, sampling was conducted by deploying one to three 2.44 m diameter rotary screw traps, depending on river conditions such as magnitude of river discharge and debris load. Traps are generally deployed from March through August. An effort was made to place traps in the river in early spring to sample a majority of outmigrating age-0 Chinook Salmon. This allows the evaluation of emigration patterns and relative abundances of natural and hatchery Chinook Salmon, as well as portions of the Coho Salmon (*O. kisutch*) and steelhead (*O. mykiss*) smolt outmigration.

Traps at both sites were anchored with 0.95 cm diameter aircraft cable to a series of steel fence stakes. One or two 0.1 x 0.15 x 6.0 m (4" x 6" x 10") beams were used to push the traps out from the bank. The number of cone revolutions were used to determine where and when the traps could be operated without inducing unnecessary risk to the trap; low cone revolutions (i.e., <4 revolutions per minute) necessitated moving the trap into faster water, high revolutions (i.e., >9 revolutions per minute) necessitated moving the trap to slower water or lifting the cone out of the water. Traps were fished on the edge of the thalweg during high river discharge, and incrementally moved back into the thalweg as river discharge decreased. When deployed, the bottom of the cone was generally <1 m from the river bottom. A sample day was defined as the time period between the setting of the trap one day and removal of captured fish approximately 24 hours later. This period encompassed all night hours, when the majority of juvenile salmonids emigrate based on past sampling. Generally, trap checks at PTRST occurred at 1700 hours the day the trap was set and 0800 hours the following morning, with the morning check marking the end of one sample day. At WCRST, trap checks in the late morning or early afternoon marked the end of one sample day. At both locations the frequency of daily trap checks increased during peak emigration periods, with the frequency dictated by water temperatures, fish numbers and mortality rates.

Daily trap catch data were summarized by Week of the Year (WOY), with the first day of WOY 1 commencing on the first day of the year (Table 1). All WOYs are seven days in length except the last WOY of the year and the ninth WOY during leap years, which are both eight days in length.

Water Flow and Temperature Measurements

Normal cone operating depth was 1.21 m for the 2.44-m traps and 0.762 m for the 1.52-m

trap. Daily velocity measurements were taken directly in front of the cone as follows: the submerged portion of the cone was divided into three cells (right, center, left); within each cell, velocity was measured at 0.2 and 0.8 of the cone operating depth for 60 seconds using a General Oceanics® digital flowmeter (Model 2030; General Oceanics, Inc. 1983). Mean water velocity (ft/s) was calculated for each cell. Each calculated cell area (ft²) was multiplied by its corresponding mean water velocity (ft/s). The values for each cell were summed, yielding an estimate of volume of river discharge sampled (Qs) in cubic feet per second (ft³/s). Discharge and water temperature records for PTRST were produced by USGS from data collected at USGS Water Resources gauge station #11-526400, which is situated approximately 61 m downstream of the trap site. Discharge data from U.S. Geological Survey Water Resource gauge station Hoopa (#11-530000 at rkm 19.9) on the Trinity River was used as a surrogate measure of mean daily river discharge (Q) at WCRST.

At PTRST, water temperature data was collected using thermometer deployed in the trap livewell. Temperature data was recorded once or twice a day at that start of trap checks. At WCRST, water temperature data were collected using a HOBO temperature logger attached to the back of a trap's portside pontoon. Water temperature was recorded once per hour for the entire sampling season. Mean daily water temperatures were calculated by averaging over 24-hour periods.

Biological Sampling Procedures

All juvenile fish captured were anesthetized with Aqui-S 20e prior to processing. Up to 30 individuals of each species, age class (based on size), ad-clipped and unclipped, were randomly subsampled (biosampled) from the daily catch. Biosampled salmonids were measured to the nearest mm fork length (FL), weighed to the nearest 0.1 g by digital scale, and examined for external marks (stains, fin clips, tattoos, and brands), and physical irregularities. All captured salmonids that were not biosampled were tallied by species, age, and origin, and examined for external marks.

All anesthetized fish not retained (see paragraph below) were allowed to resuscitate in buckets of ambient river water before being released downstream of the trap. Rarely captured adult salmonids were not anesthetized. Adult salmonid FLs were either measured or approximated based on comparing to a known length object on the trap (i.e., live box lid) before release. Any salmonid mortality in the live box was checked for a fin clip and measured if included in the subsample. If a salmonid escaped during netting or handling before it could be identified to species or checked for a hatchery mark (i.e., adipose fin or maxillary clip), it was counted in the sample tally as an "unknown". Unknown salmonids were not included in catch totals.

When present, daily subsamples of marked hatchery Chinook Salmon were collected at WCRST. A missing adipose fin (ad-clip) was the external marker indicating a Chinook Salmon with a coded wire tag (CWT) embedded in the snout. A maximum of five ad-clipped Chinook Salmon were collected daily and sacrificed for subsequent CWT retrieval. Collected fish were stored in a freezer until time of dissection. Occasionally, ad-

clipped fish were also collected for disease sampling, after which the CWTs were removed. Marked hatchery Chinook Salmon were not regularly collected at PTRST.

Juvenile Chinook Salmon were classified as age-0 (young-of-year) or age-1, based on size and date of capture. Coho Salmon were classified as either age-0 or age-1; the latter of which were much larger in size, silvery, and lacked distinct parr marks. Steelhead were classified by age based on length-to-age analysis of scales collected from a subsample of steelhead captured (WCRST) or by length frequency distributions (PTRST). Analysis of scale samples collected from unmarked steelhead over the sampling season provided length-to-age relationships. Un-aged steelhead were assigned an age based on the length to- age relationship derived from aged samples.

Fish other than Chinook Salmon, Coho Salmon, or steelhead were considered non-target species. Non-target fishes captured were identified to species (or genus in some cases), enumerated, and in the case of brown trout, ammocetes, and sturgeon, up to five specimens of each species were measured for FL. Total length (TL) was measured on species without a forked caudal fin.

Hatchery and Natural Stocks Estimate

The catch of Chinook Salmon, Coho Salmon, and steelhead was partitioned into either hatchery or natural origin based on their external marks. Hatchery release strategies for Chinook Salmon consist of fingerling releases in the spring and yearling releases in the fall. These two distinct release periods prompted the division of the trapping season into spring and fall monitoring periods. The spring monitoring period was designated as WOY 1 through 39 and the fall period as WOY 40 through 52 in years when extended sampling was conducted. This project does not sample during the fall Chinook yearling release. Hatchery-reared steelhead and Coho Salmon are typically volitionally released as smolts or yearling-plus (age-1) in early spring.

Chinook Salmon

At both PTRST and WCRSR, the proportion of hatchery Chinook Salmon in the catch in the weekly catch was estimated using TRH fin-clip rate (approximately 25%) to produce the number of hatchery Chinook Salmon captured in any given week. The estimated number of naturally produced Chinook Salmon in the weekly catch were calculated as the difference between the total weekly Chinook Salmon catch and the estimated number of hatchery Chinook Salmon.

Estimation of weekly hatchery and natural stock contribution was carried out under the assumptions that 1) differential post-release mortality between ad-clipped and non-ad-clipped fish of the same release group is negligible, 2) ad-clip and non-clip Chinook Salmon are equally vulnerable to capture, and 3) mark-fraction estimates of Chinook Salmon released from TRH are accurate.

During the beginning and end of hatchery fish emigration periods it was possible that

juvenile Chinook Salmon of hatchery origin were captured but not represented by ad-clipped fish. If no ad-clipped hatchery Chinook Salmon were captured within a given week, the hatchery contribution for that week could not be differentiated from the natural component and all Chinook Salmon captured during that week were assumed to be of natural origin. Conversely, when the ad-clip proportion of the weekly catch equaled or exceeded the clip fraction of the most recent release of Chinook Salmon from TRH, all Chinook Salmon captured during that week were assumed to be of hatchery origin.

Coho Salmon

All hatchery Coho Salmon released from TRH were marked with a right-maxillary clip (max-clip). The weekly contribution of naturally produced Coho Salmon to the catch was estimated by subtracting the catch of marked hatchery fish from the total catch.

Steelhead

All hatchery steelhead released from TRH were marked with an ad-clip. The weekly contribution of naturally produced steelhead to the catch was estimated by subtracting the catch of marked hatchery fish from the total catch.

Abundance Indices – Emigration Timing

A weekly flow-based abundance index for each age class of Chinook Salmon, Coho Salmon, and steelhead was estimated for each WOY based on catch-effort data. Daily abundance indices ($Index_{DC}$) for each species and development stage were calculated by the following equation:

$$Index_{DC} = \frac{Catch_{DC}}{Q_c/Q}$$

where:

$Catch_{DC}$ = Sum of daily catch of a species/life stage/age class from all traps.

Q_c = Sum of discharge sampled (ft^3/s) by all traps

Q = Mean daily river discharge (ft^3/s) at trap site

Weekly abundance indices ($Index_{CWOYi}$) were calculated for each WOY using the following equation:

$$Index_{CWOYi} = \frac{\sum Index_{DC}}{\left(\frac{nt_i}{TD_i}\right)}$$

where:

nt_i = Number of days in the WOY with at least one trap fishing

TD_i = Sum of the days in the WOY

The estimated proportion of hatchery-produced fish, based on catches of marked fish and marking rates, were used to partition abundance indices into hatchery and natural production. The usefulness of this index as an estimator of abundance is contingent upon assumptions that abundance is directly proportional to the percentage of river flow sampled and that individuals from a given species are equally susceptible to capture. The abundance index is not intended to represent a population estimate, but is used to compare relative abundance between weeks during the trapping season, and between years.

Emigration duration is defined as the period of time between the first and last WOYs that a species of a given age and origin is present in the catch. This definition applies strictly to the sampling period, and is potentially longer for species of a given age and origin that have a longer emigration period than the sampling period. Emigration peaks are defined as the largest weekly abundance index for a species of a given age and origin. Abundance indices are greatly influenced by river discharge, and thus require caution in order to compare indices within or between years for absolute numbers of fish passing a site. However, abundance indices are generally thought to be adequate indicators of emigration timing and duration if sampling occurred in all weeks of the appropriate sampling period for emigration timing of a specific species and life stage (Schwarz et al. 2009).

Migration Rate

Migration rates were calculated for hatchery Chinook Salmon, hatchery steelhead, and hatchery Coho Salmon were estimated by dividing the distance (rkm) traveled by the number of days elapsed between the initial hatchery release date and capture date at each trap site for specific CWT codes or marked fish. Due to potential delays in outmigration during volitional releases, mean migration rates were not calculated for volitional release groups.

Population Estimation

An intensive mark-recapture technique was employed to generate population estimates for natural and hatchery age-0 Chinook Salmon. Weekly and season totals of natural-origin age-0 Chinook Salmon outmigrating past the Pear Tree, and Willow Creek trap sites were estimated using a Bayesian time-stratified population estimation method (Bonner et al. 2009; Payton and Som 2021). This method requires the following weekly data: total age-0 Chinook Salmon with adipose fins, total adipose fin-clipped age-0 Chinook Salmon (and associated hatchery clip rate), trapping effort (weighted sample fraction, described below), marks released, and marks recaptured. The numbers of age-0 Chinook Salmon with and without adipose fins were summarized from the weekly trapping data and fin-clip rates were reported by Trinity River Hatchery (TRH).

Traps were not operated a full seven days each week, and due to operational logistics and

disruptions (e.g., flawed sets due to debris), daily catches were not completed every day as originally planned. To account for variable and less than full effort, the number of days the site was operated within each j^{th} week was divided by seven, termed sampling fraction:

$$s_j = \frac{d_j}{7}$$

Mark-recapture trap efficiency tests for age-0 Chinook Salmon were conducted at Pear Tree, Willow Creek trap sites. Hatchery-produced age-0 Chinook Salmon provided by TRH were used for this process. Test fish were marked with Bismarck Brown Y stain (Rawson 1984) and released approximately 0.5–0.8 km upstream of the trap site to be tested. At least three meso-habitat units, including at least one riffle, were located between the release site and the trap site to allow the fish enough time and space to distribute across the river channel similarly to a natural population passing the trap site. Due to the length of the sampling week, two or three recapture days were available after the release of marked fish. These capture efficiency trials were essential data for estimating abundance via the Bayesian time-stratified model. Mark-recapture efficiency tests could not be conducted for Coho Salmon or steelhead due to the limited catch of these species, so production estimates were not generated for these species.

Juvenile Chinook Salmon were obtained from TRH to conduct mark-recapture trap efficiency tests. Mark-recapture population estimates were not calculated for Coho Salmon and steelhead due to inadequate numbers necessary for valid estimates.

Mark-Recapture Technique

One or two types of marks were utilized in 2018, either freeze branding or Bismarck Brown Y. Freeze brands were applied only to hatchery-produced juvenile Chinook Salmon at TRH, which were held in raceways until brands became fully visible (approximately 5-10 days). Branded fish were transported to the appropriate release site in insulated tanks filled with aerated water. At the release site, a subsample of the freeze branded fish was sampled for mark quality; the proportion of fish with poor quality marks was applied to the release total and excluded from the total amount released. Hatchery fish with unique brands for each WOY and site were delivered from the hatchery weekly.

Bismarck Brown Y marking was applied to only hatchery-produced juvenile Chinook Salmon from TRH. The Bismarck Brown Y was applied at the release site after fish were counted and transported from the hatchery.

Releases generally occurred one hour before sunset approximately 0.9 km upstream near the stream margin (PTRST) or in the late afternoon approximately 0.4 km upstream into a large, still pool (WCRST) to mix with the population of outmigrating fish yet to pass the sampling site. During periods with low daily captures, fish were held for several days until adequate numbers for estimating trap efficiency were available. All recaptures were identified and recorded during normal trapping operations, but were not counted as part of the catch for that day.

Results

Data are grouped by Week of the Year (WOY; Table 1). Graphs of water temperature and discharge through the sampling periods are presented in Figure 2.

Sampling Efforts

In 2018, trapping at PTRST began in the second week of January and trapping at WCRST was initiated in early March (Table 2). Sampling occurred at both sites in each sampling week, although occasionally traps were not run for complete sample weeks. To ensure that the greatest portion of the natural Chinook Salmon emigration, as well as portions of the hatchery and natural Coho Salmon and steelhead smolt emigration were sampled, efforts were made to install the traps as early as possible and continue sampling throughout the summer. Sampling at PTRST has occurred between early January and late August since 2007, and sampling at Willow Creek has occurred from March through August since 2005. Readers need to note that without sampling year-round, portions of annual production are excluded from estimates and indices presented in this report.

Table 1. Week of the Year (WOY) and corresponding first calendar date.

