

Juvenile Salmonid Monitoring on the Mainstem Trinity River, California, 2014

Paul Petros, Nathan J. Harris and William D. Pinnix



HOOPA VALLEY
TRIBAL FISHERIES
DEPARTMENT
P.O. Box 417
Hoopa, CA 95546
(530) 625-4267

YUOK TRIBAL
FISHERIES PROGRAM
Po Box 36
Willow Creek, CA 95573
(530) 629-3333

U.S. FISH AND
WILDLIFE SERVICE
ARCATA FISH AND
WILDLIFE OFFICE
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201



November 2015



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.

Disclaimer: The mention of trade names or commercial products in this report does not constitute endorsement or recommendation for use by the Federal government.

The Arcata Fish and Wildlife Office Fisheries Program reports its study findings through two publication series. The **Arcata Fisheries Data Series** was established to provide timely dissemination of data to local managers and for inclusion in agency databases. The **Arcata Fisheries Technical Reports** publishes scientific findings from single and multi-year studies that have undergone more extensive peer review and statistical testing. Additionally, some study results are published in a variety of professional fisheries journals.

Key words: 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:

Petros, P., N.J. Harris, and W.D. Pinnix. 2015. Juvenile Salmonid Monitoring on the Mainstem Trinity River, California, 2014. 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 2015-44, Arcata, California.

Table of Contents

	page
List of Tables	iv
List of Figures	iv
List of Appendices	v
Introduction.....	2
Methods.....	4
Results.....	4
Sampling Efforts	4
Catch Totals	6
Abundance Indices.....	6
Hatchery/Natural Contribution	12
Chinook Salmon Population Estimation.....	12
Outmigrant Timing	12
Migration Rate	15
Fish Size.....	15
Fish Condition.....	19
References.....	23
Acknowledgements.....	23
Appendices.....	24

List of Tables

	page
Table 1. Week of the Year (WOY) and corresponding first calendar date.	4
Table 2. Period and duration of 2014 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).	6
Table 3. Juvenile salmonid catch totals in 2014 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.	7
Table 4. California Department of Fish and Wildlife, Trinity River Hatchery juvenile salmonid releases, 2014.	7
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, 2014.	8
Table 6. Juvenile salmonid proportional discharge-based abundance indices at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014.	8
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), 2014.	14
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, 2014.	15

List of Figures

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.	3
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 ($^{\circ}C$) recorded at USGS gage #11-526400 and the Willow Creek Rotary Screw Trap (WCRST) in 2014.	5
Figure 3. Weekly proportional discharge-based abundance indices 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 2014.	9

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 2014.....	10
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 2014.	11
Figure 6. Weekly mark-recapture 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 2014.....	13
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), 2014.....	16
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), 2014.	17
Figure 9. Weekly mean fork lengths for natural age-0, age-1, age-2, and hatchery age-1 Steelhead captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014.	18
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), 2014.....	20
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), 2014.	21
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), 2014.	22

List of Appendices

Appendix 1. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Chinook Salmon catches and abundance indices, 2014.....	25
Appendix 2. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Chinook Salmon catches and abundance indices, 2014.	26
Appendix 3. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Coho Salmon catches and abundance indices, 2014.....	27
Appendix 4. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Coho Salmon catches and abundance indices, 2014.	28

Appendix 5. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Steelhead catches and abundance indices, 2014.	29
Appendix 6. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Steelhead catches and abundance indices, 2014.....	30
Appendix 7. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly age-0 Chinook Salmon population estimate input and results, 2014.	31
Appendix 8. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly age-0 Chinook Salmon population estimate input and results, 2014.....	32
Appendix 9. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Chinook Salmon and Coho Salmon fork lengths, 2014.	33
Appendix 10. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Chinook Salmon and Coho Salmon fork lengths, 2014.	34
Appendix 11: Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Steelhead fork lengths, 2014.	35
Appendix 12: Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Steelhead fork lengths, 2014.....	36
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, 2014.	37
Appendix 14. Fulton's condition factor (K) for natural age-1 Coho Salmon from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2014.....	38
Appendix 15. Fulton's condition factor (K) for natural age-1+ Steelhead from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2014.....	39

Juvenile Salmonid Monitoring on the Mainstem Trinity River, California, 2014

Paul Petros¹, Nathan J. Harris², William D. Pinnix³

¹*Hoopa Valley Tribal Fisheries Department
P.O. Box 417, Hoopa, CA 95546*

²*Yurok Tribal Fisheries Program
P.O. Box 36, Willow Creek, California 95573*

³*U. S. Fish and Wildlife Service, Arcata Fish and Wildlife Office
1655 Heindon Road, Arcata, California 95521*

Executive Summary — This report presents juvenile salmonid emigration monitoring data collected in 2014 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 by 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 2014, two rotary screw traps were operated at PTRST from January 15 through August 23, with successful sampling for 197 of the 221-day sampling period. At WCRST, three rotary screw traps were operated from March 21 through August 22, with successful sampling for 113 days of the 155-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 Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*O. kisutch*), and Steelhead (*O. mykiss*). Catch data of other fishes are also presented.

Weekly stratified mark-recapture population estimates of emigrating age-0 Chinook Salmon were calculated for both naturally and hatchery-produced sub-populations. At PTRST an estimated 1,292,604 (SD = 268,281; CV = 0.208) naturally-produced age-0 Chinook Salmon and 767,561 (SD = 85,844; CV = 0.112) age-0 hatchery Chinook Salmon passed the site between January 15 and August 23. At WCRST between March 21 and August 22, an estimated 2,464,833 (SD = 206,904; CV = 0.084) naturally-produced age-0 Chinook Salmon and 332,451 (SD = 36,567; CV = 0.110) age-0 hatchery Chinook Salmon passed the site.

Juvenile salmonid emigration target dates were developed by the Trinity River Restoration Program (TRRP) to assess at what date 80% of the juvenile salmonid population had reached Willow Creek and to help manage water temperatures in the

mainstem Trinity River. The estimate of the week in which 80% of the juvenile Chinook Salmon population passed WCRST, as inferred from the proportional discharge-based abundance index was Week of the Year (WOY) 23 (June 4-June 10), which occurred before the TRRP management target date of July 9. The estimate of the week in which 80% of the natural Coho Salmon smolt population passed the WCRST was WOY 21 (May 21-May 27), which occurred prior to the TRRP management target date of June 4. The estimate of the week in which 80% of the natural Steelhead smolt population passed the WCRST, was WOY 19 (May 7-May 13), which occurred prior to the TRRP management target date of May 22.

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 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 2014 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). The intent of this data series report is to provide timely dissemination of data to local managers, for inclusion in agency databases, and provide basic biological information to evaluate 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 as these studies focus on the early life-history phase directly affected by instream conditions and management actions. In addition, it is intended this information will be used by the TRRP to aid in development of a salmon production model for the Trinity River.

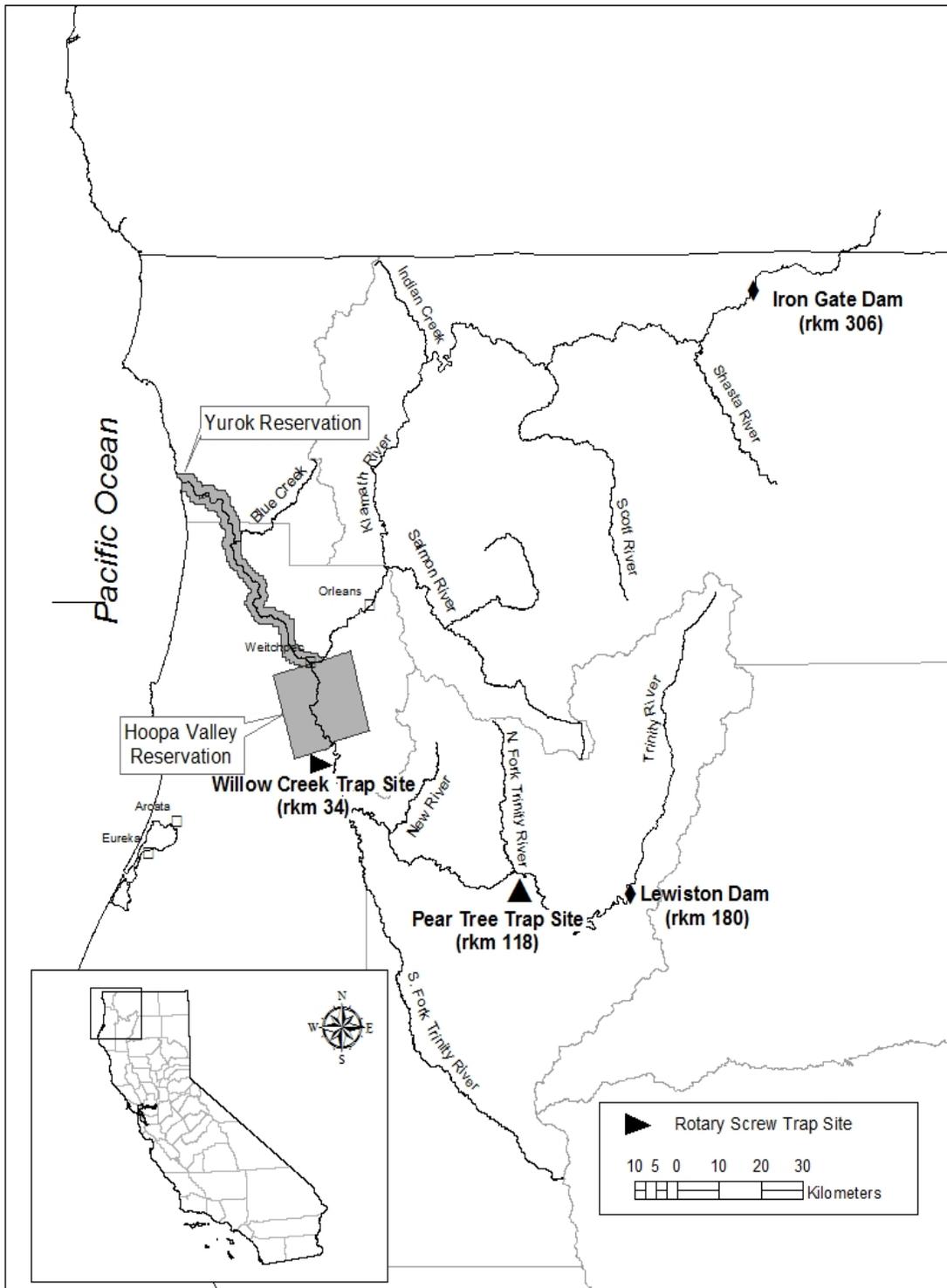


Figure 1. Location of the Trinity River Rotary Screw Trap sites near Willow Creek (rkm 34) and Pear Tree Gulch (rkm 118), California, operated by the Yurok Tribal Fisheries Program, U. S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, and the Hoopa Valley Tribal Fisheries Department.

Methods

For details on background, study site, and monitoring methods for the data presented in this report, the reader is referred to the 2009 Trinity River Juvenile Salmonid Outmigrant Monitoring Report by Harris et al. (2012).

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 2014, trapping at PTRST began in the third week of January and trapping at WCRST was initiated the third week of 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 (*O. kisutch*) and Steelhead (*O. mykiss*) 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. It is important for readers 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	01/01	18	04/30	35	08/27
2	01/08	19	05/07	36	09/03
3	01/15	20	05/14	37	09/10
4	01/22	21	05/21	38	09/17
5	01/29	22	05/28	39	09/24
6	02/05	23	06/04	40	10/01
7	02/12	24	06/11	41	10/08
8	02/19	25	06/18	42	10/15
9	02/26	26	06/25	43	10/22
10	03/05	27	07/02	44	10/29
11	03/12	28	07/09	45	11/05
12	03/19	29	07/16	46	11/12
13	03/26	30	07/23	47	11/19
14	04/02	31	07/30	48	11/26
15	04/09	32	08/06	49	12/03
16	04/16	33	08/13	50	12/10
17	04/23	34	08/20	51	12/17
				52	12/24

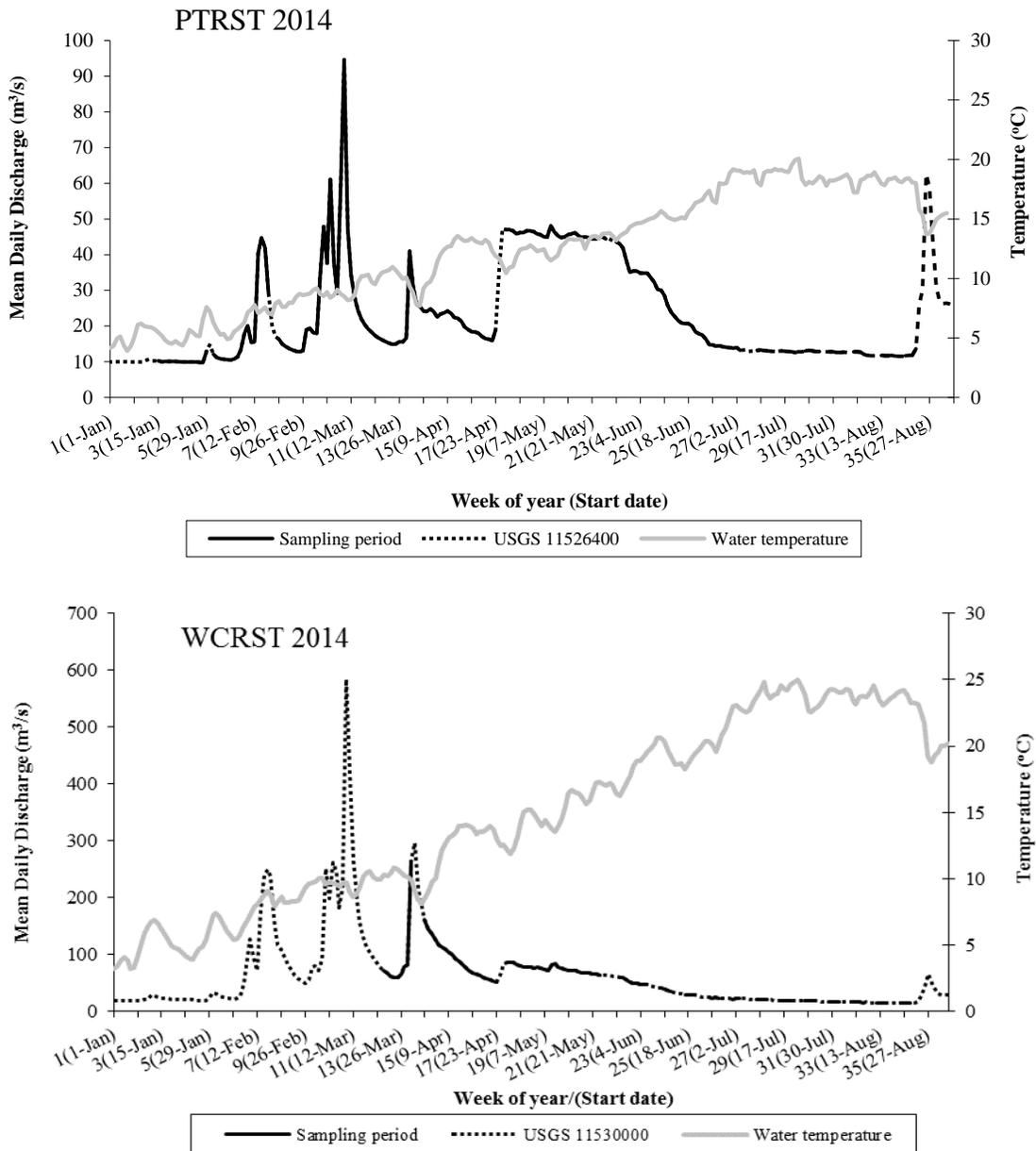


Figure 2. Mean daily discharge (m^3/s) as recorded near Helena (U.S. Geological Survey Water Resource gage station #11-526400) and Hoopa (U.S. Geological Survey Water Resource gage station #11-530000), California, and mean daily water temperatures ($^{\circ}C$) recorded at USGS gage #11-526400 and the Willow Creek Rotary Screw Trap (WCRST) in 2014. Heavy line on discharge plot indicates sampling period, dotted line on discharge plot indicates no sampling. Please note difference in scale of discharge axes.

Table 2. Period and duration of 2014 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 (2.4m)	15 Jan – 23 Aug	191	221	86.4%
PTRST	2 (1.5m)	19 Feb – 23 Jun	120	125	96.0%
Distinct Days		15 Jan – 23 Aug	197	221	89.1%
WCRST	1 (2.4m)	21 Mar – 2 Jun	65	74	87.8%
WCRST	2 (2.4m)	22 Mar – 22 Aug	112	154	72.7%
WCRST	3 (2.4m)	22 Mar – 22 Aug	110	154	71.4%
Distinct Days		21 Mar – 22 Aug	113	155	72.9%

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 93% and 91% of the total 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 Indices

The proportional discharge-based abundance indices for natural age-0 Chinook Salmon were 696,019 and 1,355,682 at PTRST and WCRST, respectively (Figure 3; Table 6; Appendices 1 & 2). The age-0 hatchery Chinook Salmon abundance indices were 168,620 at PTRST and 153,296 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 prior to trap installation. Age-1 hatchery and age-1 natural Chinook Salmon abundance indices were 184 and 2,166, respectively, at PTRST. At WCRST the age-1 Chinook Salmon indices were 38 hatchery and 376 natural.

Age-0 naturally-produced Coho Salmon abundance indices were 4,053 and 2,942 at PTRST and WCRST, respectively (Figure 4; Table 6; Appendices 3 & 4). The abundance indices for age-1 naturally-produced Coho Salmon were 4,400 and 11,475 at PTRST and WCRST, respectively. Abundance indices of hatchery age-1 Coho Salmon were 18,143 and 19,853 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 prior to trap installation.

At PTRST, abundance indices of natural age-0 and age-1 Steelhead were 13,119 and 18,679, respectively (Figure 5; Table 6; Appendices 5 & 6). Abundance indices of age-0 and age-1 Steelhead at WCRST were 1,525 and 39,479, respectively (Table 6; Appendix 6). Abundance indices of hatchery age-1 Steelhead were 4,184 at PTRST and 44,812 at WCRST. The Age-2 Steelhead abundance index was 344 at PTRST and 3,825 at

WCRST. Sampling periods at both trap sites missed portions of each respective population that emigrated prior to or after trapping operations.

Table 3. Juvenile salmonid catch totals in 2014 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	21,772	23	84,264	361	NA	106,420
PTRST	Coho Salmon	NA	3,238	408	435	NA	4,081
PTRST	Steelhead	NA	318	1,201	2,124	53	3,696
WCRST	Chinook Salmon	11,620	3	109,411	32	NA	121,066
WCRST	Coho Salmon	NA	1,749	220	1,078	NA	3,047
WCRST	Steelhead	NA	4,992	135	3,910	368	9,405

Table 4. California Department of Fish and Wildlife, Trinity River Hatchery juvenile salmonid releases, 2014. AD-clipped = adipose fin clipped fish.

Species	Release Season	Number Released	Percentage AD-clipped or Marked	Release Dates
Chinook Salmon ¹	Spring	3,123,466	24.4	06/01 - 06/04
Chinook Salmon ¹	Fall	1,426,198	24.2	10/01 - 10/22
Coho Salmon ²	Spring	528,016	98.9	03/15 - 03/18
Steelhead ³	Spring	804,079	99.6	04/22 - 04/30

¹Chinook Salmon releases includes both spring-run and fall-run races. Chinook Salmon releases were marked with an adipose fin clip.

²Coho Salmon were marked with a right maxillary clip.

³Steelhead were marked with an adipose fin 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, 2014.

Common name	Species	Life stage	PTRST Catch	WCRST Catch
Lamprey	<i>Entosphenus</i> spp.	Ammocete	2,438	894
		Eyed-juvenile	168	436
		Adult	38	15
Sucker	<i>Catostomus</i> spp.		172	1,653
Speckled Dace	<i>Rhinichthys osculus</i>		465	648
Three-Spine Stickleback	<i>Gasterosteus aculeatus</i>		84	113
Golden Shiner	<i>Notemigonus crysoleucas</i>		0	6
Sculpin	<i>Cottus</i> spp.		0	157
Green Sturgeon	<i>Acipenser medirostris</i>	Juvenile	0	4
Brown Trout	<i>Salmo trutta</i>	Juvenile	1,554	76
Sunfish	<i>Lepomis</i> spp.		0	9
Sockeye Salmon	<i>Oncorhynchus nerka</i>	Juvenile	2	1
Fathead Minnow	<i>Pimephales promelas</i>	Juvenile	0	23
Bullhead	<i>Ameiurus</i> spp.		0	1
Chum Salmon	<i>Oncorhynchus keta</i>		0	1
Season Total			4,921	4,037

Table 6. Juvenile salmonid proportional discharge-based abundance indices at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. 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	168,620	184	696,019	2,166	NA	866,989
PTRST	Coho Salmon	NA	18,143	4,053	4,400	NA	26,596
PTRST	Steelhead	NA	4,184	13,119	18,679	344	36,326
WCRST	Chinook Salmon	153,296	38	1,355,682	376	NA	1,509,392
WCRST	Coho Salmon	NA	19,853	2,942	11,475	NA	34,270
WCRST	Steelhead	NA	44,812	1,525	39,479	3,825	89,641

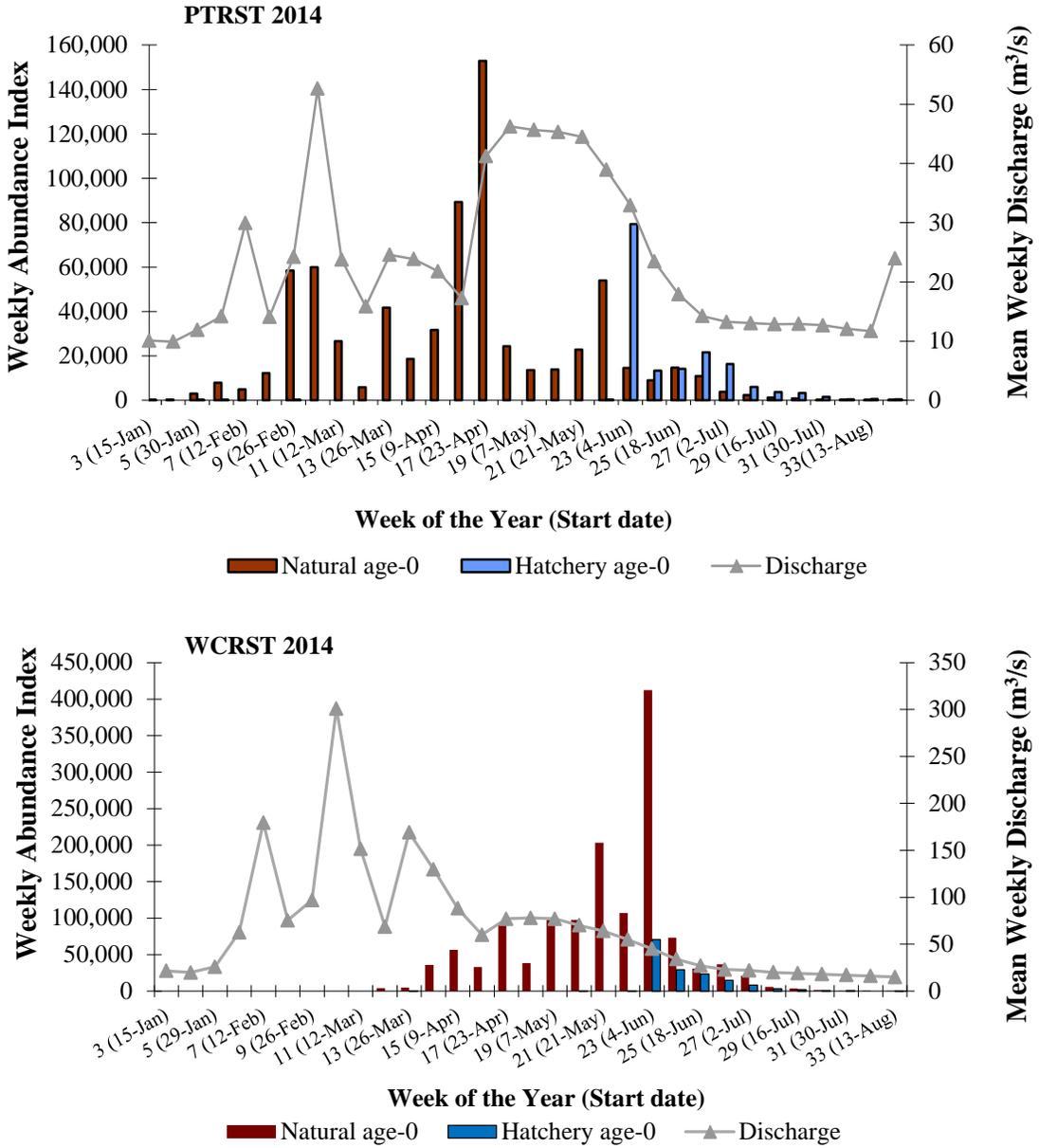


Figure 3. Weekly proportional discharge-based abundance indices for natural age-0 and hatchery age-0 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST; rkm 118) and Willow Creek Rotary Screw Trap (WCRST; rkm 34) in 2014.