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

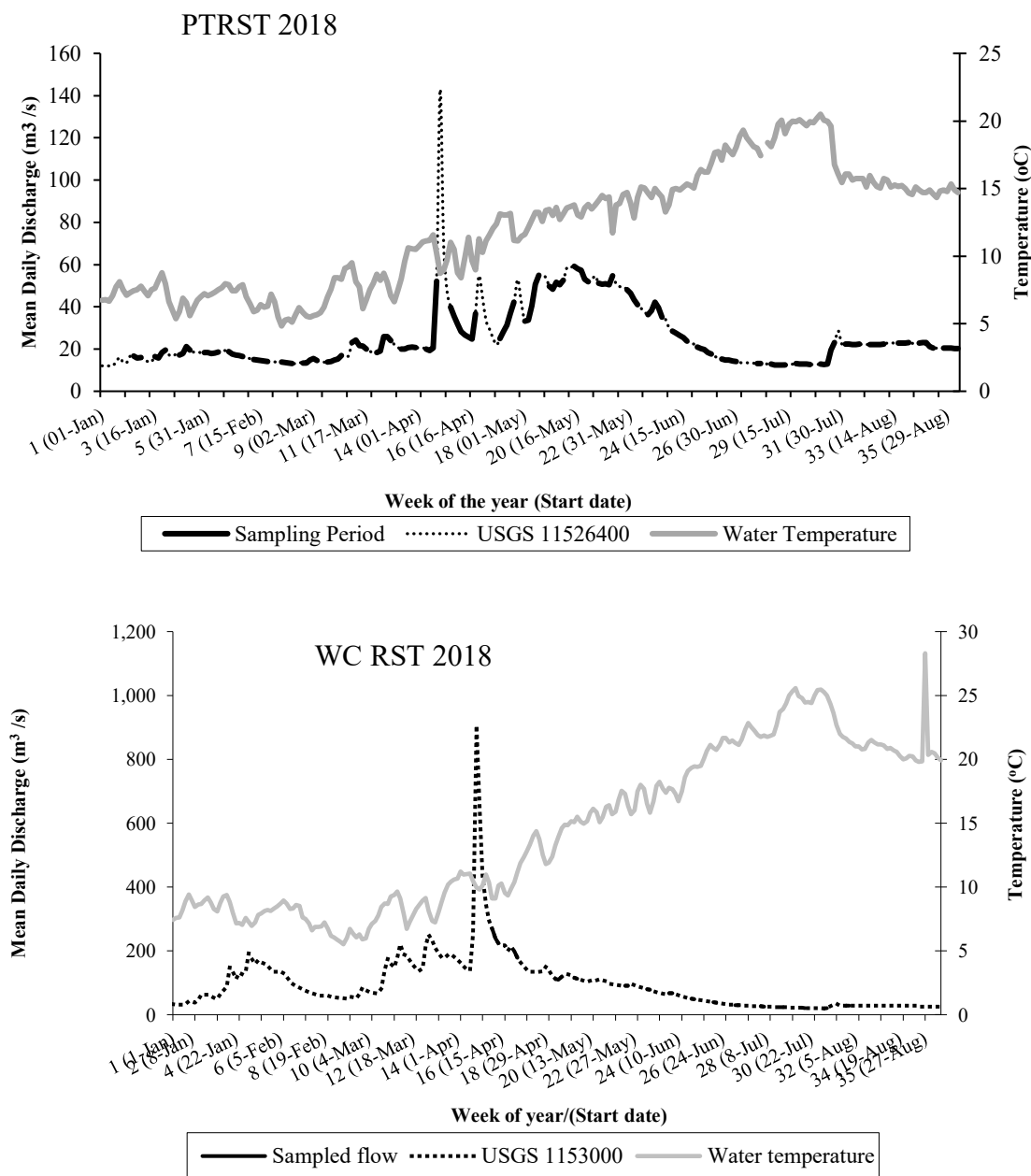


Figure 2. Mean daily discharge (m^3/s) as recorded near Helena (U.S. Geological Survey Water Resource gage station #11-526400) and Hoopa (U.S. Geological Survey Water Resource gage station #11-530000), California, and mean daily water temperatures ($^{\circ}\text{C}$) recorded at USGS gage #11-526400 and the Willow Creek Rotary Screw Trap (WCRST) in 2018. USGS gage #11-526400 is located approximately 100 m downstream of the Pear Tree Rotary Screw Trap (PTRST). The bolded sections on the discharge series indicate sampled flows and the lightly dotted sections indicate non-sampled flows.

Table 2. Period and duration of 2018 spring/summer monitoring and percent of time sampled at Pear Tree Rotary Screw Trap site (PTRST; rkm 118) and Willow Creek Rotary Screw Trap site (WCRST; rkm 34). Distinct days are total number of days sampled with at least one trap.

Site	Trap	Start-end dates	Days trapped	Days possible	Trapping rate
PTRST	1 (2.4 m)	Jan 9 – Sep 1	159	235	67.7%
Distinct Days		Jan 9 – Sep 1	159	235	67.7%
WCRST	1 (2.4 m)	Mar 16 – Jun 29	54	106	50.9%
WCRST	2 (2.4 m)	Mar 22 – Aug 16	78	148	52.7%
WCRST	3 (2.4 m)	Apr 18 – Aug 16	58	121	47.9%
Distinct Days		Mar 16 – Aug 16	64	154	41.5%

Catch Totals

Catch totals of the primary salmonids of interest (Chinook Salmon, Coho Salmon, and steelhead) are presented in Table 3. Chinook Salmon were the most commonly captured salmonid at both sites, comprising approximately 96% and 90% of the total anadromous salmonid catch at PTRST and WCRST, respectively. Hatchery salmonid releases from Trinity River Hatchery (TRH) are presented in Table 4. Catch totals of other fish species are presented in Table 5.

Abundance Estimates

The Bayesian time-stratified population estimates for natural age-0 Chinook Salmon were 660,775 and 489,071 at PTRST and WCRST, respectively (Figure 3; Table 6; Appendix 1, 2). The age-0 hatchery Chinook Salmon abundance estimates were 71,580 at PTRST and 37,931 at WCRST. Natural age-0 Chinook Salmon were captured on the first day of trap operation at both sites, indicating that some age-0 Chinook Salmon emigrated before trap installation. The proportional discharged-based abundance estimates for age-1 natural Chinook Salmon were 1,361 and 3,736 at PTRST and WCRST, respectively. The proportional discharged-based abundance indices for age-1 hatchery Chinook Salmon were 855 at WCRST in 2018. There were no age-1 hatchery Chinook Salmon captured at PTRST in 2018.

Abundance Indices

Age-0 naturally-produced Coho Salmon abundance indices were 250 and 254 at PTRST and WCRST, respectively (Figure 4; Table 6, Appendix 3, Appendix 4). The abundance indices for age-1 naturally produced Coho Salmon were 574 and 1,108 at PTRST and WCRST, respectively. Abundance indices of hatchery age-1 Coho Salmon were 6,786 and 3,325 at PTRST and WCRST, respectively. Natural age-1 Coho Salmon were captured at the beginning of the sampling period at both trap sites, indicating that portions of each respective population emigrated before trap installation.

At PTRST, abundance indices of natural age-0 and age-1 steelhead were 7,499 and 16,831, respectively (Figure 5; Table 6; Appendix 5). Abundance indices of age-0 and age-1 steelhead at WCRST were 2,078 and 28,514, respectively (Table 6; Appendix 6). Abundance indices of hatchery age-1 steelhead were 12,080 at PTRST and 39,114 at WCRST. The age-2 steelhead abundance index was 865 at PTRST and 393 at WCRST. Sampling periods at both trap sites missed portions of each respective population that emigrated before or after trapping operations.

Table 3. Juvenile salmonid catch totals in 2018 for trapping at Pear Tree Rotary Screw Trap (PTRST; rkm 118) and Willow Creek Rotary Screw Trap (WCRST; rkm 34), on the Trinity River, California, operated by the Hoopa Valley Tribal Fisheries Department, U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, and the Yurok Tribal Fisheries Program. Hatchery fish totals are expanded catch based on adipose fin clip rate. NA = Not Applicable (i.e., no fish of a particular age class exist in the Trinity River).

Site	Species	Hatchery age-0	Hatchery age-1+	Natural age-0	Natural age-1+	Natural age-2+	Total
PTRST	Chinook Salmon	18,838	0	32,108	161	NA	51,107
PTRST	Coho Salmon	NA	438	13	35	NA	486
PTRST	Steelhead	NA	330	460	964	43	1,797
WCRST	Chinook Salmon	3,409	5	29,315	43	NA	32,772
WCRST	Coho Salmon	NA	160	14	25	NA	199
WCRST	Steelhead	NA	1,935	125	1,158	9	3227

Table 4. California Department of Fish and Game, Trinity River Hatchery juvenile salmonid releases, 2018. AD-clipped = adipose fin-clipped fish.

Species	Release season	Number released	Percentage AD-clipped or marked	Release dates
Chinook Salmon ¹	Spring	1,307,206	23.9	06/08 – 06/22
Chinook Salmon ²	Fall	2,971,139	24.0	10/01 – 10/10
Coho Salmon ²	Spring	258,243	98.9	03/15 – 3/25
Steelhead	Spring	465,063		4/16 – 4/26

¹ Chinook Salmon releases includes both spring-run and fall-run races.

² Coho Salmon were marked with a right maxillary clip.

Table 5. Catch totals of non-target fish species captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST) on the mainstem Trinity River, California, 2018.

Common name	Species	Life stage	PTRST catch	WCRST catch
Lamprey	<i>Entosphenus</i> spp.	Ammocoete	1,170	150
		Eyed juvenile	371	1
		Adult	116	19
Sucker	<i>Catostomus</i> spp.		258	4,541
Speckled Dace	<i>Rhinichthys osculus</i>		1,599	549
Three-Spine Stickleback	<i>Gasterosteus aculeatus</i>		728	84
Golden Shiner	<i>Notemigonus crysoleucas</i>		0	0
Sculpin	<i>Cottus</i> spp.		0	221
Green Sturgeon	<i>Acipenser medirostris</i>	Juvenile	0	3
Brown Trout	<i>Salmo trutta</i>	Juvenile	101	3
Sunfish	<i>Lepomis</i> spp.		1	0
Sockeye Salmon	<i>Oncorhynchus nerka</i>	Juvenile	0	16
Fathead Minnow	<i>Pimephales promelas</i>	Juvenile	0	2
Bullhead	<i>Ameiurus</i> spp.		0	1
Chum Salmon	<i>Oncorhynchus keta</i>		0	1
American Shad	<i>Alosa sapidissima</i>		0	1
California Roach	<i>Hesperoleucus symmetricus</i>		15	0

Table 6. Juvenile salmonid proportional discharge-based abundance indices at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. NA = Not Applicable (i.e., no fish of a particular age class exist in the Trinity River).

Site	Species	Hatchery age-0	Hatchery age-1	Natural age-0	Natural age-1	Natural age-2+	Total
PTRST	Chinook Salmon	290,228	0	660,775	1,361	NA	952,364
PTRST	Coho Salmon	NA	6,786	250	574	NA	7,610
PTRST	Steelhead	NA	12,080	7,499	16,831	865	37,275
WCRST	Chinook Salmon	37,931	855	489,071	3,736	NA	561,593
WCRST	Coho Salmon	NA	3,325	254	1,108	NA	4,687
WCRST	Steelhead	NA	39,114	2,078	28,514	393	70,099

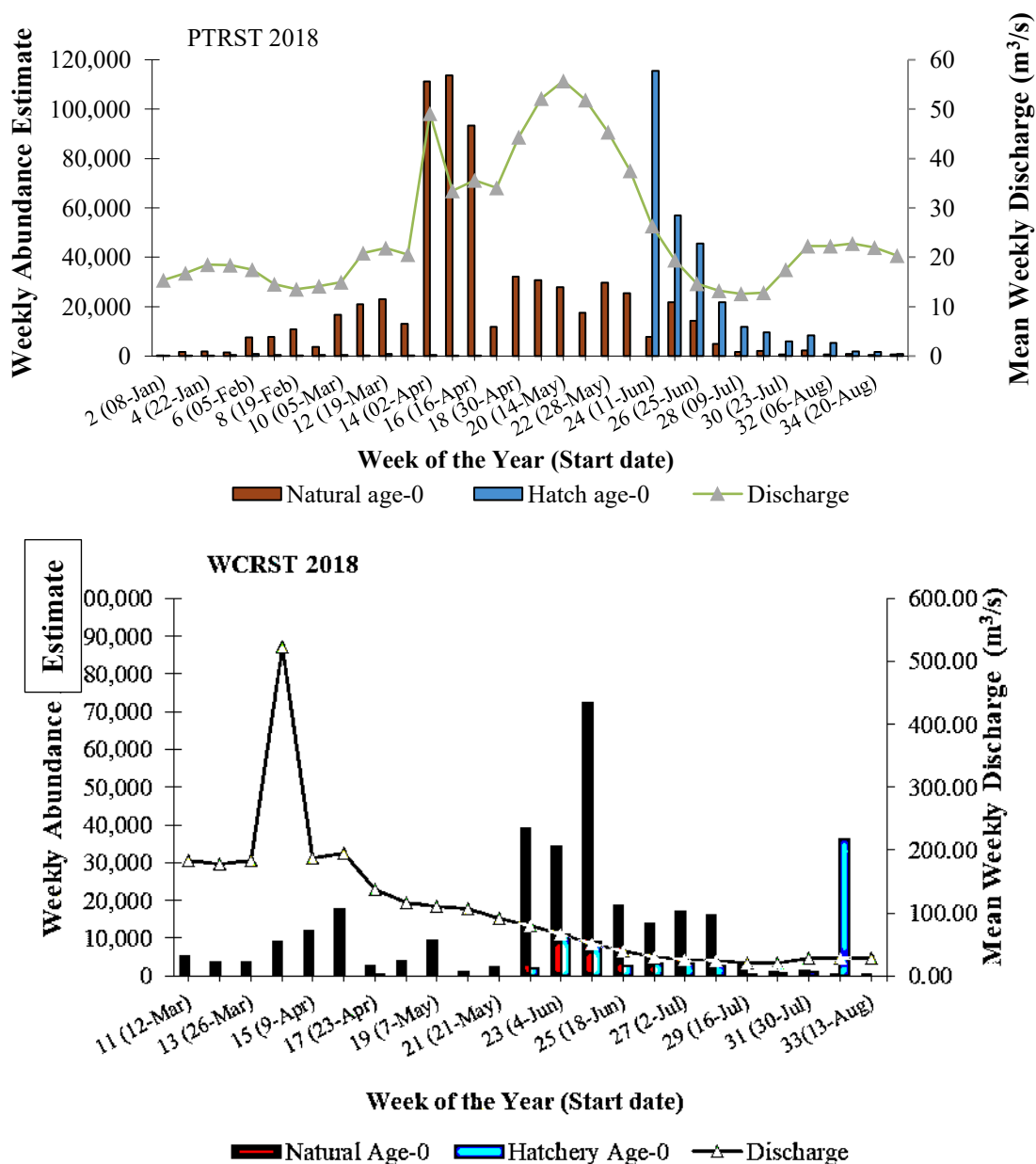


Figure 3. Weekly Bayesian time-stratified population estimates for natural age-0 and hatchery age-0 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST; rkm 118) and Willow Creek Rotary Screw Trap (WCRST; rkm 34) in 2018.

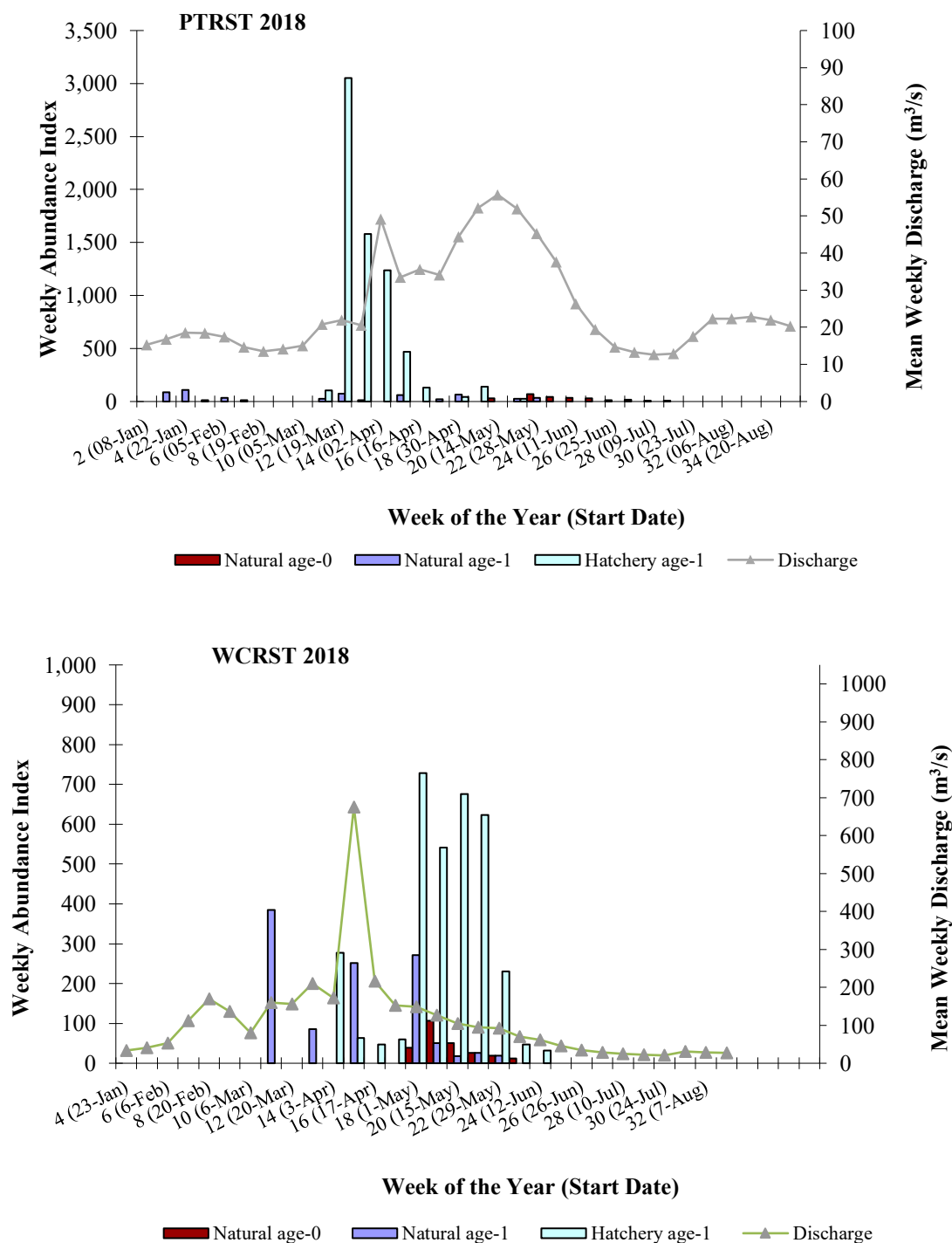


Figure 4. Weekly proportional discharge-based abundance indices for natural age-0, natural age-1, and hatchery age-1 Coho Salmon captured at Pear Tree Rotary Screw Trap (PTRST, rkm 118) and Willow Creek Rotary Screw Trap (WCRST, rkm 34) in 2018.

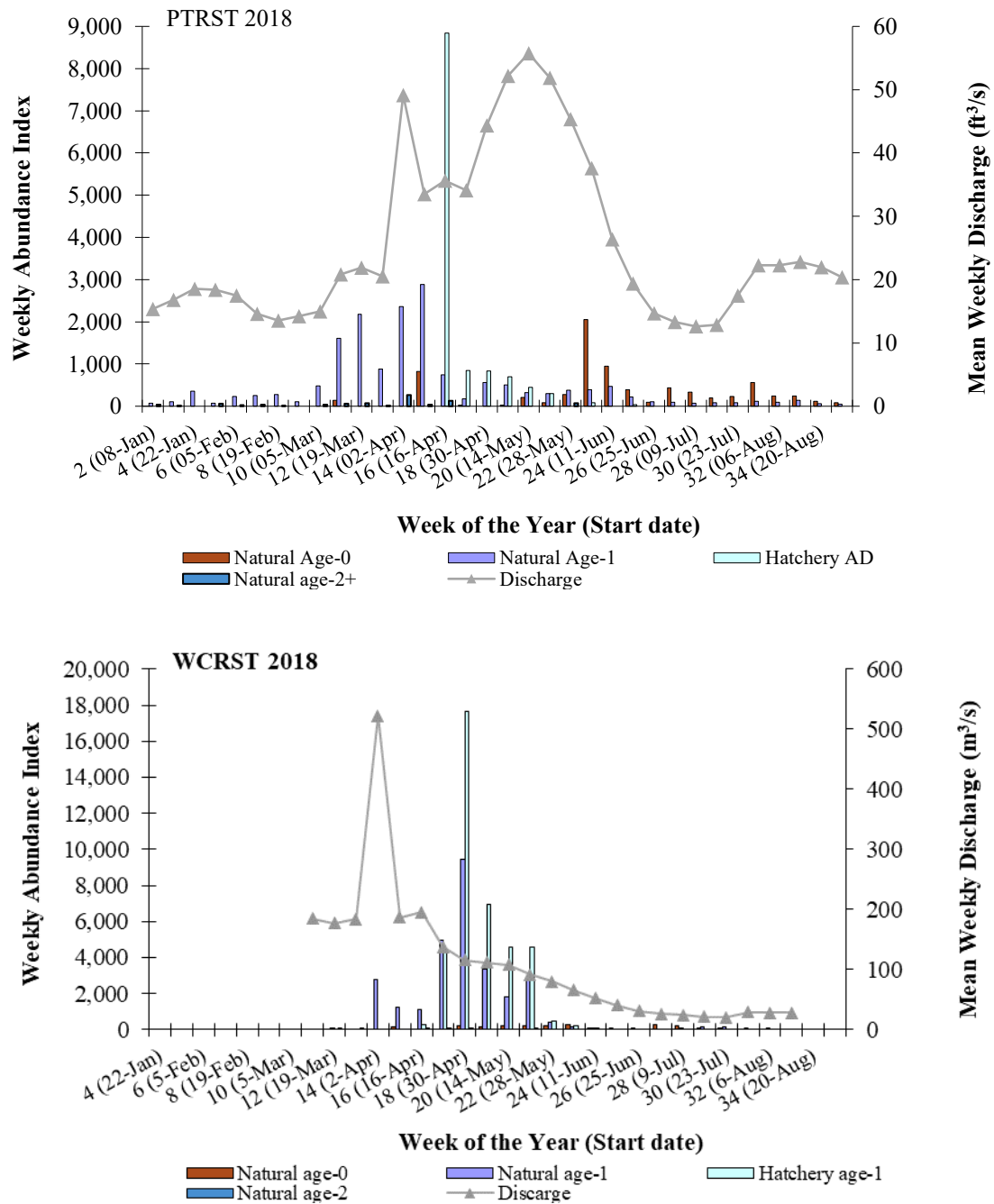


Figure 5. Weekly proportional discharge-based abundance indices for natural age-0, natural age-1, natural age-2, and hatchery age-1 steelhead captured at Pear Tree Rotary Screw Trap (PTRST, rkm 118) and Willow Creek Rotary Screw Trap (WCRST, rkm 34) in 2018.

Hatchery/Natural Contribution

Chinook Salmon were captured at PTRST and WCRST throughout the 2018 sampling season with the spring/summer emigration dominated by naturally produced fish at PTRST, comprising 69.5% of the total Bayesian time-stratified population estimates. At WCRST, hatchery and natural chinook were more proportional in abundance, with naturally-produced fish comprising 92% of the estimate (Appendix 1, 2).

Age-1 Coho Salmon smolts were predominantly hatchery origin at PTRST and comprised 92.2% of the total age-1 proportional discharge-based index in 2018 (Appendix 3). At WCRST, age-1 Coho Salmon emigrants of hatchery origin comprised 4.3% of the total age-1 proportional discharge-based index in 2018 (Appendix 4).

Based on proportional discharge-based abundance indices at PTRST and WCRST, age-1 hatchery steelhead comprised 41.8% (Appendix 5) and 57.8% (Appendix 6), respectively, of the total age-1 steelhead abundance indices at each respective site.

Chinook Salmon Population Estimation

During the 2018 sampling season, freeze-branded and photonicallly-marked hatchery Chinook Salmon were delivered to the trap sites to estimate weekly trap efficiencies for generating population estimates (Appendix 7, 8). Weekly stratified mark-recapture population estimates of emigrating age-0 Chinook Salmon were calculated for both naturally and hatchery-produced sub-populations (Figure 6). At PTRST an estimated 1,121,302 (95% CI: [736,655, 1,666,229]) naturally produced age-0 Chinook Salmon and 643,306 (95% CI: [460,072, 903,816]) age-0 hatchery Chinook Salmon passed the site between January 7 and September 1. At WCRST between March 16 and August 16, an estimated 1,404,751 (95% Credible Interval (CI): [1,114,346, 1,770,109]) naturally produced age-0 Chinook Salmon and 147,272 (CI: [97,980, 220,094]) age-0 hatchery Chinook Salmon passed the site.

Outmigrant Timing

The Chinook Salmon population in the Trinity River is composed of both naturally produced and hatchery-produced fish of both spring and fall races. The majority of juveniles during the spring/summer emigration period emigrate as age-0 fish, with the natural and hatchery emigration periods overlapping (Table 7; Appendix 1). The week marking the passage of 80% of the natural juvenile Chinook Salmon at WCRST (WC80), as inferred from the Bayesian time-stratified population estimate, was WOY 24 (June 10–16), which occurred before the TRRP management target date of July 4 (TRRP and ESSA 2009). Based on Bayesian time-stratified population estimate, natural age-0 Chinook Salmon emigration peaked during WOY 15 at PTRST and WOY 21 at WCRST. Hatchery age-0 Chinook Salmon emigration peaked in WOY 24 at PTRST and WOY 25 at WCRST.

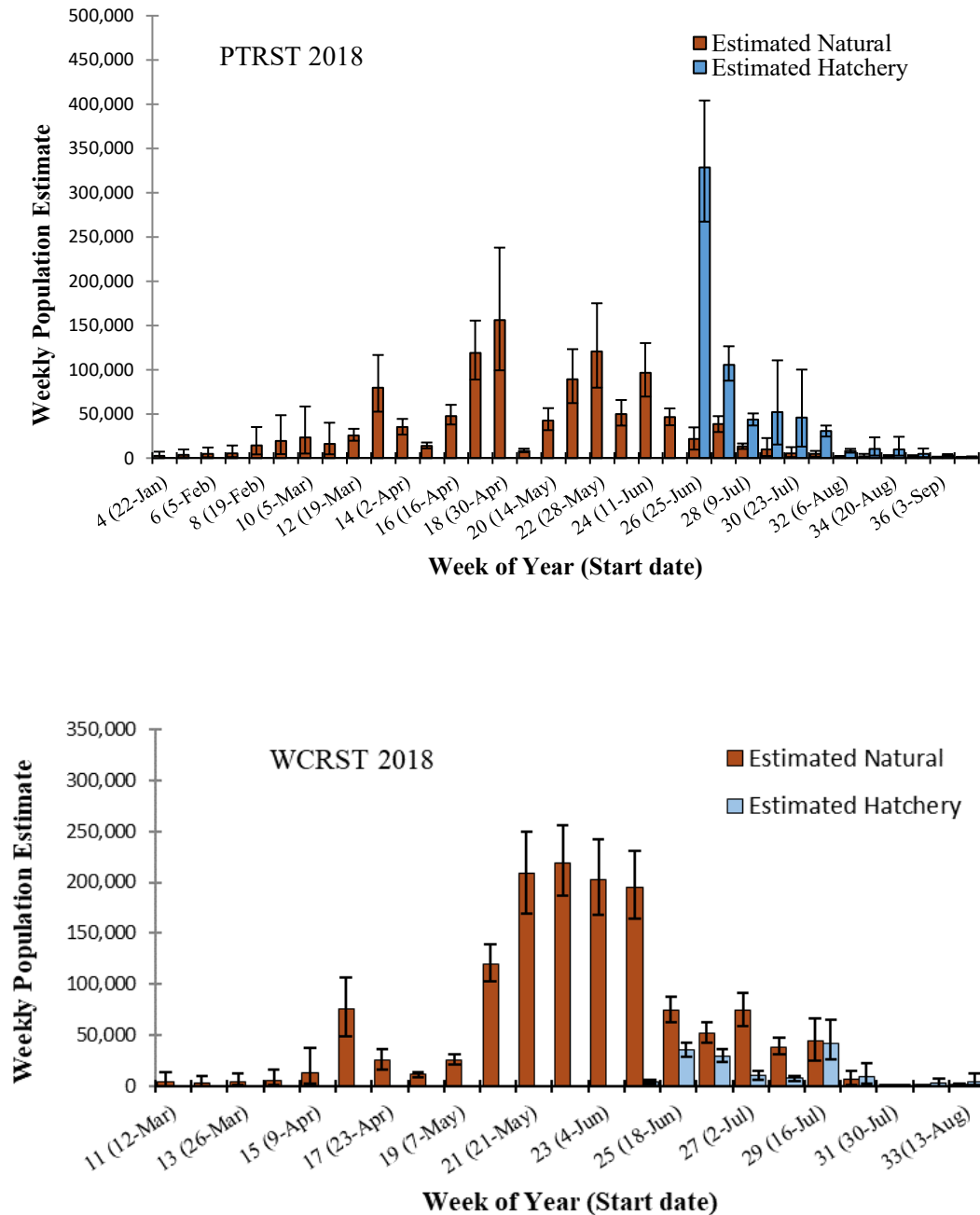


Figure 6. Weekly Bayesian time-stratified population estimates of natural age-0 and hatchery age-0 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST; rkm 118) and Willow Creek Rotary Screw Trap (WCRST; rkm 34) in 2018. Error bars represent one standard deviation of the mean weekly estimate.

Table 7. Juvenile salmonid emigration duration and peak as inferred from proportional discharge-based abundance indices at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. Values represent week of the year.

Site	Species	Emigration duration			Emigration peak		
		Natural age-0	Natural age-1+	Hatchery	Natural age-0	Natural age-1+	Hatchery
PTRST	Chinook Salmon	2-35	NA	24-35	15	NA	24
PTRST	Coho Salmon	20-29	2-22	12-24	24	4	12
PTRST	Steelhead	2-35	11-35	16-25	23	15	16
WCRST	Chinook Salmon	11-33	11-23	23-33	21	11	25
WCRST	Coho Salmon	18-23	11-22	14-24	19	11	19
WCRST	Steelhead	15-30	12-32	16-24	27	18	18

The Coho Salmon population in the Trinity River is composed of both naturally produced and hatchery populations. The vast majority of Trinity River Coho Salmon emigrate to the ocean as age-1 smolts while the emigration of age-0 fish is presumably a redistribution of rearing juveniles. Natural age-1 Coho Salmon were captured in the second week of sampling at PTRST (WOY 2) and the first week of sampling at WCRST (WOY 11) and emigration continued into late May (WOY 22) at both traps. Interpretation of data and past experience suggests that the sampling period did not encompass the entire naturally produced age-1 Coho Salmon emigration. The WC80 of the naturally-produced age-1 Coho Salmon, as inferred from the abundance index, was WOY 18 (April 29 – May 5). Natural age-1 Coho Salmon emigration peaked in WOY 3 at PTRST and WOY 11 at WCRST. Hatchery Coho Salmon emigration peaked in WOY 11 at PTRST and WOY 18 at WCRST.

The steelhead populations in the Trinity River are composed of both natural populations that exhibit highly variable juvenile life history patterns, as well as a hatchery-produced component. The bulk of age-0 steelhead were captured from early May through July at WCRST and PTRST (Table 6, Appendix 5, 6). Age-1 or older natural steelhead were present throughout the sampling period at PTRST and WCRST. Most of the hatchery-produced age-1 steelhead passed PTRST by early April and passed WCRST by early June. The week marking WC80 of the natural steelhead smolt population at WCRST, as inferred from the proportional discharge-based abundance index, was WOY 19 (May 6–12). Natural age-0 steelhead emigration peaked in WOY 23 at PTRST and WOY 27 at WCRST. Natural age-1 steelhead emigration peaked in WOY 15 at PTRST and WOY 18 at WCRST. Hatchery steelhead emigration peaked in WOY 16 at PTRST and WOY 18 at WCRST.