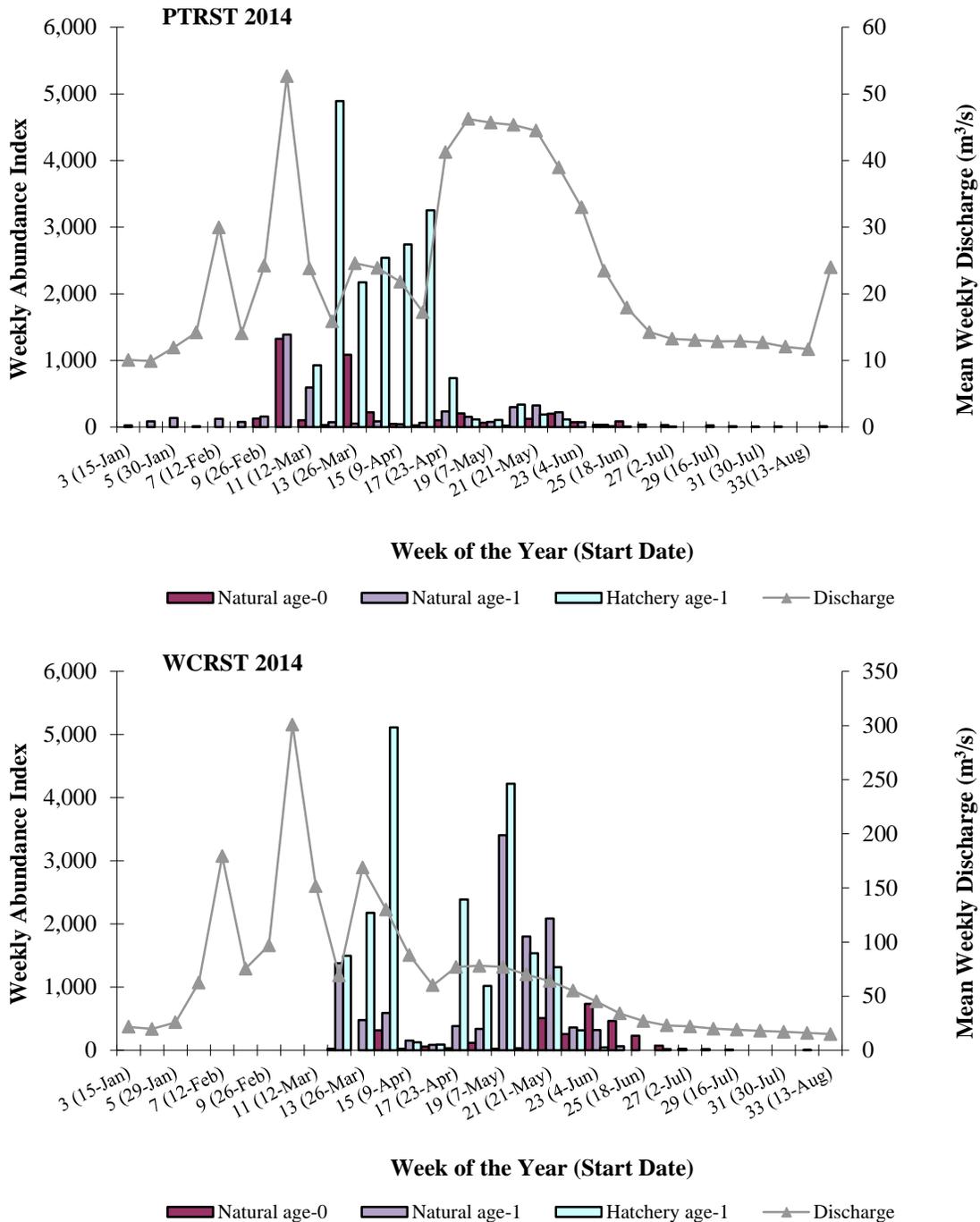


Figure 4. Weekly proportional discharge-based abundance indices for natural age-0, natural age-1, and hatchery age-1 Coho Salmon captured at Pear Tree Rotary Screw Trap (PTRST, rkm 118) and Willow Creek Rotary Screw Trap (WCRST, rkm 34) in 2014.

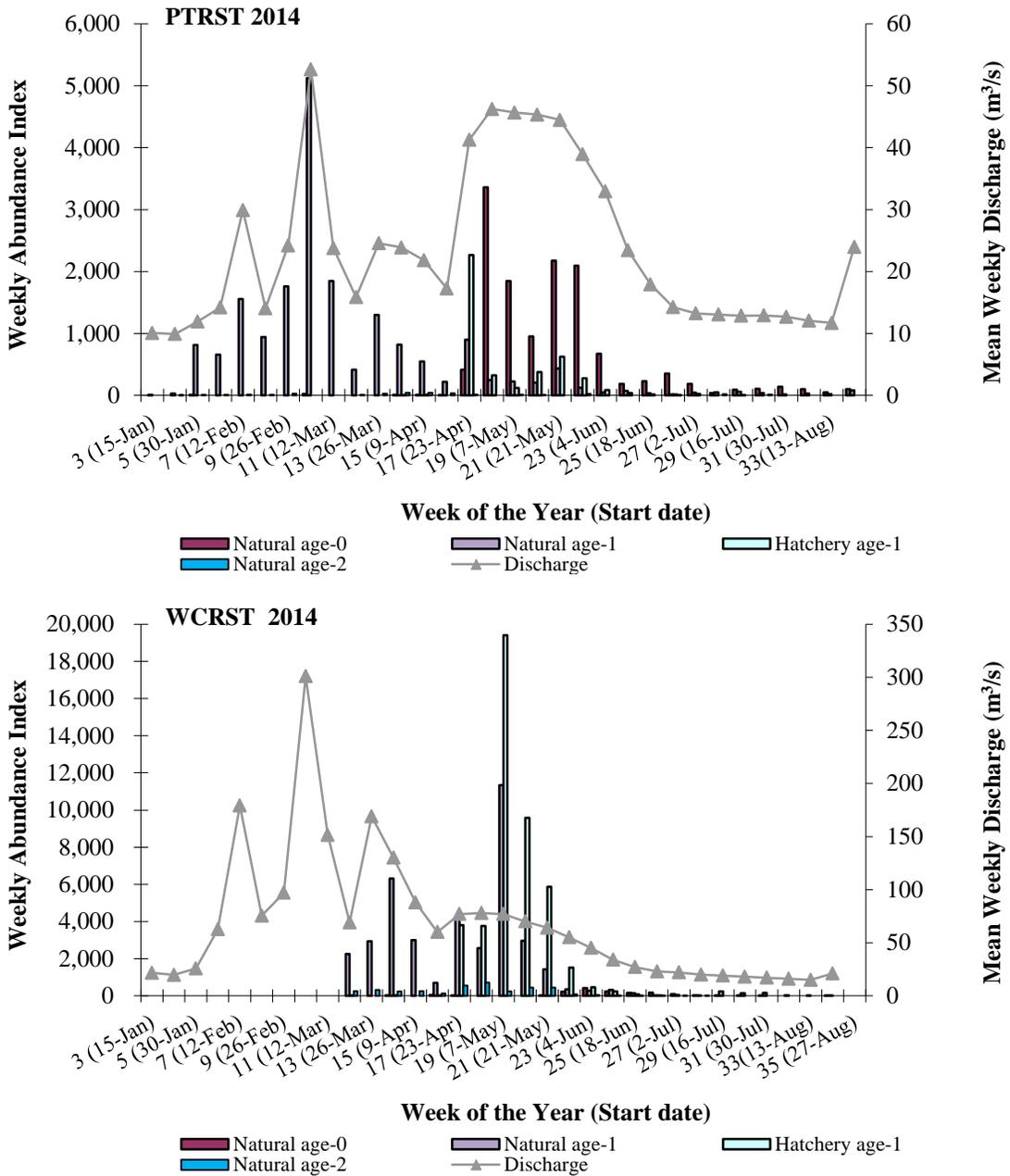


Figure 5. Weekly proportional discharge-based abundance indices for natural age-0, natural age-1, natural age-2, and hatchery age-1 Steelhead captured at Pear Tree Rotary Screw Trap (PTRST, rkm 118) and Willow Creek Rotary Screw Trap (WCRST, rkm 34) in 2014.

Hatchery/Natural Contribution

Chinook Salmon were captured at PTRST and WCRST throughout the 2014 sampling season with the spring/summer emigration dominated by naturally-produced fish comprising 81% and 90%, respectively, of the total proportional discharge-based abundance indices (Appendices 1 & 2).

Age-1 Coho Salmon smolts were predominantly hatchery origin at PTRST, which comprised 80% of the total age-1 proportional discharge-based abundance index in 2014 (Appendix 3). At WCRST, age-1 Coho Salmon emigrants of hatchery origin comprised 63% of the total age-1 proportional discharge-based abundance index in 2014 (Appendix 4).

Based on proportional discharge-based abundance indices at PTRST and WCRST, age-1 hatchery Steelhead comprised 18% (Appendix 5) and 47% (Appendix 6), respectively, of the total age-1 abundance indices.

Chinook Salmon Population Estimation

During the 2014 sampling season, freeze-branded and photonically-marked hatchery Chinook Salmon were delivered to the trap sites to estimate weekly trap efficiencies for generating population estimates (Appendices 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 1,292,604 (SD = 268,281; CV = 0.208) naturally-produced age-0 Chinook Salmon and 767,561 (SD = 85,844, CV = 0.112) age-0 hatchery Chinook Salmon passed the site between January 15 and August 23. At WCRST between March 21 and August 22, an estimated 2,464,833 (SD = 206,904; CV = 0.084) naturally-produced age-0 Chinook Salmon and 332,451 (SD = 36,567; CV = 0.110) 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 vast majority of juveniles emigrate during the spring/summer emigration period as age-0 fish, with the natural and hatchery emigration periods overlapping (Table 7; Appendices 1 & 2). The week marking the cumulative passage of 80% of the natural juvenile Chinook Salmon population at WCRST, as inferred from the proportional discharge-based abundance index, was WOY 23 (June 4 – June 10), which occurred before the TRRP management target date of July 9 (TRRP and ESSA 2009). Based on proportional discharge-based abundance indices, natural age-0 Chinook Salmon emigration peaked at PTRST in WOY 17, and peaked at WCRST in WOY 23. Hatchery age-0 Chinook Salmon emigration peaked in WOY 23 at both sites.