Migration Rate

Maximum migration rates of salmonids released from Trinity River Hatchery (TRH) are presented in Table 8. These values should be considered maximums, as hatchery fish are released on a volitional basis (Table 4).

Fish Size

Age-0 Chinook Salmon weekly mean fork length at PTRST was static from week 2 through week 4, apparently due to continued fry emergence, then increased through the remainder of the season (Figure 7; Appendix 9, 10). Age-0 Chinook Salmon weekly mean fork length increased steadily at WCRST through early June and stabilized through the summer with the arrival of hatchery fish. Age-1 Chinook Salmon were captured at PTRST and WCRST in 2018 but did not follow an obvious trend at either location.

Natural age-0 Coho Salmon fork lengths generally increased as the season progressed at PTRST. Natural age-0 Coho Salmon fork lengths did not follow an obvious trend at WCRST, presumably due to small sample size (Appendix 9, 10). Hatchery age-1 Coho Salmon fork lengths showed no weekly or seasonal trend at either trapping site. Natural age-1 Coho Salmon fork lengths sampled at PTRST showed a seasonal increase, but weekly means were quite variable. WCRST natural age-1 Coho showed no discernable seasonal trend, likely due to small sample size.

At PTRST, natural age-0 steelhead fork lengths generally increased through the sampling season while age-1 fork lengths were steady between WOY 4 and WOY 18 and increased steadily for the rest of the season (Figure 9; Appendix 11, 12). Age-2 steelhead fork lengths at PTRST remained relatively consistent throughout the season. At WCRST, age-0 steelhead fork lengths remained steady as the season progressed, age-1 steelhead showed no obvious trend, and age-2+ steelhead fork length declined slightly, but no obvious trend was visible due to the small sample size. Hatchery steelhead showed no trend at either site.

Table 8. Juvenile salmonid maximum migration rate from Trinity River Hatchery to Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST) sampling sites, operated by the Hoopa Valley Tribal Fisheries Department, U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, and the Yurok Tribal Fisheries Program, 2018.

Site	Species	Date first released	Date first captured	Number of days	Maximum migration rate (km/day)
PTRST	Chinook Salmon	06/08/2018	06/12/2018 ^a	5	12.8
PTRST	Coho Salmon	03/15/2018	03/17/2018	2	32.0
PTRST	Steelhead	04/16/2018	04/18/2018	2	32.0
WCRST	Chinook Salmon	06/08/2018	06/14/2018	5	29.4
WCRST	Coho Salmon	03/15/2018	04/17/2018 ^b	30	4.9 ^b
WCRST	Steelhead	04/16/2018	04/18/2018	3	49

^a Pear tree was not sampling on June 10-11 and likely missed the first passing hatchery Chinook Salmon.

^b Trapping was suspended during Coho Salmon release due to high discharges.

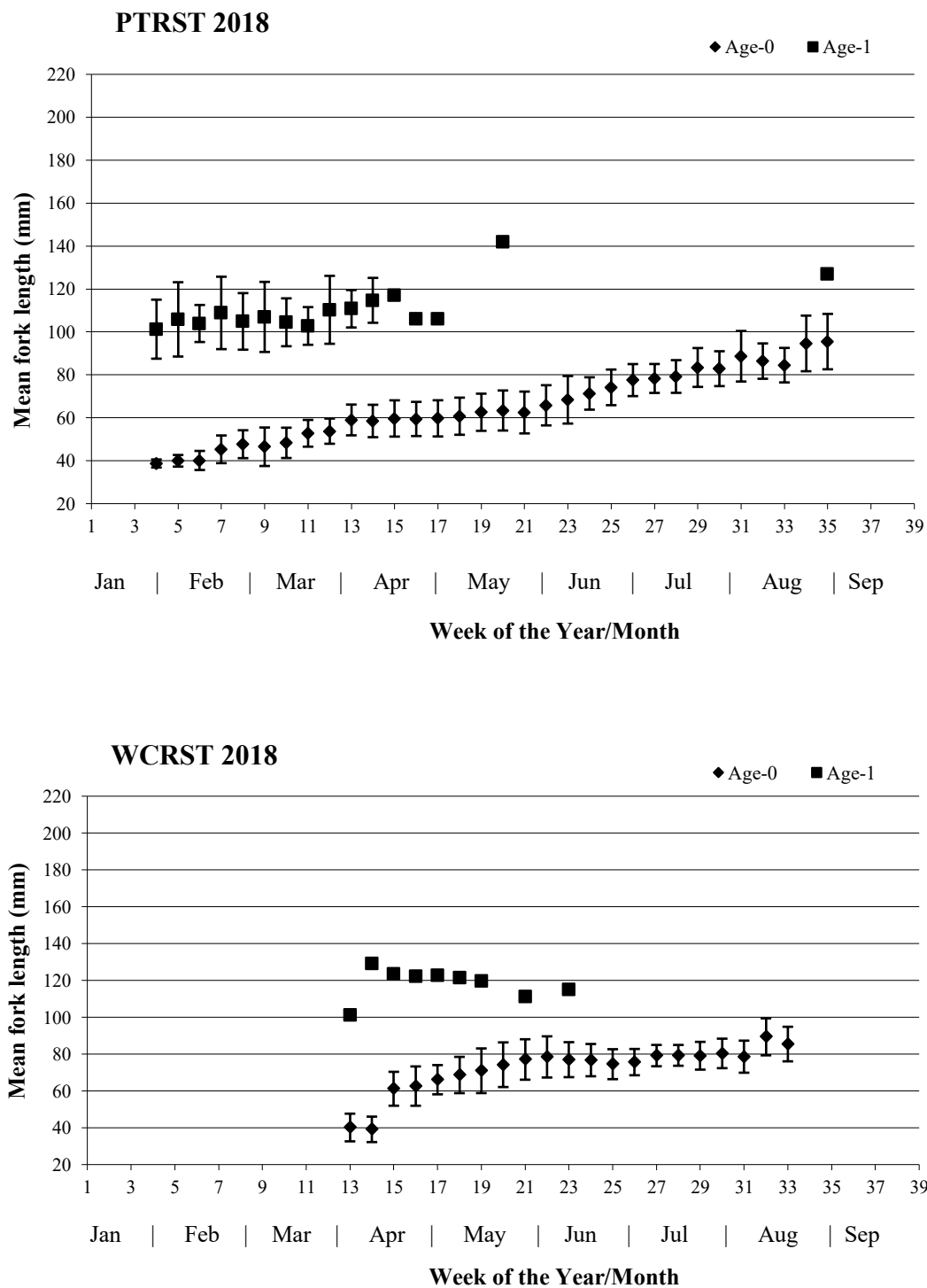


Figure 7. Weekly mean fork lengths of age-0 and age-1 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. Error bars represent one standard deviation of the mean.

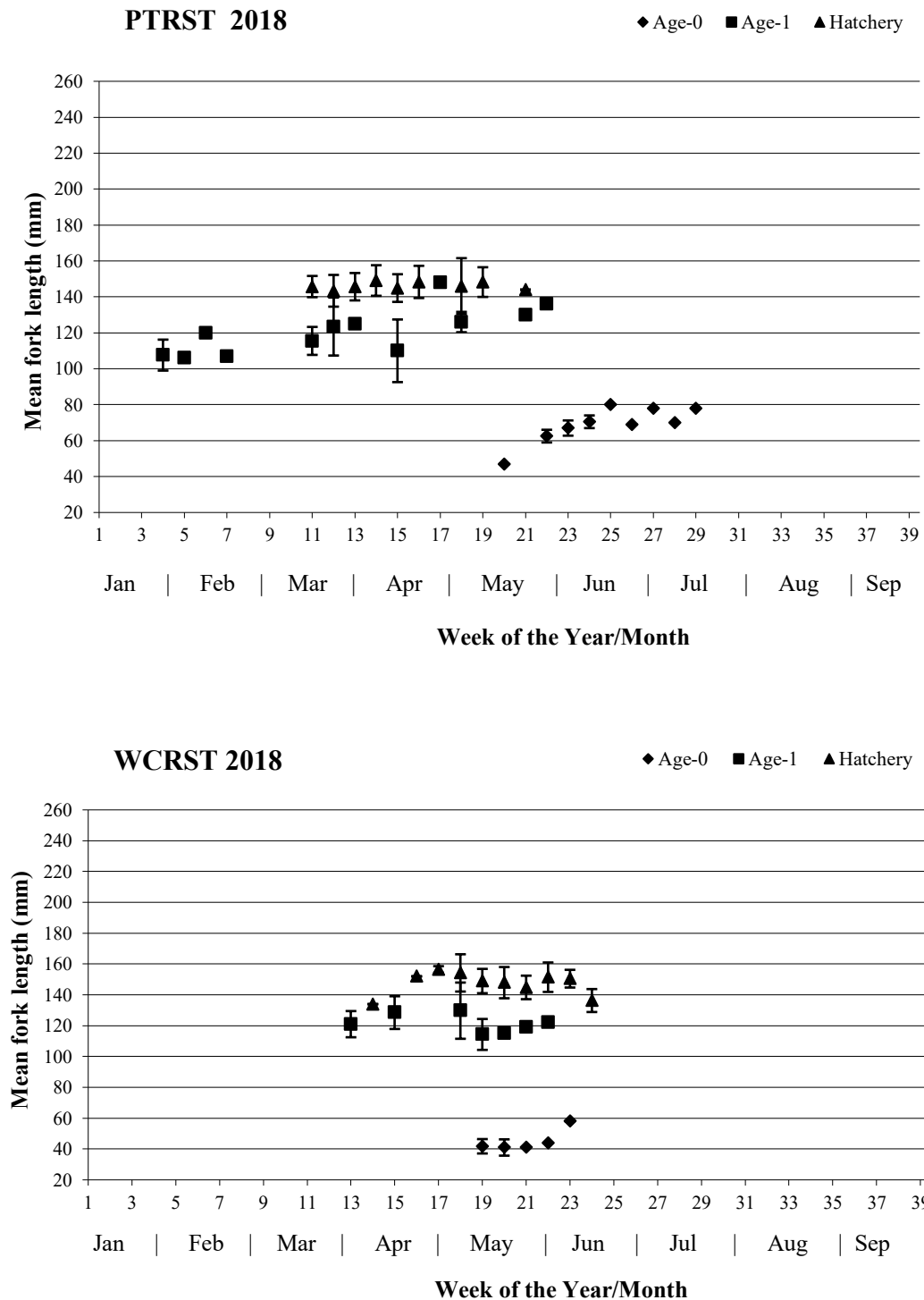
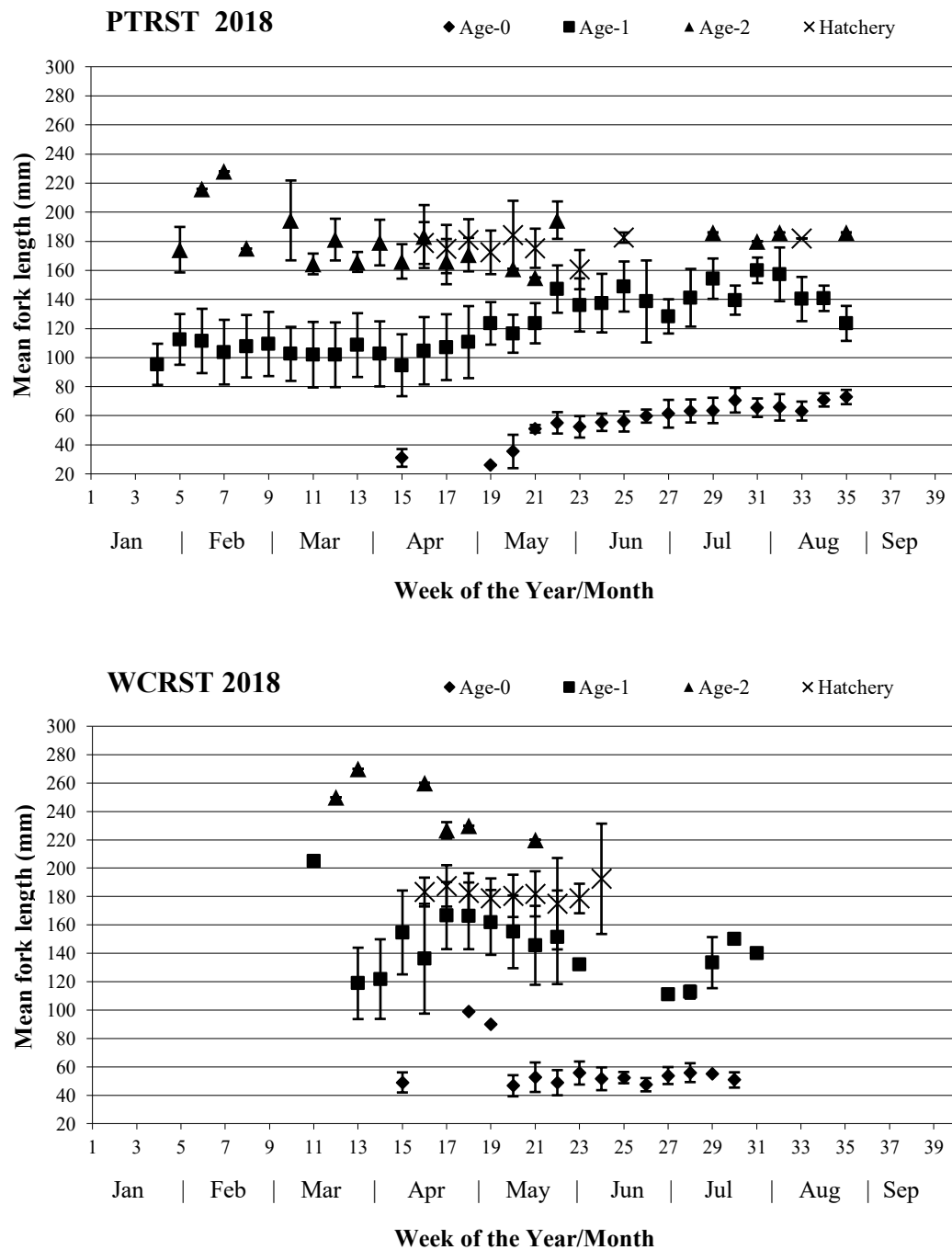


Figure 8. Weekly mean fork lengths for natural age-0, natural age-1, and hatchery Coho Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. Error bars represent one standard deviation of the mean.



Fish Condition

Fulton's condition factor ($K = 100,000 * (\text{weight}/\text{length}^3)$) was calculated on a subsample of age-0 (pooled natural and hatchery) Chinook Salmon larger than 50 mm, age-1 natural Coho Salmon, and age 1+ natural steelhead. Due to the inability to determine the origin of unmarked individuals, clipped and non-clipped juvenile Chinook Salmon were pooled in weekly mean calculations.

Chinook age-0 mean weekly condition factors were variable at the onset of sampling and showed no obvious seasonal trend at either site (Figure 10, Appendix 13). Age-1 natural Coho weekly mean condition factors were variable throughout the season at both PTRST and WCRST (Figure 11, Appendix 14), however, it should be noted that there were several weeks in which only one individual was captured at either site. Weekly mean condition factor of natural age-1+ steelhead showed no obvious trend at either PTRST or WCRST (Figure 12, Appendix 15).

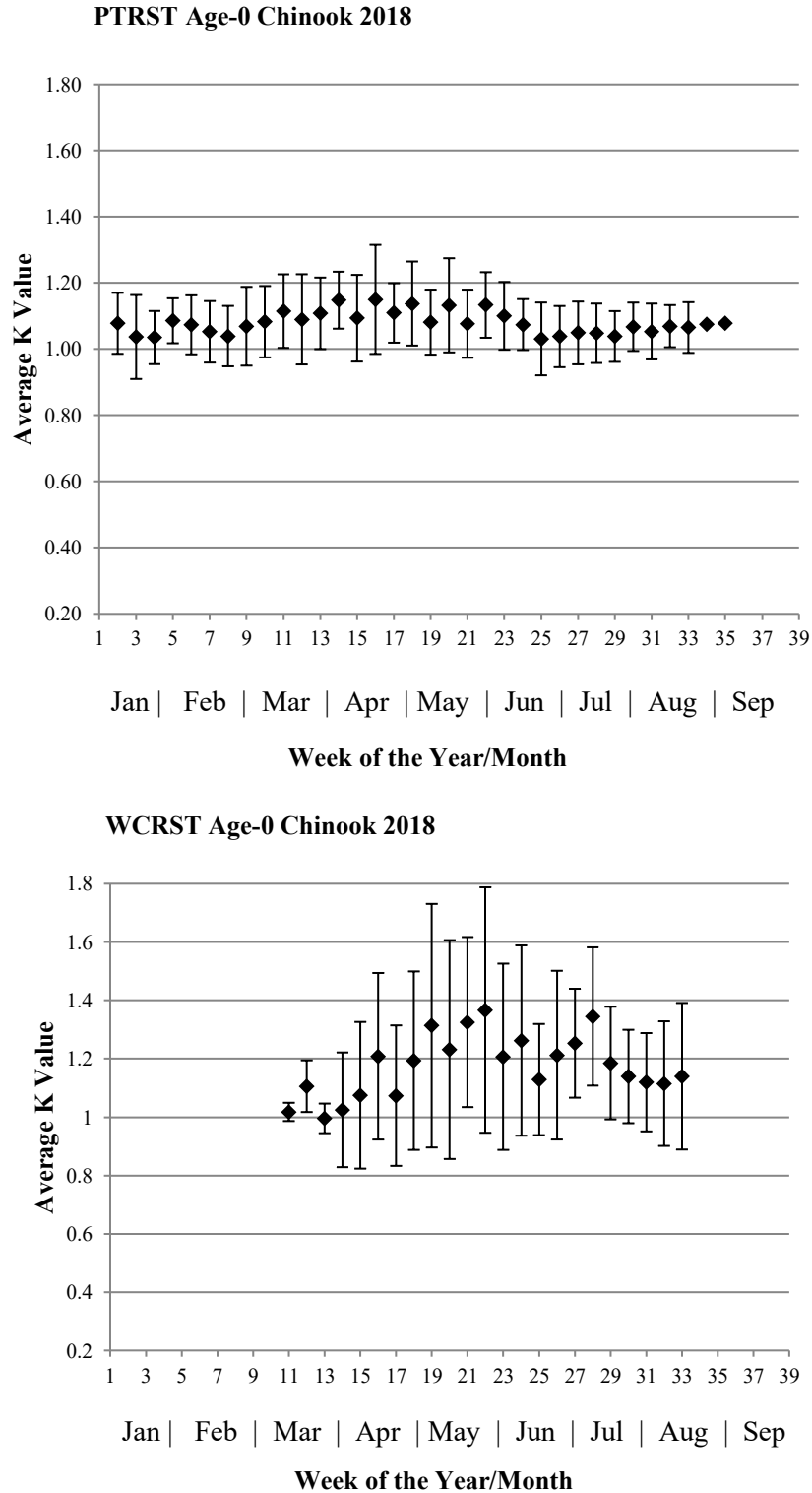


Figure 10. Weekly mean K value for pooled hatchery and natural age-0 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. Error bars represent one standard deviation of the mean.

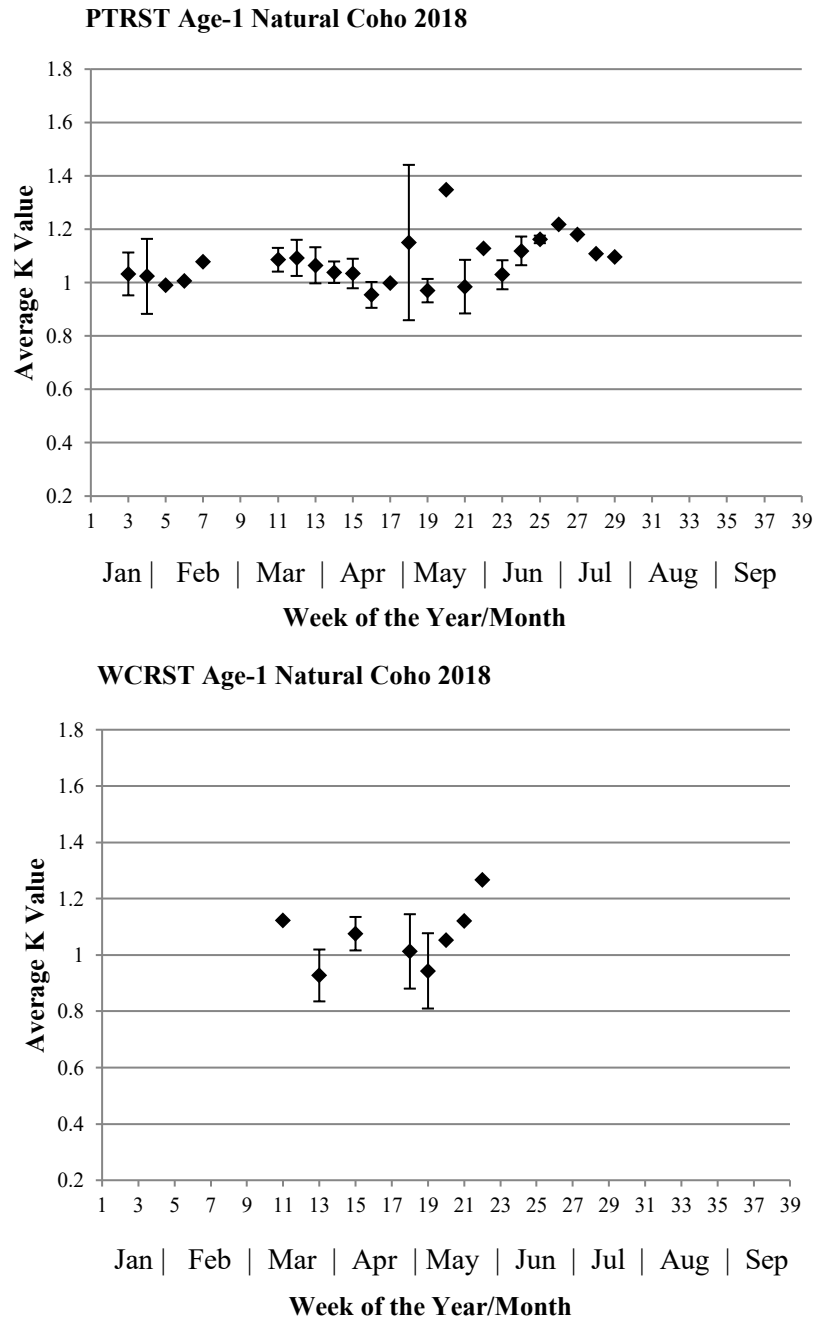


Figure 11. Weekly mean K value for natural age-1 Coho Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. Error bars represent one standard deviation of the mean.

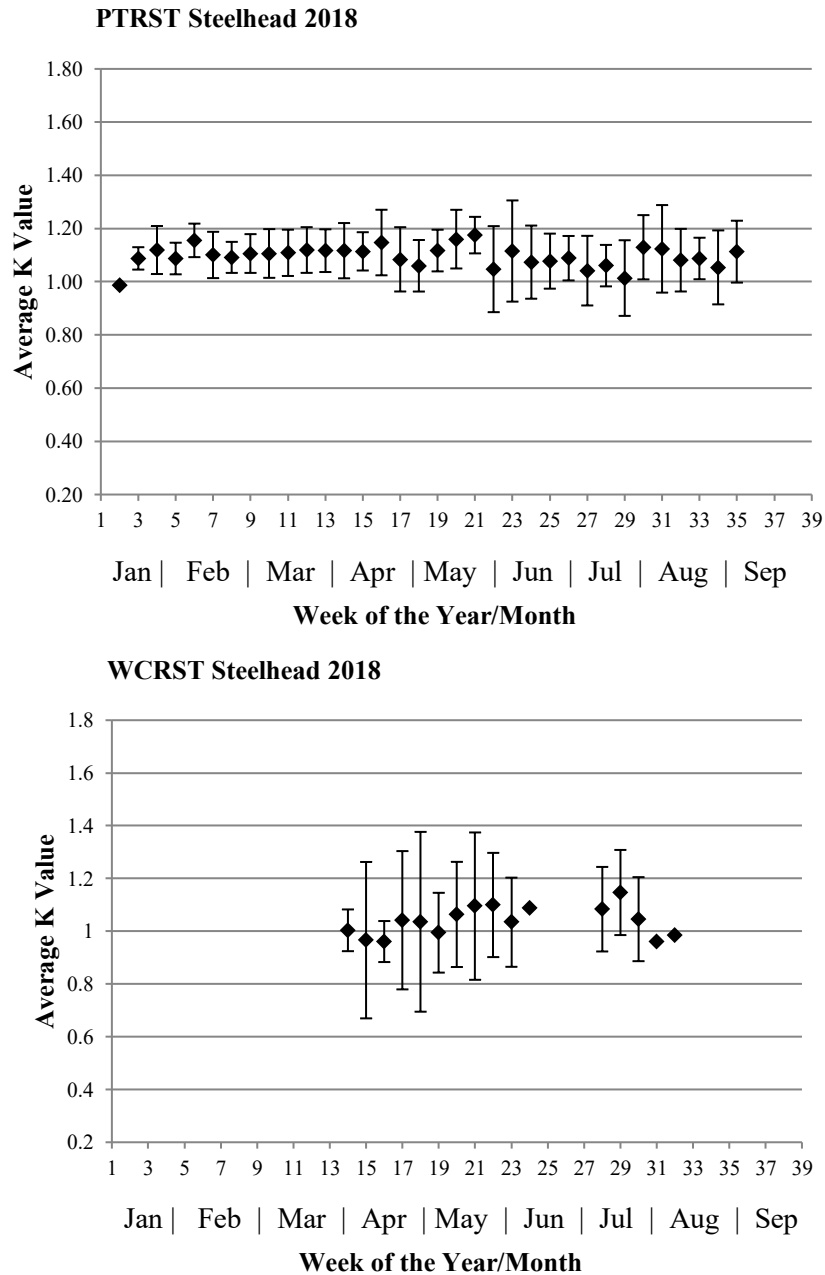


Figure 12. Weekly mean K value for natural age-1+ steelhead captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2018. Error bars represent one standard deviation of the mean.

References

- Bonner, S. J., D. Thomson, and C. J. Schwarz. 2009. Time-varying covariates and semi-parametric regression in capture-recapture: an adaptive spline approach. Pages 659–678 in D. L. Thomson, E. G. Cooch, and M. J. Conroy, editors. *Modeling Demographic Processes in Marked Populations: Environmental and Ecological Statistics*, Vol. 3, Springer, New York.
- Harris, N., P. Petros, and W. D. Pinnix. 2012. Juvenile Salmonid Monitoring on the Mainstem Trinity River, California, 2009. Yurok Tribal Fisheries Program, Hoopa Valley Tribal Fisheries Department, U. S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata Fisheries Data Series Report Number DS 2012-27, Arcata, California.
- Payton, Q., and N. S. Som. 2021. Evaluating alternative hierarchical modelling approaches for the estimation of salmonid smolt abundance. *North American Journal of Fisheries Management* 41:1182–1193. <https://doi.org/10.1002/nafm.10621>.
- Rawson, K. 1984. An estimate of the size of a migrating population of juvenile salmon using an index of trap efficiency obtained by dye marking. Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development, Juneau, Alaska, FRED Report Number 28. 23 p.
- Schwarz, C. J., D. Pickard, K. Marine and S. J. Bonner. 2009. Juvenile Salmonid Outmigrant Monitoring Evaluation, Phase II– December 2009. Final Technical Memorandum for the Trinity River Restoration Program, Weaverville, California. <http://odp.trrp.net/FileDatabase/Documents/ESSA%20etal%202009%20Juvenile%20Salmonid%20Outmigrant%20Monitoring%20Evaluation,%20Phase%20II1.pdf>.
- TRRP and ESSA (Trinity River Restoration Program and ESSA Technologies Ltd). 2009. Integrated Assessment Plan, Version 1.0 – September 2009. Draft report prepared for the Trinity River Restoration Program, Weaverville, California, 285 p.
- United States Department of the Interior (USDOI). 2000. Record of Decision. Trinity River Mainstem Fishery Restoration Final Environmental Impact Statement/Environmental Impact Report. December 2000. 43 p.

Acknowledgments

Special thanks to Al Andreoli, for allowing access through his property at the WCRST. In addition, the partners greatly appreciate the California Department of Fish and Wildlife and the Trinity River Hatchery staff for providing juvenile Chinook Salmon and facilitating mark-recapture efforts.

Appendices

Appendix 1. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Chinook Salmon catches and abundance indices, 2018. NC = no clip, AD = adipose fin clip.

Week Starting	Week of Year	Mean Daily Discharge m³/s	Trap Days Sampled	Weekly Chinook Salmon Catch							Weekly Chinook Salmon Index						
				Hatchery			Natural		Catch Total	Hatchery			Natural		Index Total		
				NC	AD	Age-1	Age-0	Age-1		NC	AD	Age-1	Age-0	Age-1			
1/8/2018	2	15.3	3	6	2	0	17	4	29	113	37	0	309	73	532		
1/15/2018	3	16.8	4	2	2	0	119	4	127	88	29	0	1,746	0	1,863		
1/22/2018	4	18.6	4	4	2	0	127	14	147	95	31	0	1,968	184	2,278		
1/29/2018	5	18.4	5	19	14	0	129	5	167	278	162	0	1,492	0	1,932		
2/5/2018	6	17.5	5	38	19	0	648	15	720	614	220	0	7,501	0	8,335		
2/12/2018	7	14.6	5	33	14	0	729	3	779	385	150	0	7,791	0	8,326		
2/19/2018	8	13.6	4	7	4	0	832	11	854	159	52	0	10,814	75	11,100		
2/26/2018	9	14.2	5	16	9	0	354	16	395	291	95	0	3,753	48	4,187		
3/5/2018	10	15.0	5	20	10	0	1,549	22	1,601	328	107	0	16,639	123	17,197		
3/12/2018	11	20.8	5	15	5	0	1,631	17	1,668	196	64	0	20,983	216	21,459		
3/19/2018	12	21.9	5	40	15	0	1,805	10	1,870	585	191	0	22,944	51	23,771		
3/26/2018	13	20.5	5	15	5	0	1,015	33	1,068	199	65	0	13,157	423	13,844		
4/2/2018	14	49.2	4	8	3	0	2,964	3	2,978	346	113	0	111,251	67	111,777		
4/9/2018	15	33.5	6	3	1	0	5,799	0	5,803	61	20	0	113,727	0	113,808		
4/16/2018	16	35.6	3	0	1	0	2,123	0	2,124	0	44	0	93,323	0	93,367		
4/23/2018	17	34.1	5	0	0	0	528	1	529	0	0	0	11,779	22	11,801		
4/30/2018	18	44.3	5	0	0	0	1,310	1	1,311	0	0	0	32,207	21	32,228		
5/7/2018	19	52.2	5	0	0	0	1,100	1	1,101	0	0	0	30,739	28	30,767		
5/14/2018	20	55.8	5	0	0	0	942	1	943	0	0	0	27,948	30	27,978		
5/21/2018	21	51.9	5	0	0	0	637	0	637	0	0	0	17,462	0	17,462		
5/28/2018	22	45.3	4	0	0	0	873	0	873	0	0	0	29,819	0	29,819		
6/4/2018	23	37.6	5	0	0	0	1,224	0	1,224	0	0	0	25,395	0	25,395		
6/11/2018	24	26.4	5	3,573	1,619	0	1,824	0	7,016	86,999	28,418	0	7,732	0	123,149		
6/18/2018	25	19.4	5	2,712	886	0	1,378	0	4,976	42,912	14,017	0	21,794	0	78,723		
6/25/2018	26	14.7	5	2,973	971	0	1,232	0	5,176	34,291	11,201	0	14,217	0	59,709		
7/2/2018	27	13.3	3	1,066	348	0	316	0	1,730	16,449	5,373	0	4,888	0	26,710		
7/9/2018	28	12.6	5	1,083	354	0	197	0	1,634	8,939	2,920	0	1,621	0	13,480		
7/16/2018	29	12.9	5	823	269	0	232	0	1,324	7,191	2,349	0	2,022	0	11,562		
7/23/2018	30	17.5	5	391	131	0	78	0	600	4,491	1,467	0	762	0	6,720		
7/30/2018	31	22.3	5	471	154	0	168	0	793	6,282	2,052	0	2,231	0	10,565		
8/6/2018	32	22.3	5	297	97	0	54	0	448	3,952	1,291	0	719	0	5,962		
8/13/2018	33	22.8	4	85	28	0	53	0	166	1,476	482	0	901	0	2,859		
8/20/2018	34	21.9	5	92	33	0	40	0	165	1,307	427	0	400	0	2,134		
8/27/2018	35	20.4	5	33	17	0	81	0	131	621	203	0	741	0	1,565		
Totals			159	13,825	5,013	0	32,108	161	51,107	218,648	71,580	0	660,775	1,361	952,364		

Appendix 2. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Chinook Salmon catches and abundance indices, 2018. NC = no clip, AD = adipose fin clip.