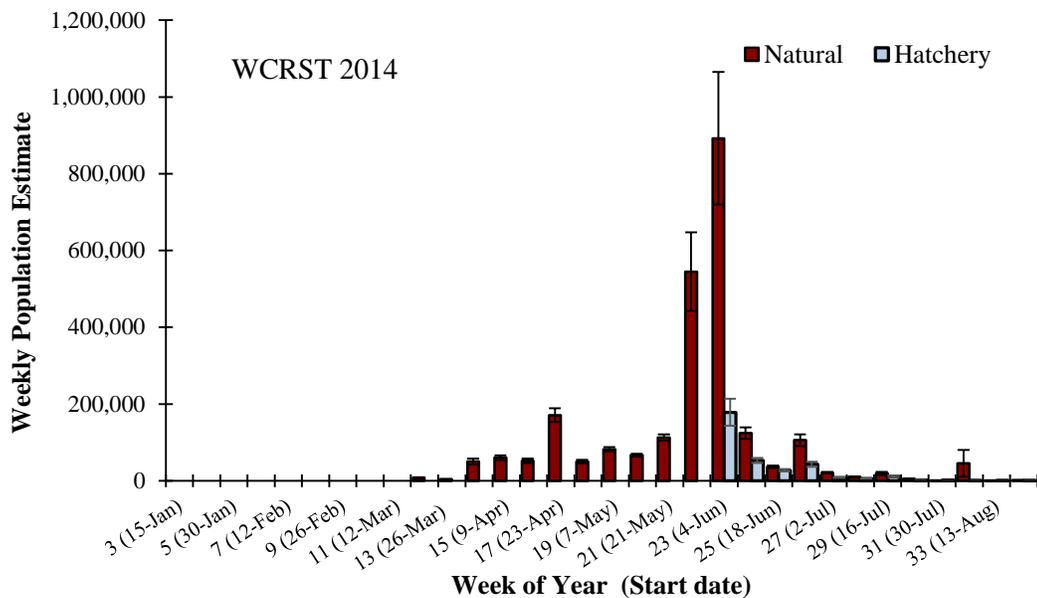
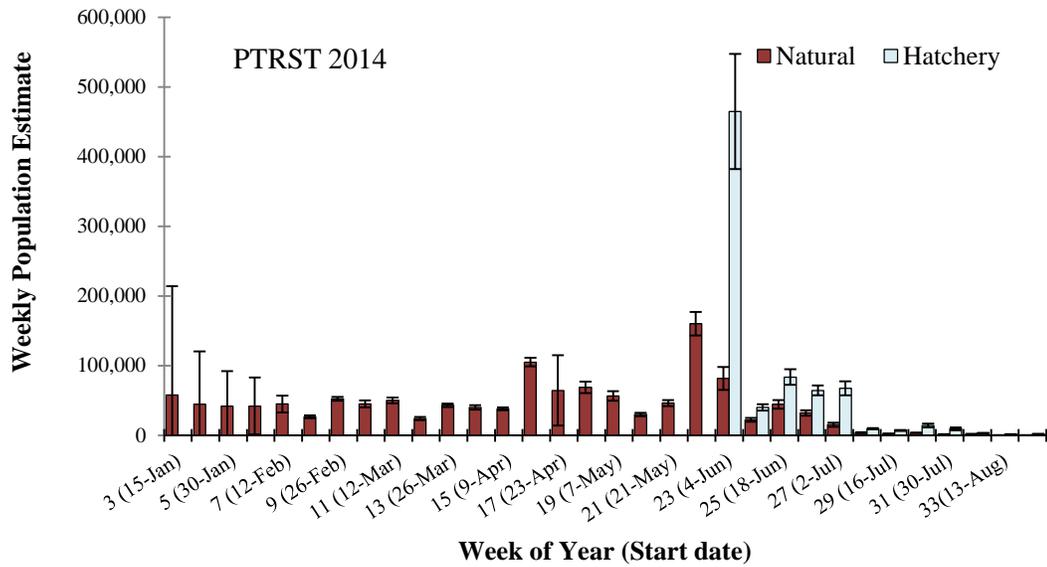


Figure 6. Weekly mark-recapture population estimates of natural age-0 and hatchery age-0 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST; rkm 118) and Willow Creek Rotary Screw Trap (WCRST; rkm 34) in 2014. Error bars represent one standard deviation of the mean weekly estimate.

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), 2014. Values represent week of the year (WOY).

Site	Species	Emigration Duration			Emigration Peak		
		Natural Age-0	Natural Age-1+	Hatchery	Natural Age-0	Natural Age-1+	Hatchery
PTRST	Chinook Salmon	03-34	03-21	22-34	17	09	23
PTRST	Coho Salmon	09-34	03-27	11-24	12	10	12
PTRST	Steelhead	14-34	03-34	14-29	18	10	17
WCRST	Chinook Salmon	12-34	12-17 ¹	23-34 ²	23	12	23
WCRST	Coho Salmon	12-29	12-26 ³	12-23	23	19	14
WCRST	Steelhead	14-34	12-34	12-26	23	19	19

¹A single age-1 Chinook Salmon was captured in WOY 33

²A single ad-clipped Chinook Salmon was captured in WOY 13, 20, and 22, prior to the 2014 hatchery release.

³A single age-1 Coho Salmon was captured in WOY 32.

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 first week of sampling at both sites and emigration continued through late August (WOY 34) at PTRST, and late June (WOY 26), with an outlier Coho Salmon in early August, at WCRST. Hatchery age-1 Coho Salmon abruptly emigrated from the upper river, with approximately 73% of the total proportional discharge-based abundance index passing PTRST within four weeks of release from TRH (Table 7; Appendix 3). Interpretation of the data suggests that the sampling period did not encompass the entire naturally-produced age-1 Coho Salmon emigration. The week marking the cumulative passage of 80% of the naturally-produced age-1 Coho Salmon population at WCRST, as inferred from the abundance index, was WOY 21 (May 21-May 27), which occurred prior to the TRRP management target date of June 4 (TRRP and ESSA 2009). Natural age-0 Coho Salmon emigration peaked in WOY 12 at PTRST and WOY 23 at WCRST. Natural age-1 Coho Salmon emigration peaked in WOY 10 at PTRST and WOY 19 at WCRST. Hatchery Coho Salmon emigration peaked in WOY 12 at PTRST and WOY 14 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. Age-0 Steelhead were captured from April through August at both PTRST and WCRST (Table 6, Appendices 5 & 6). Age-1 or older natural Steelhead were present throughout the sampling period at both sites. The majority of hatchery-produced age-1 Steelhead passed both sites by the end of May. The week marking the cumulative passage of 80% of the natural Steelhead smolt population at WCRST, as inferred from the proportional discharge-based abundance index, was WOY 19 (May 7 – May 13), which occurred prior to the TRRP management target date of May 22 (TRRP and ESSA 2009). Natural age-0 Steelhead emigration peaked in WOY 18 at PTRST and WOY 23 at

WCRST. Natural age-1 Steelhead emigration peaked in WOY 10 at PTRST and WOY 19 at WCRST. Hatchery Steelhead emigration peaked in WOY 17 at PTRST and WOY 19 at WCRST.

Migration Rate

Maximum migration rates of salmonids released from 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 generally increased through the season at both PTRST and WCRST (Figure 7; Appendices 9 & 10). Age-1 Chinook Salmon captured at PTRST early in the season included a few very large hatchery fish released in 2013 that greatly influenced mean fork lengths from WOY 3 to WOY 9, but a general increase in lengths was observed after the hatchery fish passed the site.

Natural age-0 Coho Salmon fork lengths generally increased through the sampling season at both PTRST and WCRST (Figure 8; Appendices 9 & 10). Hatchery age-1 Coho Salmon fork lengths varied across sampled weeks with no apparent trend at either site. Natural age-1 Coho Salmon fork lengths generally increased from WOY 3 to WOY 11 at PTRST but remained relatively stable between WOY 12 and WOY 34 at both sites.

Natural age 0 and age-1 Steelhead fork lengths generally increased through the sampling season at both sites (Figure 9; Appendices 11 & 12). Hatchery and natural age-2 Steelhead fork lengths remained relatively stable through the sampling season at both sites.

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, 2014.

Site	Species	Date First Released	Date First Captured	# of Days	Maximum Migration Rate
PTRST	Chinook Salmon	06/01/2014	06/02/2014	1	64 rkm/day
PTRST	Coho Salmon	03/15/2014	03/18/2014	3	21 rkm/day
PTRST	Steelhead	04/22/2014	04/23/2014	1	64 rkm/day
WCRST	Chinook Salmon	06/01/2014	06/04/2014	3	49 rkm/day
WCRST	Coho Salmon	03/15/2014	03/21/2014 ¹	6	25 rkm/day
WCRST	Steelhead	04/22/2014	04/25/2014	3	49 rkm/day

¹Trapping started on March 21, when fish may have already passed.

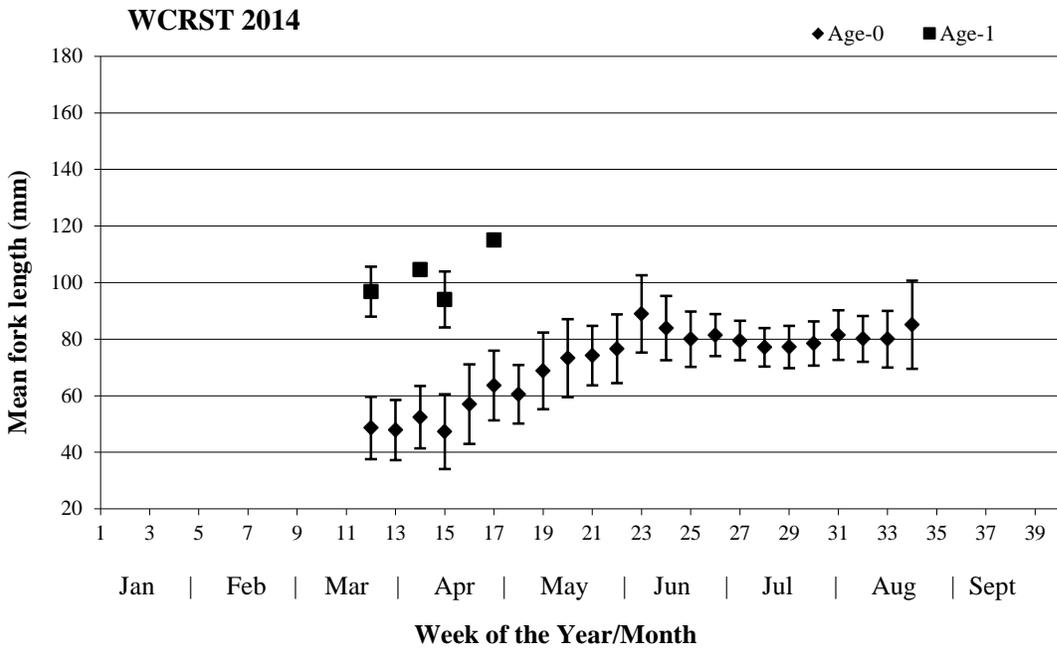
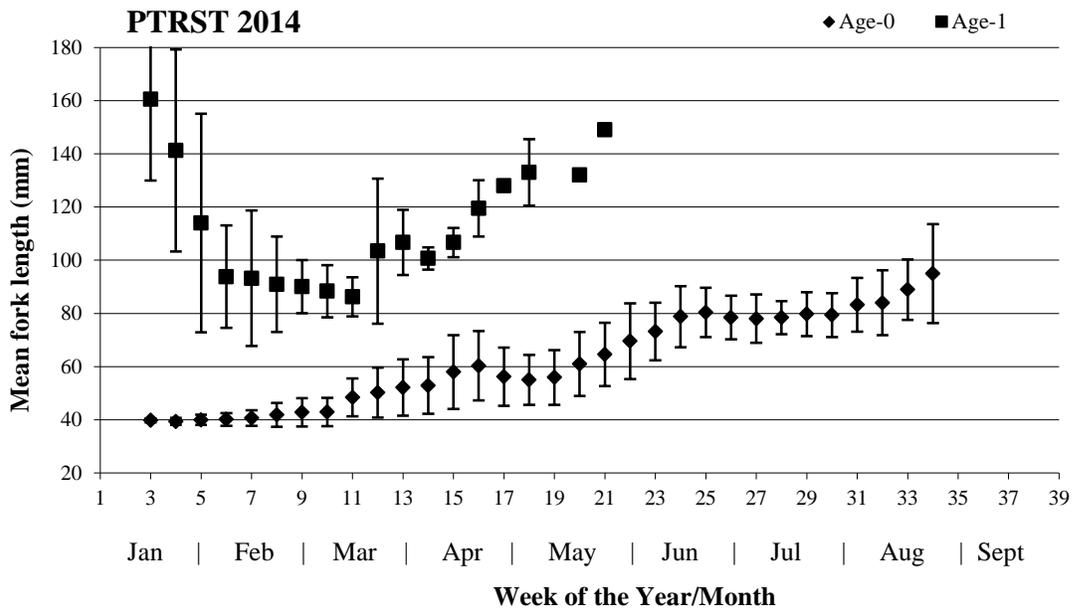


Figure 7. Weekly mean fork lengths of age-0 and age-1 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. Error bars represent one standard deviation of the mean.