Week Starting	Week of Year	Mean Daily Discharge m³/s	Trap Days Sampled	Weekly Chinook Salmon Catch						Weekly Chinook Salmon Index						Index Total	
				Hatchery			Natural			Catch Total	Hatchery			Natural			
				NC	AD	Age-1	Age-0	Age-1	NC		AD	Age-1	Age-0	Age-1			
3/11/2018	11	159.8	1	0	0	0	14	7	21	0	0	0	5,348	2,674	8,022		
3/18/2018	12	156.0	4	0	0	0	42	2	44	0	0	0	3,736	166	3,902		
3/25/2018	13	210.4	8	0	0	0	78	2	80	0	0	0	3,721	74	3,795		
4/1/2018	14	171.9	8	0	0	0	91	1	92	0	0	0	9,137	277	9,414		
4/8/2018	15	675.3	6	0	0	2	178	4	184	0	0	543	12,010	121	12,674		
4/15/2018	16	216.4	8	0	0	0	374	3	377	0	0	0	17,645	142	17,787		
4/22/2018	17	151.9	10	0	0	2	92	8	102	0	0	238	2,623	74	2,935		
4/29/2018	18	148.9	12	0	0	1	271	10	282	0	0	74	5,367	135	5,576		
5/6/2018	19	126.7	14	0	0	0	574	4	578	0	0	0	9,443	35	9,478		
5/13/2018	20	105.2	12	0	0	0	2,659	0	2,659	0	0	0	44,665	0	44,665		
5/20/2018	21	94.9	8	0	0	0	3,418	1	3,419	0	0	0	88,295	26	88,321		
5/27/2018	22	92.9	9	0	0	0	3,846	0	3,846	0	0	0	70,513	0	70,513		
6/3/2018	23	70.1	12	9	3	0	5,343	1	5,356	98	46	0	64,041	12	64,197		
6/10/2018	24	61.7	10	93	30	0	5,414	0	5,537	1,366	647	0	72,280	0	74,293		
6/17/2018	25	45.6	11	903	290	0	2,479	0	3,672	8,517	4,032	0	25,856	0	38,405		
6/24/2018	26	34.9	11	697	224	0	1,574	0	2,495	6,182	2,927	0	13,990	0	23,099		
7/1/2018	27	28.3	4	84	27	0	773	0	884	1,701	805	0	16,895	0	19,401		
7/8/2018	28	25.4	8	233	75	0	1,525	0	1,833	2,230	1,055	0	16,226	0	19,511		
7/15/2018	29	22.6	8	233	75	0	318	0	626	2,280	1,080	0	3,556	0	6,916		
7/22/2018	30	20.7	8	205	66	0	182	0	453	1,974	935	0	2,004	0	4,913		
7/29/2018	31	30.7	8	9	3	0	54	0	66	105	49	0	1,356	0	1,510		
8/5/2018	32	28.4	8	53	17	0	5	0	75	513	243	0	149	0	905		
8/12/2018	33	27.9	6	59	19	0	13	0	91	778	368	0	215	0	1,361		
Totals			194	2,580	829	5	29,315	43	32,772	25,744	12,187	855	489,071	3,736	531,593		

Appendix 3. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Coho Salmon catches and abundance indices, 2018.
R-MAX = right maxillary clip.

Week Starting	Week of Year	Mean Daily Discharge m ³ /s	Trap Days Sampled	Weekly Coho Salmon Catch				Weekly Coho Salmon Index			
				Hatchery	Natural		Catch	Hatchery	Natural		Index
				R-MAX	Age-0	Age-1	Total	R-MAX	Age-0	Age-1	Total
1/8/2018	2	15.3	3	0	0	0	0	0	0	0	0
1/15/2018	3	16.8	4	0	0	6	6	0	0	88	88
1/22/2018	4	18.6	4	0	0	7	7	0	0	108	108
1/29/2018	5	18.4	5	0	0	1	1	0	0	12	12
2/5/2018	6	17.5	5	0	0	3	3	0	0	35	35
2/12/2018	7	14.6	5	0	0	1	1	0	0	11	11
2/19/2018	8	13.6	4	0	0	0	0	0	0	0	0
2/26/2018	9	14.2	5	0	0	0	0	0	0	0	0
3/5/2018	10	15.0	5	0	0	0	0	0	0	0	0
3/12/2018	11	20.8	5	8	0	2	10	103	0	26	129
3/19/2018	12	21.9	5	240	0	6	246	3,051	0	76	3,127
3/26/2018	13	20.5	5	122	0	1	123	1581	0	13	1594
4/2/2018	14	49.2	4	33	0	0	33	1239	0	0	1239
4/9/2018	15	33.5	6	22	0	3	25	471	0	59	530
4/16/2018	16	35.6	3	5	0	0	5	132	0	0	132
4/23/2018	17	34.1	5	0	0	1	1	0	0	22	22
4/30/2018	18	44.3	5	2	0	2	4	42	0	63	105
5/7/2018	19	52.2	5	5	0	0	5	140	0	0	140
5/14/2018	20	55.8	5	0	1	0	1	0	30	0	30
5/21/2018	21	51.9	5	1	0	1	2	27	0	27	54
5/28/2018	22	45.3	4	0	2	1	3	0	68	34	102
6/4/2018	23	37.6	5	0	2	0	2	0	41	0	41
6/11/2018	24	26.4	5	0	2	0	2	0	35	0	35
6/18/2018	25	19.4	5	0	2	0	2	0	32	0	32
6/25/2018	26	14.7	5	0	1	0	1	0	12	0	12
7/2/2018	27	13.3	3	0	1	0	1	0	15	0	15
7/9/2018	28	12.6	5	0	1	0	1	0	8	0	8
7/16/2018	29	12.9	5	0	1	0	1	0	9	0	9
7/23/2018	30	17.5	5	0	0	0	0	0	0	0	0
7/30/2018	31	22.3	5	0	0	0	0	0	0	0	0
8/6/2018	32	22.3	5	0	0	0	0	0	0	0	0
8/13/2018	33	22.8	4	0	0	0	0	0	0	0	0
8/20/2018	34	21.9	5	0	0	0	0	0	0	0	0
8/27/2018	35	20.4	5	0	0	0	0	0	0	0	0
Total			147	438	13	35	486	6,786	250	574	7,610

Appendix 4. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Coho Salmon catches and abundance indices, 2018. R-MAX = right maxillary clip.

Week Starting	Week of Year	Mean Daily Discharge m ³ /s	Trap Days Sampled	Weekly Coho Salmon Catch				Weekly Coho Salmon Index			
				Hatchery R-MAX	Natural		Catch Total	Hatchery R-MAX	Natural		Index Total
					Age-0	Age-1			Age-0	Age-1	
3/11/2018	11	159.8	1	0	0	1	1	0	0	385	385
3/18/2018	12	156.0	4	0	0	0	0	0	0	0	0
3/25/2018	13	210.4	8	0	0	2	2	0	0	86	86
4/1/2018	14	171.9	8	1	0	0	1	277	0	0	277
4/8/2018	15	675.3	6	1	0	2	3	63	0	252	315
4/15/2018	16	216.4	8	1	0	0	1	47	0	0	47
4/22/2018	17	151.9	10	2	0	0	2	60	0	0	60
4/29/2018	18	148.9	12	39	2	14	55	728	39	271	1038
5/6/2018	19	126.7	14	32	6	3	41	541	107	51	699
5/13/2018	20	105.2	12	40	3	1	44	676	51	18	745
5/20/2018	21	94.9	8	24	1	1	26	623	26	26	675
5/27/2018	22	92.9	9	13	1	1	15	231	19	19	269
6/3/2018	23	70.1	12	4	1	0	5	47	12	0	59
6/10/2018	24	61.7	10	3	0	0	3	32	0	0	32
6/17/2018	25	45.6	11	0	0	0	0	0	0	0	0
6/24/2018	26	34.9	11	0	0	0	0	0	0	0	0
7/1/2018	27	28.3	4	0	0	0	0	0	0	0	0
7/8/2018	28	25.4	8	0	0	0	0	0	0	0	0
7/15/2018	29	22.6	8	0	0	0	0	0	0	0	0
7/22/2018	30	20.7	8	0	0	0	0	0	0	0	0
7/29/2018	31	30.7	8	0	0	0	0	0	0	0	0
8/5/2018	32	28.4	8	0	0	0	0	0	0	0	0
8/12/2018	33	27.9	6	0	0	0	0	0	0	0	0
Totals			194	160	14	25	199	3,325	254	1,108	4,687

Appendix 5. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly steelhead catches and abundance indices, 2018. AD = adipose fin clip.

Mean Daily				Weekly Steelhead Catch					Weekly Steelhead Index				
Week	Week of	Discharge	Trap Days	Hatchery	Natural			Catch	Hatchery	Natural			Index
Starting	Year	m ³ /s	Sampled	AD	Age-0	Age-1	Age-2+	Total	AD	Age-0	Age-1	Age-2+	Total
1/7/2018	2	15.3	3	0	0	4	2	6	0	0	73	37	110
1/14/2018	3	16.8	4	0	0	7	1	8	0	0	103	15	118
1/21/2018	4	18.6	4	0	0	23	0	23	0	0	356	0	356
1/28/2018	5	18.4	5	0	0	6	5	11	0	0	69	58	127
2/4/2018	6	17.5	5	0	0	20	2	22	0	0	232	23	255
2/11/2018	7	14.6	5	0	0	24	3	27	0	0	256	32	288
2/18/2018	8	13.6	4	0	0	21	1	22	0	0	273	13	286
2/25/2018	9	14.2	5	0	0	10	0	10	0	0	106	0	106
3/4/2018	10	15.0	5	0	0	45	3	48	0	0	483	32	515
3/11/2018	11	20.8	5	0	11	125	5	141	0	142	1,608	64	1,814
3/18/2018	12	21.9	5	0	0	171	6	177	0	0	2,174	76	2,250
3/25/2018	13	20.5	5	0	0	68	1	69	0	0	881	13	894
4/1/2018	14	49.2	4	0	0	63	7	70	0	0	2,365	263	2,628
4/8/2018	15	33.5	6	0	41	130	2	173	0	824	2,883	39	3,746
4/15/2018	16	35.6	3	201	1	34	3	239	8,836	0	747	132	9,715
4/22/2018	17	34.1	5	38	1	8	0	47	848	22	178	0	1,048
4/29/2018	18	44.3	5	34	0	22	0	56	835	0	564	0	1,399
5/6/2018	19	52.2	5	25	1	18	0	44	699	28	503	0	1,230
5/13/2018	20	55.8	5	15	7	11	0	33	445	208	326	0	979
5/20/2018	21	51.9	5	11	3	11	0	25	302	82	302	0	686
5/27/2018	22	45.3	4	0	8	11	2	21	0	273	376	68	717
6/3/2018	23	37.6	5	4	99	19	0	122	83	2,054	394	0	2,531
6/10/2018	24	26.4	5	0	54	27	0	81	0	948	474	0	1,422
6/17/2018	25	19.4	5	2	25	14	0	41	32	396	221	0	649
6/24/2018	26	14.7	5	0	8	9	0	17	0	92	104	0	196
7/1/2018	27	13.3	3	0	28	6	0	34	0	432	93	0	525
7/8/2018	28	12.6	5	0	40	8	0	48	0	330	66	0	396
7/15/2018	29	12.9	5	0	22	9	0	31	0	192	79	0	271
7/22/2018	30	17.5	5	0	21	7	0	28	0	235	78	0	313
7/29/2018	31	22.3	5	0	42	9	0	51	0	560	120	0	680
8/5/2018	32	22.3	5	0	18	7	0	25	0	240	93	0	333
8/12/2018	33	22.8	4	0	14	8	0	22	0	241	138	0	379
8/19/2018	34	21.9	5	0	9	5	0	14	0	116	65	0	181
8/26/2018	35	20.4	5	0	7	4	0	11	0	84	48	0	132
Total			159	330	460	964	43	1,797	12,080	7,499	16,831	865	37,275

Appendix 6. Trinity River at Willow Creek Rotary crew Trap site (WCRST) weekly steelhead catches and abundance indices, 2018.
AD = adipose fin clip.

Week Starting	Week of Year	Mean Daily Discharge m³/s	Trap Days Sampled	Weekly Steelhead Catch					Weekly Steelhead Index				
				Hatchery AD	Natural			Catch Total	Hatchery AD	Natural			Index Total
					Age-0	Age-1	Age-2+			Age-0	Age-1	Age-2+	
3/11/2018	11	159.8	1	0	0	0	0	0	0	0	0	0	0
3/18/2018	12	156.0	4	0	0	1	1	2	0	0	84	84	168
3/25/2018	13	210.4	8	0	0	0	1	1	0	0	0	86	86
4/1/2018	14	171.9	8	0	0	10	0	10	0	0	2,769	0	2,769
4/8/2018	15	675.3	6	0	2	11	0	13	0	121	1,260	0	1,381
4/15/2018	16	216.4	8	6	0	23	2	31	273	0	1,092	96	1,461
4/22/2018	17	151.9	10	126	0	156	3	285	4,358	0	4,953	82	9,393
4/29/2018	18	148.9	12	902	10	477	1	1390	17,677	203	9,415	19	27,314
5/6/2018	19	126.7	14	409	8	197	0	614	6,925	145	3,336	0	10,406
5/13/2018	20	105.2	12	269	11	107	0	387	4,568	180	1,818	0	6,566
5/20/2018	21	94.9	8	174	9	109	1	293	4,559	233	2,853	26	7,671
5/27/2018	22	92.9	9	27	11	21	0	59	490	198	383	0	1,071
6/3/2018	23	70.1	12	20	22	14	0	56	238	263	170	0	671
6/10/2018	24	61.7	10	2	7	1	0	10	26	110	18	0	154
6/17/2018	25	45.6	11	0	5	0	0	5	0	49	0	0	49
6/24/2018	26	34.9	11	0	5	0	0	5	0	47	0	0	47
7/1/2018	27	28.3	4	0	12	0	0	12	0	280	0	0	280
7/8/2018	28	25.4	8	0	18	2	0	20	0	194	21	0	215
7/15/2018	29	22.6	8	0	1	14	0	15	0	11	156	0	167
7/22/2018	30	20.7	8	0	4	13	0	17	0	44	142	0	186
7/29/2018	31	30.7	8	0	0	1	0	1	0	0	32	0	32
8/5/2018	32	28.4	8	0	0	1	0	1	0	0	12	0	12
8/12/2018	33	27.9	6	0	0	0	0	0	0	0	0	0	0
			194	1,935	125	1158	9	3,227	39,114	2,078	28,514	393	70,099

Appendix 7. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly age-0 Chinook Salmon population estimate input and results, 2018. NC = no clip, AD = adipose fin clip.