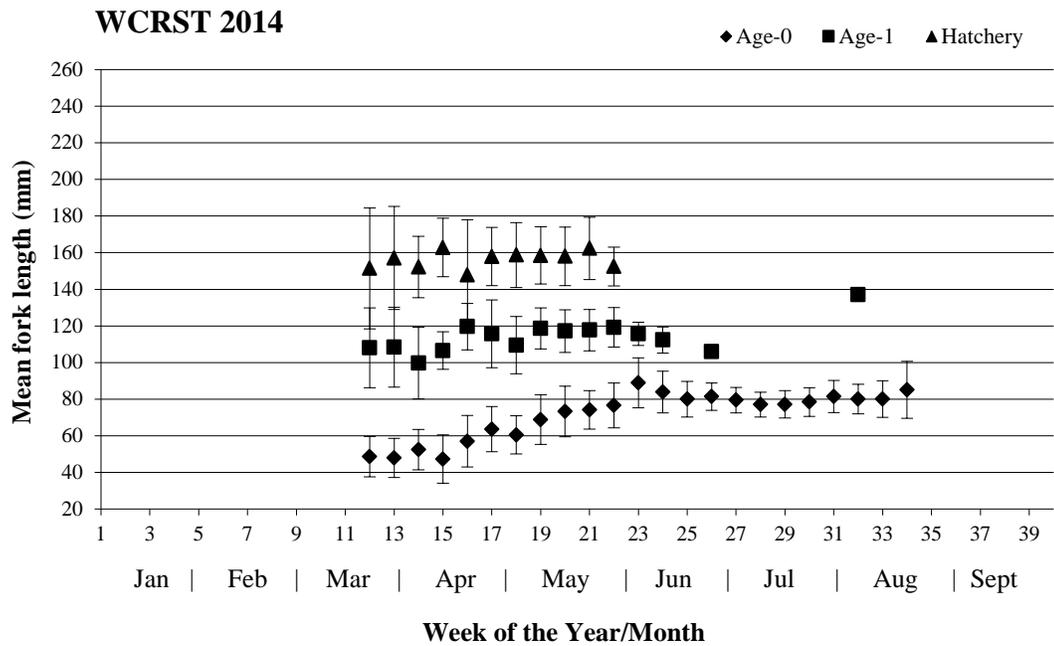
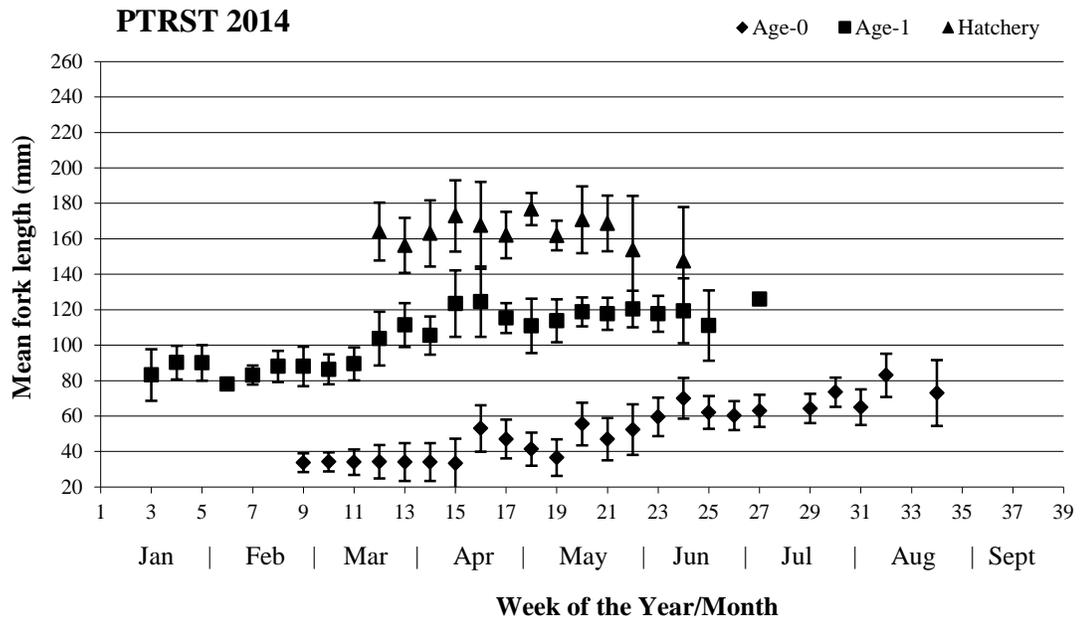


Figure 8. Weekly mean fork lengths for natural age-0, natural age-1, and hatchery Coho Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. Error bars represent one standard deviation of the mean.

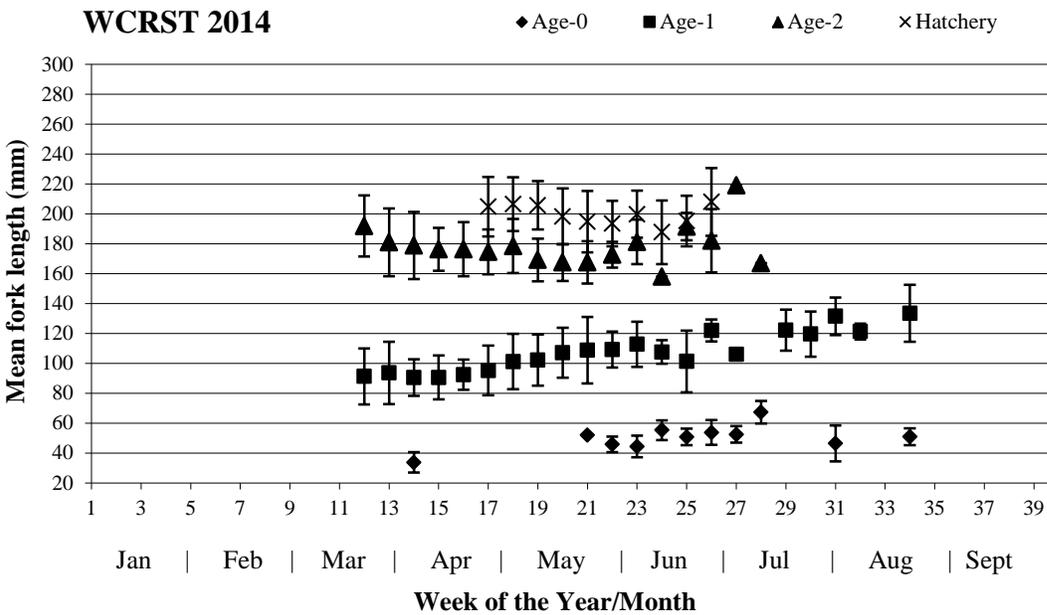
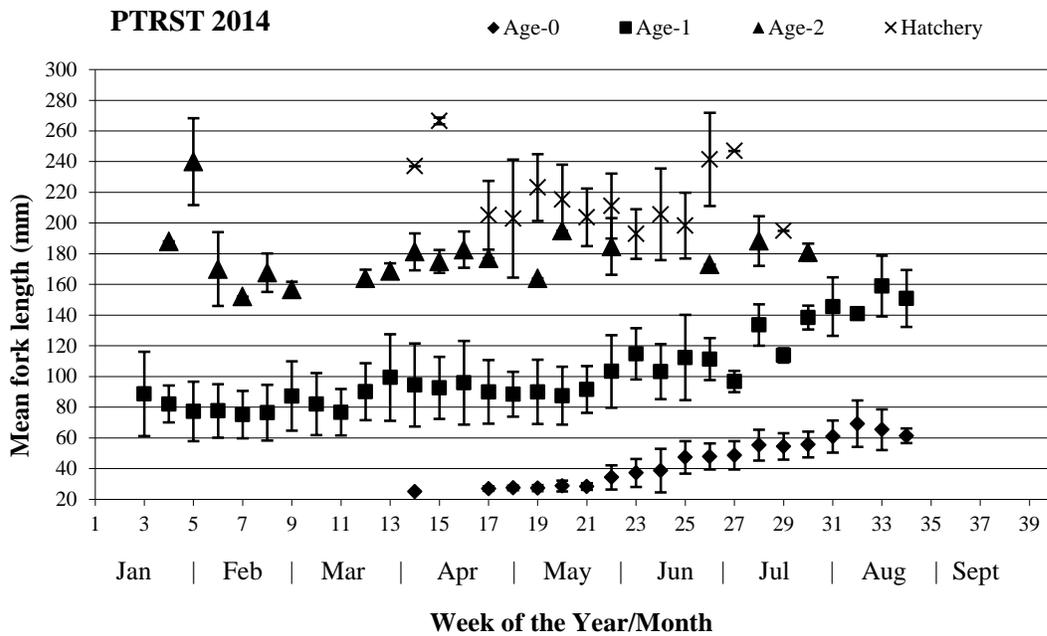


Figure 9. Weekly mean fork lengths for natural age-0, age-1, age-2, and hatchery age-1 Steelhead captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. Error bars represent one standard deviation of the mean.

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 (Figure 10, Appendix 13), age-1 natural Coho Salmon (Figure 11, Appendix 14), and age 1+ natural Steelhead (Figure 12, Appendix 15). Due to the inability to determine the origin of unmarked individuals, clipped and non-clipped juvenile Chinook Salmon were pooled in weekly mean calculations.

At PTRST weekly mean condition factor of juvenile Chinook Salmon increased rapidly between WOY 8 and WOY 11 and then remained relatively consistent for the remainder of the season. At WCRST there was no apparent trend in age-0 Chinook Salmon condition.

Weekly mean condition factor of natural age-1 Coho Salmon increased slightly prior to WOY 11 at PTRST and decreased slightly for the remainder of the season at both sites, but peaked in WOY 17 at WCRST.

At PTRST, weekly mean condition factor of age-1+ Steelhead increased slightly from WOY 3 to WOY 11 and then remained relatively stable for the remainder of the season. At WCRST weekly mean condition of age-1+ Steelhead generally decreased from WOY 12 to WOY 23 and then increased slightly for several weeks. Weekly mean condition factor of Steelhead peaked in WOY 13 at WCRST.

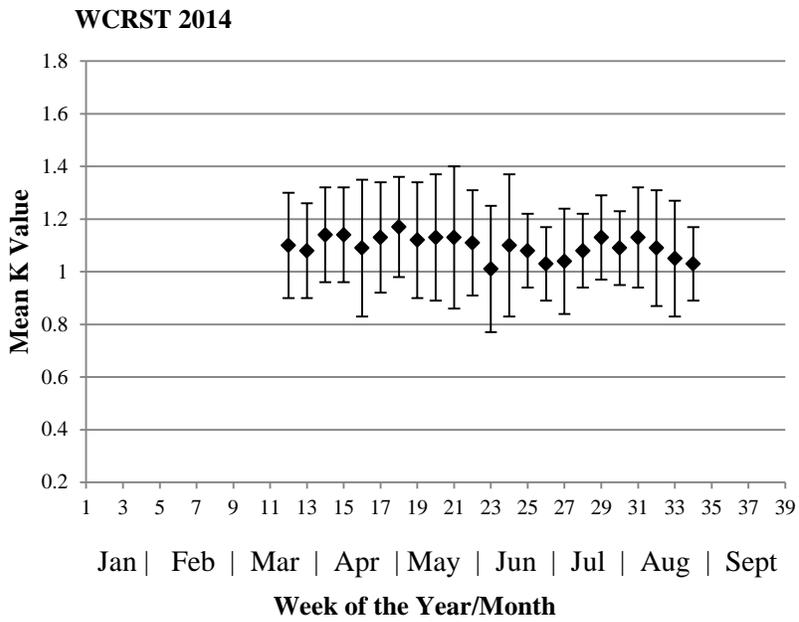
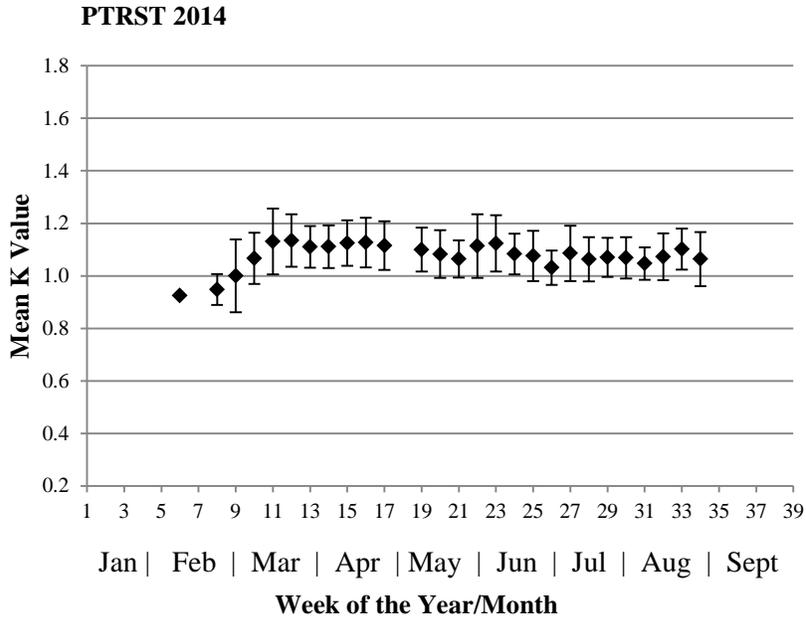


Figure 10. Weekly mean K value for pooled hatchery and natural age-0 Chinook Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. Error bars represent one standard deviation of the mean.