Week Starting	Week of Year	Sampling Fraction ¹	Catch NC	Catch AD	Marks Released	Marks Recaptured	Recapture Rate	Estimated Natural	Estimated Natural Lower Bound	Estimated Natural Upper Bound	Estimated Hatchery	Estimated Hatchery Lower Bound	Estimated Hatchery Upper Bound
1/7/2018	2	0.00	27	2	---	---	---	2,431	427	7,274	0	0	0
1/14/2018	3	0.00	125	2	---	---	---	3,895	927	9,808	0	0	0
1/21/2018	4	0.00	145	2	---	---	---	4,609	914	11,963	0	0	0
1/28/2018	5	0.00	153	14	---	---	---	5,572	1,125	14,272	0	0	0
2/4/2018	6	0.00	701	19	---	---	---	14,282	4,190	35,111	0	0	0
2/11/2018	7	0.00	765	14	---	---	---	19,383	4,501	48,498	0	0	0
2/18/2018	8	0.00	850	4	---	---	---	23,325	5,137	58,337	0	0	0
2/25/2018	9	0.00	386	9	---	---	---	16,119	4,289	39,988	0	0	0
3/4/2018	10	0.00	1591	10	605	53	0.09	25,804	19,608	33,115	0	0	0
3/11/2018	11	0.00	1663	5	692	17	0.02	79,529	52,474	116,550	0	0	0
3/18/2018	12	0.00	1855	15	701	52	0.07	34,889	26,561	44,308	0	0	0
3/25/2018	13	0.00	1063	5	616	67	0.11	13,938	10,981	17,636	0	0	0
4/1/2018	14	0.00	2975	3	516	58	0.11	47,592	37,994	60,226	0	0	0
4/8/2018	15	0.00	5802	1	788	45	0.06	118,840	88,770	155,419	0	0	0
4/15/2018	16	0.00	2123	1	497	12	0.02	156,062	99,191	237,865	0	0	0
4/22/2018	17	0.00	529	0	733	71	0.10	8,387	6,554	10,668	0	0	0
4/29/2018	18	0.00	1311	0	952	40	0.04	42,690	31,582	56,458	0	0	0
5/6/2018	19	0.00	1101	0	1681	27	0.02	88,951	62,147	123,118	0	0	0
5/13/2018	20	0.00	943	0	2008	18	0.01	120,495	79,603	175,008	0	0	0
5/20/2018	21	0.00	637	0	2454	44	0.02	49,827	36,757	65,688	0	0	0
5/27/2018	22	0.00	873	0	2310	33	0.01	96,599	69,559	130,018	0	0	0
6/3/2018	23	0.00	1224	0	2459	90	0.04	46,601	37,131	56,161	0	0	0
6/10/2018	24	0.00	5397	1619	2946	80	0.03	21,924	9,593	34,728	328,475	267,203	404,182
6/17/2018	25	0.00	4090	886	2465	118	0.05	38,491	29,476	47,426	105,339	87,503	126,400
6/24/2018	26	0.00	4205	971	1330	173	0.13	13,238	10,346	16,538	43,709	36,869	50,497
7/1/2018	27	0.00	1382	348	---	---	---	9,967	2,400	22,634	51,804	15,353	110,511
7/8/2018	28	0.00	1280	354	---	---	---	5,446	1,200	12,385	45,913	12,982	100,047
7/15/2018	29	0.00	1055	269	2382	123	0.05	4,911	1,617	8,134	30,423	24,389	36,808
7/22/2018	30	0.00	469	131	763	72	0.09	1,335	504	2,421	8,240	6,152	10,501
7/29/2018	31	0.00	639	154	---	---	---	2,043	319	4,779	10,488	2,869	23,451
8/5/2018	32	0.00	351	97	---	---	---	1,246	166	3,384	9,931	2,835	24,121
8/12/2018	33	0.00	138	28	150	0	0.00	1,235	153	3,276	4,555	1,147	10,890
8/19/2018	34	0.00	132	33	959	55	0.06	798	178	1,600	3,221	2,056	4,498
8/26/2018	35	0.00	114	17	871	80	0.09	848	280	1,435	1,208	715	1,911
Total			46,094	5,013	28,878	1,328		1,121,302	736,655	1,666,229	643,306	460,072	903,816

¹ Fraction of possible trap days successfully sampled each week

Appendix 8. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly age-0 Chinook Salmon population estimate input and results, 2018. NC = no clip, AD = adipose fin clip.

Week Starting	Week of Year	Sampling Fraction ¹	Catch NC	Catch AD	Marks Released	Marks Recaptured	Recapture Rate	Estimated Natural	Estimated Natural Lower Bound	Estimated Natural Upper Bound	Estimated Hatchery	Estimated Hatchery Lower Bound	Estimated Hatchery Upper Bound
3/11/2018	11	0.14	14		0	--	--	4,292	480	13,924	0	-	-
3/18/2018	12	0.43	42		0	1,102	5	0.005	3,443	531	10,137	0	-
3/25/2018	13	0.57	78		0	1,668	7	0.004	4,259	712	12,447	0	-
4/1/2018	14	0.57	91		0	1,469	0	0.000	5,700	1,048	16,876	0	-
4/8/2018	15	0.57	182		0	2,414	0	0.000	12,898	2,497	37,527	0	-
4/15/2018	16	0.57	374		0	3,020	15	0.005	75,427	48,375	105,947	0	-
4/22/2018	17	0.57	92		0	4,020	23	0.006	25,129	15,918	36,743	0	-
4/29/2018	18	0.57	271		0	4,162	172	0.041	11,254	9,256	13,415	0	-
5/6/2018	19	0.57	570	1	4,068	78	0.019	25,948	21,441	31,162	0	-	-
5/13/2018	20	0.57	2,659	0	5,786	88	0.015	120,057	102,727	139,214	0	-	-
5/20/2018	21	0.57	3,418	0	3,531	60	0.017	208,617	169,449	249,771	0	-	-
5/27/2018	22	0.43	3,846	0	1,749	213	0.122	219,335	186,525	256,273	0	-	-
6/3/2018	23	0.57	5,352	3	2,529	51	0.020	201,957	168,391	241,586	0	-	-
6/10/2018	24	0.57	5,507	30	2,524	127	0.050	195,412	164,318	230,849	4,713	2,978	6,576
6/17/2018	25	0.57	3,382	290	2,521	146	0.058	75,078	62,575	87,287	35,566	28,906	42,324
6/24/2018	26	0.57	2,271	224	2,456	139	0.057	51,954	43,113	62,120	30,033	24,357	36,787
7/1/2018	27	0.29	857	27	2,564	91	0.035	73,984	58,775	90,991	10,715	6,618	15,040
7/8/2018	28	0.57	1,758	75	1,313	90	0.069	38,053	30,932	47,432	7,811	5,548	10,268
7/15/2018	29	0.57	551	75	1,503	3	0.002	43,950	25,172	67,000	41,812	25,788	65,551
7/22/2018	30	0.57	387	66	1,489	22	0.015	6,259	1,631	14,604	9,418	2,536	22,041
7/29/2018	31	0.57	63	3	--	--	--	988	472	1,485	524	171	983
8/5/2018	32	0.57	58	17	--	--	--	408	6	1,429	2,671	504	7,626
8/12/2018	33	0.43	72	19	1,573	79	0.050	347	1	1,891	4,008	574	12,900
Total			31,895	830	51,461	1,409	0.027	1,404,751	1,114,346	1,770,109	147,272	97,980	220,094

¹ Fraction of possible trap days successfully sampled each week

Appendix 9. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Chinook and Coho salmon fork lengths, 2018.

Week Starting	Week of Year	Chinook Salmon ¹										Natural Coho Salmon										Hatchery Coho Salmon				
		Age-0					Age-1					Age-0					Age-1					Age-1				
		n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD
1/8/2018	2	23	38.0	36	40	1.43	6	103.3	90	121	11.8	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
1/15/2018	3	66	38.6	36	47	1.54	8	112.3	94	155	18.7	0	---	---	---	---	5	93.4	79.0	102.0	9.7	0	---	---	---	---
1/22/2018	4	78	38.7	36	48	1.87	14	101.3	81	124	13.75	0	---	---	---	---	5	107.6	95.0	116.0	8.62	0	---	---	---	---
1/29/2018	5	99	40.0	35	52	2.71	39	105.8	57	172	17.31	0	---	---	---	---	1	106.0	106.0	106.0	---	0	---	---	---	---
2/5/2018	6	120	40.1	35	60	4.44	58	103.9	88	126	8.63	0	---	---	---	---	1	120.0	120.0	120.0	---	0	---	---	---	---
2/12/2018	7	150	45.3	36	63	6.45	50	108.9	82	163	16.87	0	---	---	---	---	1	107.0	107.0	107.0	---	0	---	---	---	---
2/19/2018	8	120	47.7	37	59	6.49	22	104.9	88	157	13.18	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
2/26/2018	9	127	46.5	35	76	8.97	40	107.0	92	194	16.33	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
3/5/2018	10	200	48.3	35	80	7.06	51	104.5	87	150	11.16	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
3/12/2018	11	135	52.8	36	69	6.23	37	102.8	89	130	8.77	0	---	---	---	---	2	115.5	110.0	121.0	7.78	8	145.8	138.0	154.0	5.90
3/19/2018	12	189	53.8	37	70	5.86	65	110.3	86	175	15.82	0	---	---	---	---	6	123.5	111.0	154.0	16.13	136	143.4	121.0	170.0	8.83
3/26/2018	13	187	59.0	39	80	7.17	53	110.8	95	140	8.72	0	---	---	---	---	1	125.0	125.0	125.0	---	105	145.7	128.0	166.0	7.62
4/2/2018	14	152	58.5	37	73	7.55	14	114.7	98	135	10.45	0	---	---	---	---	0	---	---	---	---	33	149.1	134.0	166.0	8.51
4/9/2018	15	215	59.7	36	93	8.44	1	117.0	117	117	---	0	---	---	---	---	3	110.0	98.0	130.0	17.44	24	145	129	158	8
4/16/2018	16	101	59.5	37	78	7.96	1	106.0	106	106	---	0	---	---	---	---	0	---	---	---	---	3	148.3	138.0	154.0	8.96
4/23/2018	17	190	59.7	40	86	8.43	1	106.0	106	106	---	0	---	---	---	---	1	148.0	148.0	148.0	---	0	---	---	---	---
4/30/2018	18	197	60.7	45	103	8.65	0	---	---	---	---	0	---	---	---	---	2	126.0	122.0	130.0	5.66	2	146.0	135.0	157.0	15.56
5/7/2018	19	175	62.6	43	99	8.65	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	4	148.3	142.0	160.0	8.26
5/14/2018	20	168	63.4	47	97	9.33	1	142.0	142	142	---	1	47.0	47.0	47.0	---	0	---	---	---	---	0	---	---	---	---
5/21/2018	21	193	62.5	47	105	9.75	0	---	---	---	---	0	---	---	---	---	1	130.0	130.0	130.0	---	1	144.0	144.0	144.0	NA
5/28/2018	22	153	65.8	48	94	9.36	0	---	---	---	---	2	62.5	60.0	65.0	3.5	1	136.0	136.0	136.0	---	0	---	---	---	---
6/4/2018	23	195	68.4	41	109	11.08	0	---	---	---	---	2	67.0	64.0	70.0	4.2	0	---	---	---	---	0	---	---	---	---
6/11/2018	24	332	71.3	55	97	7.55	0	---	---	---	---	2	70.5	68.0	73.0	3.5	0	---	---	---	---	0	---	---	---	---
6/18/2018	25	273	74.2	55	97	8.31	0	---	---	---	---	2	80.0	80.0	80.0	0.0	0	---	---	---	---	0	---	---	---	---
6/25/2018	26	221	77.6	61	97	7.46	0	---	---	---	---	1	69.0	69.0	69.0	---	0	---	---	---	---	0	---	---	---	---
7/2/2018	27	210	78.3	51	100	6.74	0	---	---	---	---	1	78.0	78.0	78.0	---	0	---	---	---	---	0	---	---	---	---
7/9/2018	28	300	79.2	52	104	7.62	0	---	---	---	---	1	70.0	70.0	70.0	---	0	---	---	---	---	0	---	---	---	---
7/16/2018	29	331	83.4	62	116	9.05	0	---	---	---	---	1	78.0	78.0	78.0	---	0	---	---	---	---	0	---	---	---	---
7/23/2018	30	301	82.9	58	113	8.12	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
7/30/2018	31	234	88.7	64	118	11.77	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
8/6/2018	32	241	86.4	67	114	8.23	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
8/13/2018	33	142	84.5	64	112	8.04	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
8/20/2018	34	196	94.6	67	124	12.95	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
8/27/2018	35	158	95.5	66	125	12.91	5	127.0	126	130	1.73	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---

¹Natural and Hatchery combined

Appendix 10. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Chinook and Coho salmon fork lengths, 2018.

Week Starting	Week of Year	Chinook Salmon ¹										Natural Coho Salmon										Hatchery Coho Salmon				
		Age-0					Age-1					Age-0					Age-1					Age-1				
		n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD
3/11/2018	11	14	41.9	30	52	6.46	7	104.1	95	120	9.17	0	---	---	---	---	1	105	105	105	0	0	---	---	---	---
3/18/2018	12	42	41.1	30	65	6.93	2	103.5	95	112	12.02	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
3/25/2018	13	63	10.1	30	64	7.51	2	101	100	102	1.41	0	---	---	---	---	2	121	115	127	8.49	0	---	---	---	---
4/1/2018	14	86	39.1	30	60	6.9	1	129	129	129	0	0	---	---	---	---	0	---	---	---	---	1	134	134	134	0
4/8/2018	15	70	61.2	44	80	9.2	4	123.3	104	145	16.82	0	---	---	---	---	2	128.5	121	136	10.61	0	---	---	---	---
4/15/2018	16	175	62.6	39	87	10.67	3	122	112	136	12.49	0	---	---	---	---	0	---	---	---	---	1	152	152	152	0
4/22/2018	17	78	66.1	45	85	7.94	8	122.6	100	152	13.86	0	---	---	---	---	0	---	---	---	---	2	156.5	155	158	2.12
4/29/2018	18	109	68.6	44	114	9.84	10	121.2	105	140	11.91	0	---	---	---	---	8	129.8	104	170	18.23	24	154.3	130	187	12.1
5/6/2018	19	144	70.9	42	97	12.12	4	119.5	113	130	7.59	5	41.8	38	49	4.66	3	114.3	115	124	10.02	32	149	136	172	7.88
5/13/2018	20	265	74.2	44	101	12.12	0	---	---	---	---	3	41	35	45	5.29	1	115	115	115	0	40	147.9	123	170	10.1
5/20/2018	21	191	77.1	50	103	10.98	1	111	111	111	0	1	41	41	41	0	1	119	119	119	0	24	144.8	130	166	7.62
5/27/2018	22	256	78.5	24	101	11.18	0	---	---	---	---	1	44	44	44	0	1	122	122	122	0	13	151.5	132	165	9.55
6/3/2018	23	363	77	50	99	9.5	1	115	115	115	0	1	58	58	58	0	0	---	---	---	---	4	150.5	143	155	5.74
6/10/2018	24	271	76.7	49	110	8.76	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	3	136.3	125	154	7.44
6/17/2018	25	293	74.5	43	100	8.13	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
6/24/2018	26	252	75.6	50	95	7.14	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
7/1/2018	27	119	79.2	70	95	5.78	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
7/8/2018	28	238	79.3	56	95	5.64	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
7/15/2018	29	220	79.1	55	113	7.53	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
7/22/2018	30	191	80.4	59	110	8	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
7/29/2018	31	33	78.6	60	101	8.7	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
8/5/2018	32	58	89.4	70	115	10.04	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
8/12/2018	33	68	85.4	56	105	9.38	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---

¹Natural and Hatchery combined.