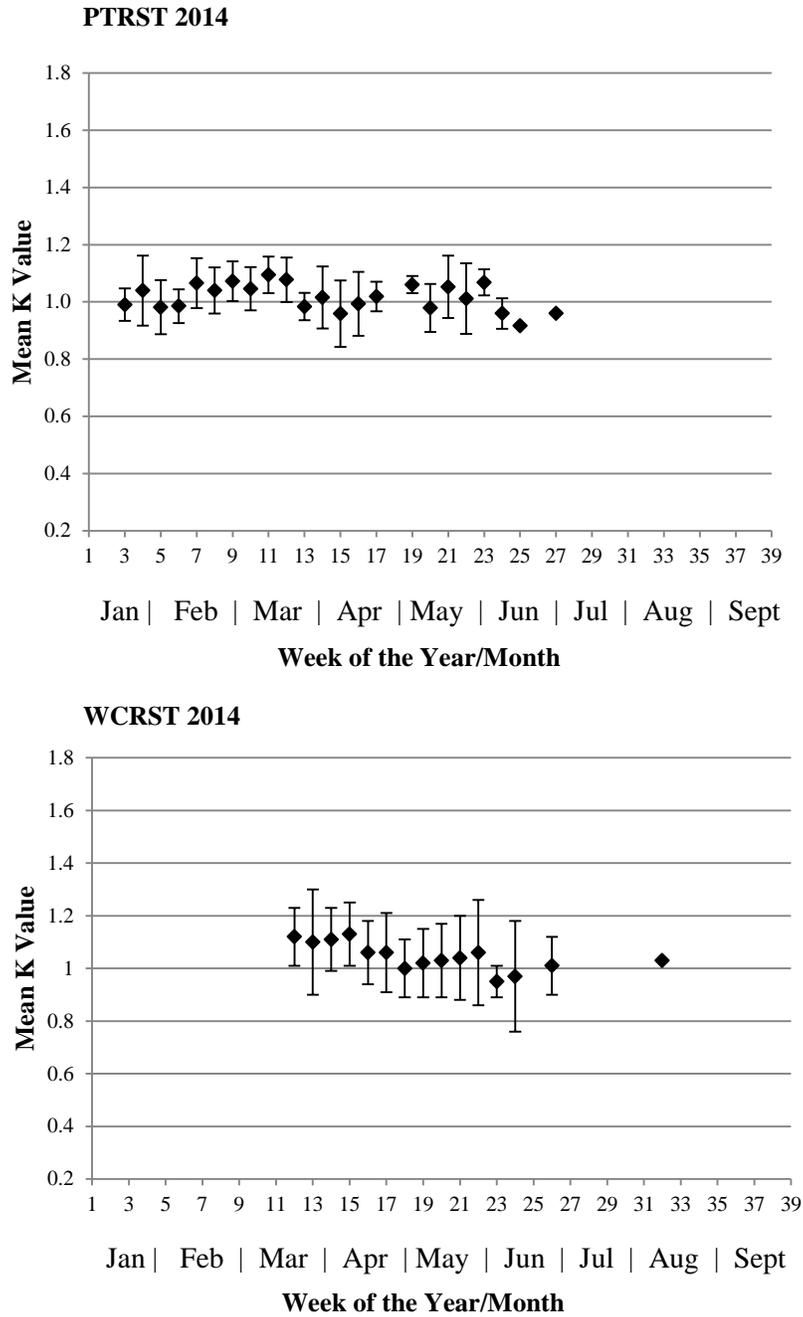


Figure 11. Weekly mean K value for natural age-1 Coho Salmon captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. Error bars represent one standard deviation of the mean.

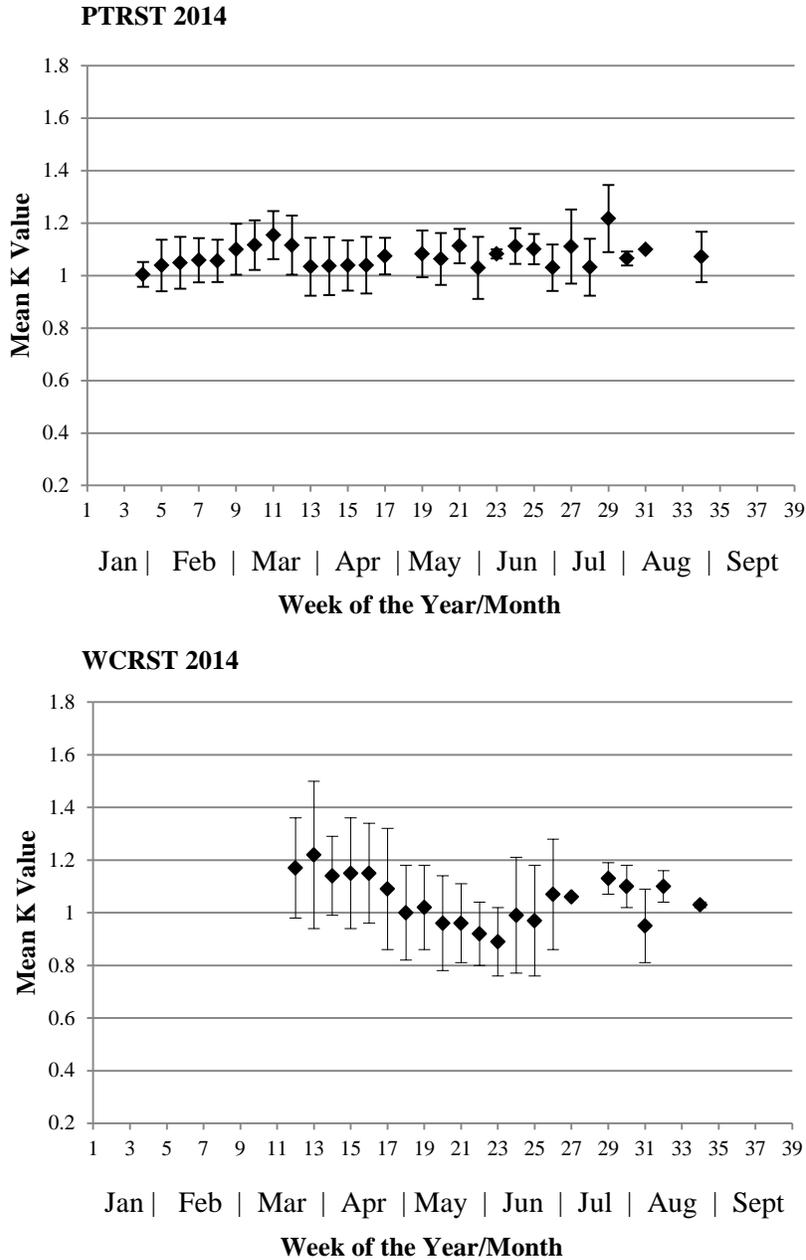


Figure 12. Weekly mean K value for natural age-1+ Steelhead captured at Pear Tree Rotary Screw Trap (PTRST) and Willow Creek Rotary Screw Trap (WCRST), 2014. Error bars represent one standard deviation of the mean.

References

- 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.
- Trinity River Restoration Program, ESSA Technologies Ltd. 2009. Integrated Assessment Plan, Version 1.0 – September 2009. Draft report prepared for the Trinity River Restoration Program, Weaverville, California, 285 pp.
- 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 pp.

Acknowledgements

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, 2014. (NC = no clip, AD = adipose fin clip)

Week Starting	Week of Year	Mean Daily Discharge m ³ /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			
1/15/2014	3	10.1	7	0	0	11	8	30	49	0	0	105	32	59	196		
1/22/2014	4	9.9	7	0	0	0	87	30	117	0	0	0	340	117	457		
1/30/2014	5	11.9	6	0	0	4	560	61	625	0	0	22	2,964	322	3,308		
2/5/2014	6	14.2	7	0	0	4	1,586	51	1,641	0	0	22	7,900	252	8,174		
2/12/2014	7	29.9	5	0	0	0	353	20	373	0	0	0	4,903	278	5,181		
2/19/2014	8	14.1	14	0	0	0	2,953	35	2,988	0	0	0	12,254	145	12,399		
2/26/2014	9	24.2	12	0	0	4	7,679	62	7,745	0	0	35	58,497	468	59,000		
3/5/2014	10	52.6	11	0	0	0	2,761	5	2,766	0	0	0	59,972	109	60,081		
3/12/2014	11	23.8	14	0	0	0	3,620	5	3,625	0	0	0	26,619	37	26,656		
3/19/2014	12	15.9	14	0	0	0	1,312	33	1,345	0	0	0	5,906	149	6,055		
3/26/2014	13	24.6	13	0	0	0	5,628	12	5,640	0	0	0	41,782	89	41,871		
4/2/2014	14	23.9	14	0	0	0	3,195	3	3,198	0	0	0	18,698	18	18,716		
4/9/2014	15	21.8	14	0	0	0	5,684	3	5,687	0	0	0	31,705	17	31,722		
4/16/2014	16	17.2	14	0	0	0	18,784	5	18,789	0	0	0	89,333	24	89,357		
4/23/2014	17	41.3	10	0	0	0	10,381	1	10,382	0	0	0	152,836	15	152,851		
4/30/2014	18	46.2	14	0	0	0	1,873	3	1,876	0	0	0	24,397	39	24,436		
5/7/2014	19	45.7	14	0	0	0	1,028	0	1,028	0	0	0	13,567	0	13,567		
5/14/2014	20	45.3	14	0	0	0	1,155	1	1,156	0	0	0	13,924	12	13,936		
5/21/2014	21	44.5	10	0	0	0	1,467	1	1,468	0	0	0	22,812	16	22,828		
5/28/2014	22	39.0	14	28	9	0	6,471	0	6,508	232	75	0	53,979	0	54,286		
6/4/2014	23	33.0	14	6,428	2,074	0	1,560	0	10,062	60,001	19,360	0	14,562	0	93,923		
6/11/2014	24	23.4	14	1,455	471	0	1,093	0	3,019	10,819	3,491	0	8,065	0	22,375		
6/18/2014	25	17.9	12	2,510	810	0	1,789	0	5,109	15,512	5005	0	11,053	0	31,570		
6/25/2014	26	14.2	7	3,184	1028	0	2,128	0	6,340	16,308	5262	0	10,882	0	32,452		
7/2/2014	27	13.3	3	1,138	367	0	350	0	1,855	12,357	3987	0	3807	0	20,151		
7/9/2014	28	13.1	5	688	222	0	364	0	1,274	4,556	1470	0	2409	0	8,435		
7/16/2014	29	12.9	5	399	129	0	171	0	699	2842	917	0	1208	0	4,967		
7/23/2014	30	12.9	5	326	107	0	118	0	551	2532	817	0	858	0	4,207		
7/30/2014	31	12.7	5	168	55	0	13	0	236	1134	366	0	70	0	1570		
8/6/2014	32	12.1	4	49	16	0	49	0	114	387	125	0	379	0	891		
8/13/2014	33	11.7	5	62	23	0	31	0	116	449	145	0	136	0	730		
8/20/2014	34	24.0	4	19	7	0	13	0	39	356	115	0	170	0	641		
Totals			311	16,454	5,318	23	84,264	361	106,420	127,485	41,135	184	696,019	2,166	866,989		

Appendix 2. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Chinook Salmon catches and abundance indices, 2014. (NC = no clip, AD = adipose fin clip)

Week Starting	Week of Year	Mean Daily Discharge m ³ /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			
3/19/2014	12	69	13	0	0	0	359	26	385	0	0	0	3,962	307	4,269		
3/26/2014	13	169	10	0	0	1	243	0	244	0	0	21	4,797	0	4,818		
4/2/2014	14	130	21	0	0	0	2,474	2	2,476	0	0	0	35,989	29	36,018		
4/9/2014	15	88	21	0	0	0	5,280	2	5,282	0	0	0	56,367	21	56,388		
4/16/2014	16	60	21	0	0	0	4,142	0	4,142	0	0	0	32,879	0	32,879		
4/23/2014	17	77	21	0	0	0	10,011	1	10,012	0	0	0	90,982	10	90,992		
4/30/2014	18	78	21	0	0	0	4,278	0	4,278	0	0	0	38,230	0	38,230		
5/7/2014	19	77	21	0	0	0	11,777	0	11,777	0	0	0	97,437	0	97,437		
5/14/2014	20	70	21	0	0	1	13,534	0	13,535	0	0	10	97,516	0	97,526		
5/21/2014	21	64	9	0	0	0	7,790	0	7,790	0	0	0	203,373	0	203,373		
5/28/2014	22	55	17	0	0	1	13,700	0	13,701	0	0	7	106,792	0	106,799		
6/4/2014	23	45	8	3,054	991	0	20,300	0	24,345	53,406	17,331	0	412,353	0	483,090		
6/11/2014	24	34	8	1,929	626	0	6,011	0	8,566	22,176	7,196	0	73,142	0	102,514		
6/18/2014	25	27	8	1,630	529	0	2,864	0	5,023	17,801	5,777	0	31,070	0	54,648		
6/25/2014	26	23	8	1,112	361	0	3,612	0	5,085	11,036	3,582	0	36,859	0	51,477		
7/2/2014	27	22	6	502	163	0	1,687	0	2,352	6,257	2,031	0	21,147	0	29,435		
7/9/2014	28	20	8	256	83	0	638	0	977	2,353	764	0	5,870	0	8,987		
7/16/2014	29	19	8	145	47	0	323	0	515	1,441	468	0	3,453	0	5,362		
7/23/2014	30	18	8	59	19	0	198	0	276	532	173	0	1,731	0	2,436		
7/30/2014	31	17	8	62	20	0	36	0	118	513	166	0	385	0	1,064		
8/6/2014	32	16	8	0	0	0	79	0	79	0	0	0	655	0	655		
8/13/2014	33	15	7	18	6	0	55	1	80	151	49	0	464	9	673		
8/20/2014	34	21	6	6	2	0	20	0	28	70	23	0	229	0	322		
Totals			287	8,773	2,847	3	109,411	32	121,066	115,736	37,560	38	1,355,682	376	1,509,392		

Appendix 3. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Coho Salmon catches and abundance indices, 2014.
(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	
1/15/2014	3	10.1	7	0	0	7	7	0	0	28	28
1/22/2014	4	9.9	7	0	0	22	22	0	0	86	86
1/30/2014	5	11.9	6	0	0	26	26	0	0	138	138
2/5/2014	6	14.2	7	0	0	3	3	0	0	15	15
2/12/2014	7	29.9	5	0	0	9	9	0	0	125	125
2/19/2014	8	14.1	14	0	0	19	19	0	0	79	79
2/26/2014	9	24.2	12	0	17	21	38	0	130	160	290
3/5/2014	10	52.6	11	0	61	64	125	0	1,325	1,390	2,715
3/12/2014	11	23.8	14	126	14	81	221	927	103	596	1,626
3/19/2014	12	15.9	14	1,087	7	16	1,110	4,893	32	72	4,997
3/26/2014	13	24.6	13	293	146	7	446	2,175	1,084	52	3,311
4/2/2014	14	23.9	14	434	38	15	487	2,540	222	88	2,850
4/9/2014	15	21.8	14	491	9	8	508	2,739	50	45	2,834
4/16/2014	16	17.2	14	684	6	14	704	3,253	29	67	3,349
4/23/2014	17	41.3	10	50	7	16	73	736	103	236	1,075
4/30/2014	18	46.2	14	9	16	12	37	117	208	156	481
5/7/2014	19	45.7	14	8	5	6	19	106	66	79	251
5/14/2014	20	45.3	14	28	2	25	55	338	24	301	663
5/21/2014	21	44.5	10	12	8	21	41	187	124	327	638
5/28/2014	22	39.0	14	14	24	27	65	117	200	225	542
6/4/2014	23	33.0	14	0	8	8	16	0	75	75	150
6/11/2014	24	23.4	14	2	5	5	12	15	37	37	89
6/18/2014	25	17.9	12	0	15	2	17	0	93	12	105
6/25/2014	26	14.2	7	0	8	0	8	0	41	0	41
7/2/2014	27	13.3	3	0	3	1	4	0	33	11	44
7/9/2014	28	13.1	5	0	0	0	0	0	0	0	0
7/16/2014	29	12.9	5	0	4	0	4	0	28	0	28
7/23/2014	30	12.9	5	0	2	0	2	0	15	0	15
7/30/2014	31	12.7	5	0	1	0	1	0	7	0	7
8/6/2014	32	12.1	4	0	1	0	1	0	8	0	8
8/13/2014	33	11.7	5	0	0	0	0	0	0	0	0
8/20/2014	34	24.0	4	0	1	0	1	0	16	0	16
Total			311	3,238	408	435	4,081	18,143	4,053	4,400	26,596

Appendix 4. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Coho Salmon catches and abundance indices, 2014. (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 Age-0 Age-1		Catch Total	Hatchery R-MAX	Natural Age-0 Age-1		Index Total
3/19/2014	12	69	13	101	2	92	195	1,498	24	1,380	2,902
3/26/2014	13	169	10	115	0	26	141	2,177	0	476	2,653
4/2/2014	14	130	21	339	22	43	404	5,115	316	593	6,024
4/9/2014	15	88	21	11	2	14	27	129	21	154	304
4/16/2014	16	60	21	12	7	11	30	90	57	85	232
4/23/2014	17	77	21	251	4	42	297	2,390	32	383	2,805
4/30/2014	18	78	21	114	13	38	165	1,018	116	337	1,471
5/7/2014	19	77	21	487	3	401	891	4,220	23	3,407	7,650
5/14/2014	20	70	21	219	4	255	478	1,537	31	1,804	3,372
5/21/2014	21	64	9	58	18	86	162	1,318	511	2,088	3,917
5/28/2014	22	55	17	39	33	48	120	317	258	361	936
6/4/2014	23	45	8	3	39	14	56	44	737	319	1,100
6/11/2014	24	34	8	0	40	5	45	0	465	62	527
6/18/2014	25	27	8	0	21	0	21	0	229	0	229
6/25/2014	26	23	8	0	7	2	9	0	72	19	91
7/2/2014	27	22	6	0	2	0	2	0	23	0	23
7/9/2014	28	20	8	0	2	0	2	0	18	0	18
7/16/2014	29	19	8	0	1	0	1	0	9	0	9
7/23/2014	30	18	8	0	0	0	0	0	0	0	0
7/30/2014	31	17	8	0	0	0	0	0	0	0	0
8/6/2014	32	16	8	0	0	1	1	0	0	7	7
8/13/2014	33	15	7	0	0	0	0	0	0	0	0
8/20/2014	34	21	6	0	0	0	0	0	0	0	0
Total			287	1,749	220	1,078	3,047	19,853	2,942	11,475	34,270

Appendix 5. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Steelhead catches and abundance indices, 2014. (AD = adipose fin clip)

Week Starting	Week of Year	Mean Daily Discharge m ³ /s	Trap Days Sampled	Weekly Steelhead Catch					Weekly Steelhead Abundance Indices				
				Hatchery AD	Natural			Catch Total	Hatchery AD	Natural			Index Total
					Age-0	Age-1	Age-2+			Age-0	Age-1	Age-2+	
1/15/2014	3	10.1	7	0	0	3	0	3	0	0	12	0	12
1/22/2014	4	9.9	7	0	0	8	1	9	0	0	31	4	35
1/30/2014	5	11.9	6	0	0	154	2	156	0	0	815	11	826
2/5/2014	6	14.2	7	0	0	132	2	134	0	0	657	10	667
2/12/2014	7	29.9	5	0	0	112	1	113	0	0	1,556	14	1,570
2/19/2014	8	14.1	14	0	0	227	3	230	0	0	942	12	954
2/26/2014	9	24.2	12	0	0	231	4	235	0	0	1,760	30	1,790
3/5/2014	10	52.6	11	0	0	236	0	236	0	0	5,126	0	5,126
3/12/2014	11	23.8	14	0	0	251	0	251	0	0	1,846	0	1,846
3/19/2014	12	15.9	14	0	0	92	2	94	0	0	414	9	423
3/26/2014	13	24.6	13	0	0	175	4	179	0	0	1,299	30	1,329
4/2/2014	14	23.9	14	1	2	140	7	150	6	12	819	41	878
4/9/2014	15	21.8	14	2	2	98	8	110	11	11	547	45	614
4/16/2014	16	17.2	14	0	1	46	7	54	0	5	219	33	257
4/23/2014	17	41.3	10	154	28	61	1	244	2,267	412	898	15	3,592
4/30/2014	18	46.2	14	25	258	19	0	302	326	3,361	247	0	3,934
5/7/2014	19	45.7	14	9	140	17	1	167	119	1,848	224	13	2,204
5/14/2014	20	45.3	14	31	79	17	1	128	374	952	205	12	1,543
5/21/2014	21	44.5	10	40	140	28	0	208	622	2,177	435	0	3,234
5/28/2014	22	39.0	14	33	251	15	3	302	275	2,094	125	25	2,519
6/4/2014	23	33.0	14	9	72	5	0	86	84	672	47	0	803
6/11/2014	24	23.4	14	5	25	10	0	40	37	185	74	0	296
6/18/2014	25	17.9	12	3	36	6	0	45	19	222	37	0	278
6/25/2014	26	14.2	7	3	69	3	1	76	15	353	15	5	388
7/2/2014	27	13.3	3	2	17	4	0	23	22	185	43	0	250
7/9/2014	28	13.1	5	0	6	7	3	16	0	40	46	20	106
7/16/2014	29	12.9	5	1	13	8	0	22	7	92	57	0	156
7/23/2014	30	12.9	5	0	14	5	2	21	0	107	38	15	160
7/30/2014	31	12.7	5	0	21	2	0	23	0	140	13	0	153
8/6/2014	32	12.1	4	0	13	4	0	17	0	102	31	0	133
8/13/2014	33	11.7	5	0	8	3	0	11	0	50	19	0	69
8/20/2014	34	24.0	4	0	6	5	0	11	0	99	82	0	181
Total			311	318	1,201	2,124	53	3,696	4,184	13,119	18,679	344	36,326

Appendix 6. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Steelhead catches and abundance indices, 2014. (AD = adipose fin clip)

Week Starting	Week of Year	Mean Daily Discharge m ³ /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+	
3/19/2014	12	69	13	1	0	188	24	213	13	0	2,255	262	2,530
3/26/2014	13	169	10	0	0	152	17	169	0	0	2,928	317	3,245
4/2/2014	14	130	21	2	3	454	15	474	35	39	6,310	240	6,624
4/9/2014	15	88	21	0	0	273	26	299	0	0	2,998	260	3,258
4/16/2014	16	60	21	2	6	87	15	110	17	51	707	123	898
4/23/2014	17	77	21	402	1	446	60	909	3,813	10	4,182	557	8,562
4/30/2014	18	78	21	420	0	288	81	789	3,757	0	2,574	722	7,053
5/7/2014	19	77	21	2,277	0	1,354	32	3,663	19,411	0	11,335	245	30,991
5/14/2014	20	70	21	1,367	0	430	61	1,858	9,575	0	2,966	452	12,993
5/21/2014	21	64	9	256	1	72	16	345	5,873	14	1,426	446	7,759
5/28/2014	22	55	17	201	29	44	11	285	1,517	228	347	83	2,175
6/4/2014	23	45	8	33	25	14	3	75	464	417	275	42	1,198
6/11/2014	24	34	8	22	21	26	1	70	239	238	322	11	810
6/18/2014	25	27	8	7	15	13	2	37	77	163	145	21	406
6/25/2014	26	23	8	2	17	4	2	25	21	173	39	23	256
7/2/2014	27	22	6	0	8	4	1	13	0	103	49	12	164
7/9/2014	28	20	8	0	3	1	1	5	0	28	9	9	46
7/16/2014	29	19	8	0	1	18	0	19	0	11	236	0	247
7/23/2014	30	18	8	0	1	16	0	17	0	9	137	0	146
7/30/2014	31	17	8	0	2	17	0	19	0	18	158	0	176
8/6/2014	32	16	8	0	0	5	0	5	0	0	40	0	40
8/13/2014	33	15	7	0	0	2	0	2	0	0	18	0	18
8/20/2014	34	21	6	0	2	2	0	4	0	23	23	0	46
Total			287	4,992	135	3,910	368	9,405	44,812	1,525	39,479	3,825	89,641