Appendix 11: Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly steelhead fork lengths, 2018.

Week Starting	Week of Year	Natural Steelhead															Hatchery Steelhead				
		Age-0					Age-1					Age-2					Age-1				
		n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD
1/8/2018	2	0	---	---	---	---	3	123.3	114	140	14.47	2	157.5	155	160	3.54	0	---	---	---	---
1/15/2018	3	0	---	---	---	---	7	93.9	80	122	14.54	1	158.0	158	158	---	0	---	---	---	---
1/22/2018	4	0	---	---	---	---	16	95.4	71	118	14.15	0	---	---	---	---	0	---	---	---	---
1/29/2018	5	0	---	---	---	---	6	112.5	82	134	17.47	5	174.2	160	196	15.66	0	---	---	---	---
2/5/2018	6	0	---	---	---	---	14	111.4	64	150	22.12	1	216.0	216	216	---	0	---	---	---	---
2/12/2018	7	0	---	---	---	---	26	103.7	69	152	22.24	1	228.0	228	228	---	0	---	---	---	---
2/19/2018	8	0	---	---	---	---	21	107.8	67	151	21.48	1	175.0	175	175	---	0	---	---	---	---
2/26/2018	9	0	---	---	---	---	9	109.3	82	151	22.07	0	---	---	---	---	0	---	---	---	---
3/5/2018	10	0	---	---	---	---	45	102.5	58	140	18.58	3	194.3	177	226	27.47	0	---	---	---	---
3/12/2018	11	0	---	---	---	---	89	102.0	63	152	22.55	5	164.4	156	172	7.13	0	---	---	---	---
3/19/2018	12	0	---	---	---	---	97	101.9	65	153	22.27	7	181.1	165	209	14.35	0	---	---	---	---
3/26/2018	13	0	---	---	---	---	62	108.6	67	154	21.95	5	165.8	155	174	6.83	0	---	---	---	---
4/2/2018	14	0	---	---	---	---	60	102.5	71	154	22.37	9	179.1	161	211	15.70	0	---	---	---	---
4/9/2018	15	3	31.0	27	38	6.08	142	94.7	63	153	21.28	7	166.1	155	190	11.85	0	---	---	---	---
4/16/2018	16	0	---	---	---	---	16	104.7	77	137	23.17	4	183.3	167	215	21.64	44	178.8	122	202	14.40
4/23/2018	17	0	---	---	---	---	6	107.2	77	135	22.63	2	166.0	155	177	15.56	37	174.6	127	203	16.60
4/30/2018	18	0	---	---	---	---	16	110.6	75	151	24.78	5	170.8	155	182	11.52	32	181.0	144	202	14.17
5/7/2018	19	1	26.0	26	26	NA	17	123.5	92	149	14.63	0	---	---	---	---	25	172.4	128	198	15.01
5/14/2018	20	7	35.4	26	56	11.49	10	116.4	91	139	13.07	1	161.0	161	161	---	15	184.1	129	233	23.78
5/21/2018	21	3	51.0	48	53	2.65	8	123.6	100	139	13.85	1	155.0	155	155	---	11	175.2	142	187	13.47
5/28/2018	22	8	55.1	46	65	7.36	9	147.1	128	175	16.29	4	194.5	181	206	12.87	0	---	---	---	---
6/4/2018	23	99	52.4	35	67	7.36	17	136.2	95	168	18.28	0	---	---	---	---	4	160.5	142	171	13.48
6/11/2018	24	53	55.5	45	69	5.95	24	137.5	72	162	20.15	0	---	---	---	---	0	---	---	---	---
6/18/2018	25	20	56.1	46	67	6.92	7	148.9	125	175	17.23	0	---	---	---	---	2	182.5	180	185	3.54
6/25/2018	26	4	59.8	54	65	4.50	10	138.6	74	172	28.19	0	---	---	---	---	0	---	---	---	---
7/2/2018	27	28	61.4	50	92	9.55	6	128.3	115	149	11.78	0	---	---	---	---	0	---	---	---	---
7/9/2018	28	40	63.3	48	78	7.91	7	141.1	109	171	19.84	0	---	---	---	---	0	---	---	---	---
7/16/2018	29	22	63.6	45	79	8.73	4	154.3	137	170	13.89	1	186.0	186	186	---	0	---	---	---	---
7/23/2018	30	19	70.7	57	88	8.48	4	139.5	127	149	10.02	0	---	---	---	---	0	---	---	---	---
7/30/2018	31	42	65.5	53	79	6.35	5	160.0	149	173	8.80	1.0	180	180	180.00	---	0	---	---	---	---
8/6/2018	32	18	65.8	55	85	9.10	4	157.3	132	176	18.46	1.0	186	186	186.00	---	0	---	---	---	---
8/13/2018	33	14	63.2	54	80	6.51	4	140.3	120	155	15.20	0	---	---	---	---	1	182.0	182	182	---
8/20/2018	34	9	70.9	64	79	4.57	4	140.8	130	151	8.73	0	---	---	---	---	0	---	---	---	---
8/27/2018	35	7	72.9	65	80	4.91	2	123.5	115	132	12.02	1	186.0	186	186	---	0	---	---	---	---

Appendix 12: Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly steelhead fork lengths, 2018.

	Week of Year	Natural Steelhead										Hatchery Steelhead				
		Age-0					Age-1					Age-2				
		n	mean	min	max	SD	n	mean	min	max	SD	n	mean	min	max	SD
3/11/2018	11	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---
3/18/2018	12	0	---	---	---	---	1	205.0	205	205	0.0	1	250	250	250	0.0
3/25/2018	13	0	---	---	---	---	0	---	---	---	---	1	270	270	270	0.0
4/1/2018	14	0	---	---	---	---	10	118.8	88	150	25.2	0	---	---	---	---
4/8/2018	15	2	49	44	54	7.07	11	121.8	88	185	28.1	0	---	---	---	---
4/15/2018	16	0	---	---	---	---	23	154.7	91	195	27.6	2	260	260	260	0.0
4/22/2018	17	0	---	---	---	---	99	136.2	95	200	32.7	3	226.7	220	230	5.8
4/29/2018	18	1	80	80	80	0.0	122	166.6	102	210	23.7	1	230	230	230	0.0
5/6/2018	19	1	84	84	84	0.0	140	166.4	90	220	23.5	0	---	---	---	---
5/13/2018	20	11	46.6	37	60	7.5	88	161.8	90	215	22.9	0	---	---	---	---
5/20/2018	21	9	52.6	38	71	10.4	97	155.1	100	220	25.6	1	220	220	220	0.0
5/27/2018	22	11	48.8	30	60	8.9	21	145.6	95	180	27.8	0	---	---	---	---
6/3/2018	23	21	55.6	38	72	8.1	14	151.3	99	200	33.0	0	---	---	---	---
6/10/2018	24	7	51.6	37	61	8.0	1	132.0	132	132	0.0	0	---	---	---	---
6/17/2018	25	5	52.4	47	57	4.0	0	---	---	---	---	0	---	---	---	---
6/24/2018	26	5	47.4	41	54	4.7	0	---	---	---	---	0	---	---	---	---
7/1/2018	27	12	53.8	45	62	6.0	0	---	---	---	---	0	---	---	---	---
7/8/2018	28	18	55.9	46	66	6.7	2	111.0	109	113	2.8	0	---	---	---	---
7/15/2018	29	1	55.0	55	55	0.0	3	112.7	110	118	4.6	0	---	---	---	---
7/22/2018	30	4	50.8	45	58	5.4	9	133.4	105	156	18.0	0	---	---	---	---
7/29/2018	31	0	---	---	---	---	1	150.0	150	150	0.0	0	---	---	---	---
8/5/2018	32	0	---	---	---	---	1	140.0	140	140	0.0	0	---	---	---	---
8/12/2018	33	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---

Appendix 13. Fulton's condition factor (K) for pooled natural and hatchery age-0 Chinook Salmon with FL >50 mm from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2018.

Week Starting	Week of Year	Pear Tree Trap Site			Willow Creek Trap Site		
		n	Average K	Standard Deviation of K	n	Average K	Standard Deviation of K
1/8/2018	2	2	1.08	0.057	---	---	---
1/15/2018	3	8	1.04	0.081	---	---	---
1/22/2018	4	14	1.03	0.092	---	---	---
1/29/2018	5	38	1.09	0.127	---	---	---
2/5/2018	6	58	1.07	0.080	---	---	---
2/12/2018	7	50	1.05	0.068	---	---	---
2/19/2018	8	22	1.04	0.089	---	---	---
2/26/2018	9	83	1.07	0.093	---	---	---
3/5/2018	10	110	1.08	0.091	---	---	---
3/12/2018	11	112	1.11	0.119	2	1.02	0.031
3/19/2018	12	164	1.09	0.108	3	1.11	0.089
3/26/2018	13	185	1.11	0.111	8	1	0.051
4/2/2018	14	113	1.15	0.136	10	1.03	0.197
4/9/2018	15	131	1.09	0.108	55	10.7	0.251
4/16/2018	16	79	1.15	0.086	159	1.21	0.285
4/23/2018	17	126	1.11	0.131	73	1.07	0.241
4/30/2018	18	133	1.14	0.165	102	1.19	0.306
5/7/2018	19	138	1.08	0.090	132	1.31	0.417
5/14/2018	20	131	1.13	0.127	249	1.23	0.375
5/21/2018	21	145	1.08	0.098	179	1.33	0.291
5/28/2018	22	90	1.13	0.142	236	1.37	0.421
6/4/2018	23	119	1.10	0.103	311	1.21	0.319
6/11/2018	24	300	1.07	0.099	243	1.26	0.326
6/18/2018	25	240	1.03	0.103	264	1.13	0.191
6/25/2018	26	129	1.04	0.077	222	1.21	0.289
7/2/2018	27	180	1.05	0.110	102	1.25	0.178
7/9/2018	28	299	1.05	0.092	211	1.34	0.237
7/16/2018	29	300	1.04	0.095	195	1.19	0.193
7/23/2018	30	269	1.07	0.090	165	1.14	0.160
7/30/2018	31	234	1.05	0.077	33	1.12	0.168
8/6/2018	32	241	1.07	0.073	58	1.11	0.214
8/13/2018	33	142	1.07	0.084	66	1.14	0.251
8/20/2018	34	159	1.08	0.064	---	---	---
8/27/2018	35	121	1.08	0.077	---	---	---

Appendix 14. Fulton's condition factor (K) for natural age-1 Coho Salmon from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2018.

Week Starting	Week of Year	Pear Tree Trap Site			Willow Creek Trap Site		
		n	Average K	Standard Deviation of K	n	Average K	Standard Deviation of K
1/7/2018	2	---	---	---	---	---	---
1/14/2018	3	5	1.03	0.080	---	---	---
1/21/2018	4	5	1.02	0.141	---	---	---
1/28/2018	5	1	0.99	NA	---	---	---
2/4/2018	6	1	1.01	NA	---	---	---
2/11/2018	7	1	1.08	NA	---	---	---
2/18/2018	8	---	---	---	---	---	---
2/25/2018	9	---	---	---	---	---	---
3/4/2018	10	---	---	---	---	---	---
3/11/2018	11	10	1.09	0.044	1	1.12	---
3/18/2018	12	142	1.09	0.068	0	---	---
3/25/2018	13	106	1.07	0.068	2	0.93	0.92
4/1/2018	14	33	1.04	0.040	0	---	---
4/8/2018	15	22	1.03	0.055	2	1.08	0.590
4/15/2018	16	3	0.95	0.049	0	---	---
4/22/2018	17	1	1.00	NA	0	---	---
4/29/2018	18	4	1.15	0.291	8	1.01	0.132
5/6/2018	19	4	0.97	0.044	3	0.94	0.134
5/13/2018	20	1	1.35	NA	1	1.05	---
5/20/2018	21	2	0.99	0.100	1	1.12	---
5/27/2018	22	1	1.13	NA	1	1.27	---
6/3/2018	23	2	1.03	0.054	0	---	---
6/10/2018	24	2	1.12	0.054	0	---	---
6/17/2018	25	2	1.16	0.014	0	---	---
6/24/2018	26	1	1.22	NA	0	---	---
7/1/2018	27	1	1.18	NA	0	---	---
7/8/2018	28	1	1.11	NA	0	---	---
7/15/2018	29	1	1.10	NA	0	---	---
7/22/2018	30	---	---	---	0	---	---
7/29/2018	31	---	---	---	0	---	---
8/5/2018	32	---	---	---	0	---	---
8/12/2018	33	---	---	---	0	---	---
8/19/2018	34	---	---	---	---	---	---
8/26/2018	35	---	---	---	---	---	---

Appendix 15. Fulton's condition factor (K) for natural age-1+ steelhead from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2018.

Week Starting	Week of Year	Pear Tree Trap Site			Willow Creek Trap Site		
		n	Average K	Standard Deviation of K	n	Average K	Standard Deviation of K
1/7/2018	2	1	0.99	NA	---	---	---
1/14/2018	3	8	1.09	0.042	---	---	---
1/21/2018	4	15	1.12	0.090	---	---	---
1/28/2018	5	11	1.09	0.059	---	---	---
2/4/2018	6	14	1.16	0.063	---	---	---
2/11/2018	7	27	1.10	0.087	---	---	---
2/18/2018	8	22	1.09	0.058	---	---	---
2/25/2018	9	9	1.11	0.073	---	---	---
3/4/2018	10	48	1.11	0.092	---	---	---
3/11/2018	11	94	1.11	0.087	---	---	---
3/18/2018	12	103	1.12	0.086	1	0.17	---
3/25/2018	13	67	1.12	0.080	0	---	---
4/1/2018	14	69	1.12	0.104	10	1.00	0.079
4/8/2018	15	119	1.11	0.072	11	0.97	0.296
4/15/2018	16	19	1.15	0.123	23	0.96	0.078
4/22/2018	17	8	1.08	0.121	98	1.04	0.262
4/29/2018	18	21	1.06	0.097	20	1.04	0.341
5/6/2018	19	17	1.12	0.078	134	0.99	0.151
5/13/2018	20	8	1.16	0.110	87	1.06	0.199
5/20/2018	21	10	1.18	0.069	95	1.10	0.279
5/27/2018	22	18	1.05	0.162	21	1.10	0.198
6/3/2018	23	50	1.12	0.190	14	1.03	0.169
6/10/2018	24	72	1.07	0.137	1	1.09	---
6/17/2018	25	21	1.08	0.103	0	---	---
6/24/2018	26	7	1.09	0.084	0	---	---
7/1/2018	27	34	1.04	0.131	0	---	---
7/8/2018	28	46	1.06	0.078	2	1.08	0.160
7/15/2018	29	27	1.01	0.142	3	1.15	0.161
7/22/2018	30	23	1.13	0.121	9	1.05	0.159
7/29/2018	31	48	1.12	0.165	1	0.96	---
8/5/2018	32	23	1.08	0.118	1	0.98	---
8/12/2018	33	18	1.09	0.078	0	---	---
8/19/2018	34	13	1.05	0.139	---	---	---
8/26/2018	35	10	1.11	0.116	---	---	---