Appendix 7. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly age-0 Chinook Salmon population estimate input and results, 2014. (NC = no clip, AD = adipose fin clip)

Week Starting	Week of Year	Sampling Fraction ¹	Catch		Marks		Recapture Rate	Estimated		SD	
			NC	AD	Released	Recaptured		Natural	Natural	Hatchery	Hatchery
1/15/2014	3	1.00	8	0	0	0	---	57,880	156,316	0	---
1/22/2014	4	1.00	87	0	0	0	---	44,930	75,755	0	---
1/30/2014	5	0.86	560	0	0	0	---	41,919	50,157	0	---
2/5/2014	6	1.00	1,586	0	0	0	---	42,168	41,019	0	---
2/12/2014	7	0.71	353	0	1,184	13	0.01	44,996	11,964	0	---
2/19/2014	8	1.00	2,953	0	1,460	164	0.11	26,594	2,014	0	---
2/26/2014	9	1.00	7,679	0	2,478	362	0.15	52,575	2,622	0	---
3/5/2014	10	1.00	2,761	0	1,198	74	0.06	45,130	5,168	0	---
3/12/2014	11	1.00	3,620	0	2,046	148	0.07	50,190	4,059	0	---
3/19/2014	12	1.00	1,312	0	1,992	111	0.06	24,152	2,323	0	---
3/26/2014	13	1.00	5,628	0	1,993	261	0.13	43,261	2,554	0	---
4/2/2014	14	1.00	3,195	0	1,981	159	0.08	40,233	3,112	0	---
4/9/2014	15	1.00	5,684	0	1,808	272	0.15	38,018	2,169	0	---
4/16/2014	16	1.00	18,784	0	1,279	228	0.18	105,158	6,288	0	---
4/23/2014	17	0.71	10,381	0	1,961	27	0.01	64,481	50,582	0	---
4/30/2014	18	1.00	1,873	0	2,481	68	0.03	68,918	8,392	0	---
5/7/2014	19	1.00	1,028	0	3,797	70	0.02	56,744	6,872	0	---
5/14/2014	20	1.00	1,155	0	3,606	142	0.04	30,009	2,570	0	---
5/21/2014	21	0.71	1,467	0	2,674	120	0.04	46,431	4,292	0	---
5/28/2014	22	1.00	6,499	9	2,105	83	0.04	160,246	16,835	0	---
6/4/2014	23	1.00	7,988	2,074	2,156	37	0.02	81,607	16,556	464,626	82,709
6/11/2014	24	1.00	2,548	471	1,941	98	0.05	22,398	2,830	40,227	4,430
6/18/2014	25	1.00	4,299	810	1,307	50	0.04	44,483	6,262	83,718	11,253
6/25/2014	26	1.00	5,312	1,028	1,212	77	0.06	32,212	3,888	64,520	7,137
7/2/2014	27	0.43	1,488	367	805	39	0.05	15,277	2,959	67,643	9,932
7/9/2014	28	0.71	1,052	222	783	109	0.14	3,813	579	9,506	1,009
7/16/2014	29	0.71	570	129	760	84	0.11	2,324	496	7,033	890
7/23/2014	30	0.71	444	107	584	25	0.04	3,181	1,058	14,139	2,889
7/30/2014	31	0.71	181	55	802	25	0.03	1,164	559	9,516	2,050
8/6/2014	32	0.57	98	16	865	38	0.04	1,458	563	3,065	749
8/13/2014	33	0.71	93	23	892	73	0.08	369	190	1,686	302
8/20/2014	34	0.57	32	7	924	28	0.03	284	256	1,883	524
Total			100,718	5,318	47,074	2,985	0.06	1,292,605	268,281	767,561	85,844

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, 2014. (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	SD Natural	Estimated Hatchery	SD Hatchery
3/19/2014	12	0.62	359	0	976	69	0.071	8,325	1,033	0	---
3/26/2014	13	0.48	240	0	965	121	0.125	4,041	386	0	---
4/2/2014	14	1.00	2,474	0	820	41	0.050	50,309	7,735	0	---
4/9/2014	15	1.00	5,280	0	984	87	0.088	60,377	6,295	0	---
4/16/2014	16	1.00	4,142	0	966	77	0.080	52,551	5,811	0	---
4/23/2014	17	1.00	10,011	0	1,494	88	0.059	171,028	17,887	0	---
4/30/2014	18	1.00	4,278	0	1,409	122	0.087	49,910	4,427	0	---
5/7/2014	19	1.00	11,777	0	1,461	210	0.144	82,250	5,319	0	---
5/14/2014	20	1.00	13,531	0	1,397	283	0.203	67,011	3,642	0	---
5/21/2014	21	0.43	7,790	0	945	153	0.162	112,607	8,364	0	---
5/28/2014	22	0.81	13,697	0	894	28	0.031	544,955	102,156	0	---
6/4/2014	23	0.71	23,354	991	877	28	0.032	891,996	172,905	178,600	34,923
6/11/2014	24	0.71	7,940	626	990	67	0.068	124,314	14,580	53,135	6,395
6/18/2014	25	0.71	4,494	529	1,000	111	0.111	36,206	3,445	27,552	2,714
6/25/2014	26	0.71	4,724	361	976	46	0.047	105,732	15,414	43,352	6,578
7/2/2014	27	0.71	2,189	163	905	102	0.113	21,064	2,054	8,360	949
7/9/2014	28	0.71	894	83	835	73	0.087	10,298	1,289	5,507	804
7/16/2014	29	0.71	468	47	945	22	0.023	18,930	4,208	11,312	2,731
7/23/2014	30	0.71	257	19	926	49	0.053	5,274	889	2,121	502
7/30/2014	31	0.71	98	20	1,036	86	0.083	613	244	1,407	296
8/6/2014	32	0.71	79	0	996	2	0.002	45,244	34,764	305	481
8/13/2014	33	0.50	73	6	995	164	0.165	577	98	290	85
8/20/2014	34	0.43	26	2	990	36	0.036	1,222	368	512	288
Total			118,175	2,847	23,782	2,065	0.087	2,464,833	206,904	332,451	36,567

¹ Fraction of possible trap days successfully sampled each week

Appendix 9. Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Chinook Salmon and Coho Salmon fork lengths, 2014.

Week Starting	Week of Year	Chinook Salmon ¹										Natural Coho Salmon					Hatchery Coho Salmon									
		n	Age-0			Age-1			n	Age-0			Age-1		n	Age-1										
		mean	min	max	SD	mean	min	max	SD	mean	min	max	SD	mean	min	max	SD	mean	min	max	SD	mean	min	max	SD	
1/15/2014	3	8	39.8	39	41	0.71	41	160.5	88	194	30.53	0	0.0	0.0	0.0	0.0	7	83.1	68.0	113.0	14.5	0	---	---	---	---
1/22/2014	4	71	39.3	36	43	1.32	30	141.2	80	193	37.99	0	0.0	0.0	0.0	0.0	22	90.2	73.0	109.0	9.5	0	---	---	---	---
1/30/2014	5	98	39.9	34	47	1.92	65	114.0	63	190	41.11	0	0.0	0.0	0.0	0.0	26	90.0	70.0	113.0	10.0	0	---	---	---	---
2/5/2014	6	183	40.1	36	52	2.39	55	93.8	66	180	19.25	0	0.0	0.0	0.0	0.0	3	78.0	77.0	80.0	1.7	0	---	---	---	---
2/12/2014	7	89	40.6	35	48	2.96	19	93.2	72	188	25.47	0	0.0	0.0	0.0	0.0	8	83.1	73.0	92.0	5.4	0	---	---	---	---
2/19/2014	8	360	41.8	35	58	4.52	35	90.9	73	182	17.93	0	0.0	0.0	0.0	0.0	19	88.0	73.0	105.0	8.7	0	---	---	---	---
2/26/2014	9	270	42.8	35	58	5.31	66	90.0	72	115	9.96	16	33.6	28.0	36.0	1.8	19	88.0	73.0	111.0	11.2	0	---	---	---	---
3/5/2014	10	321	42.9	33	61	5.35	6	88.3	76	101	9.77	58	34.2	27.0	41.0	2.0	59	86.3	70.0	110.0	8.4	0	---	---	---	---
3/12/2014	11	300	48.4	37	67	7.14	5	86.2	78	95	7.36	8	34.0	33.0	36.0	1.1	54	89.4	72.0	112.0	9.4	0	---	---	---	---
3/19/2014	12	364	50.2	34	75	9.40	29	103.4	83	235	27.30	7	34.3	33.0	36.0	1.4	15	103.7	65.0	130.0	15.2	169	164.0	84	218	16.33
3/26/2014	13	281	52.1	34	75	10.64	9	106.7	93	135	12.24	84	34.1	31.0	39.0	1.4	3	111.3	101.0	125.0	12.3	63	156.3	130	200	15.56
4/2/2014	14	291	52.9	35	76	10.64	3	100.7	96	104	4.16	28	34.0	33.0	37.0	1.1	7	105.4	93.0	125.0	10.8	95	163.0	93	213	18.71
4/9/2014	15	368	58.0	35	90	13.88	3	106.7	103	113	5.51	3	33.3	33.0	34.0	0.6	5	123.4	95.0	142.0	18.8	127	172.9	90	238	20.03
4/16/2014	16	374	60.3	33	90	13.03	4	119.5	111	135	10.60	1	53.0	53.0	53.0	---	13	124.5	107.0	185.0	19.8	109	167.6	80	258	24.55
4/23/2014	17	240	56.2	35	95	10.96	1	128.0	128	128	---	6	47.0	37.0	58.0	8.2	16	115.3	104.0	137.0	8.4	32	162.1	130	185	13.08
4/30/2014	18	292	55.0	39	82	9.39	3	133.0	123	147	12.49	12	41.3	34.0	53.0	6.8	8	110.9	76.0	127.0	15.3	4	176.8	164	185	9.00
5/7/2014	19	309	55.9	37	86	10.30	0	---	---	---	---	4	36.5	34.0	38.0	1.7	4	113.8	100.0	127.0	12.1	5	161.8	152	175	8.32
5/14/2014	20	262	61.0	38	100	11.99	1	132.0	132	132	---	2	55.5	50.0	61.0	7.8	25	118.8	104.0	134.0	8.2	23	170.8	127	203	18.87
5/21/2014	21	179	64.6	35	96	11.89	1	149.0	149	149	---	4	47.0	42.0	55.0	5.9	19	117.7	100.0	138.0	9.1	8	168.6	145	187	15.72
5/28/2014	22	404	69.6	39	105	14.23	0	---	---	---	---	24	52.4	40.0	65.0	8.1	25	120.4	104.0	143.0	10.3	13	153.7	90	207	30.46
6/4/2014	23	742	73.2	39	115	10.83	0	---	---	---	---	8	59.5	46.0	80.0	10.7	8	117.8	100.0	130.0	10.1	0	---	---	---	---
6/11/2014	24	657	78.8	46	115	11.47	0	---	---	---	---	4	70.0	57.0	79.0	10.5	5	119.4	96.0	139.0	18.4	2	147.5	126	169	30.41
6/18/2014	25	601	80.4	48	110	9.26	0	---	---	---	---	15	62.0	50.0	85.0	9.9	2	111.0	97.0	125.0	19.8	0	---	---	---	---
6/25/2014	26	420	78.4	54	102	8.23	0	---	---	---	---	8	60.3	46.0	73.0	9.4	0	0.0	0.0	0.0	0.0	0	---	---	---	---
7/2/2014	27	180	78.0	50	101	9.06	0	---	---	---	---	3	63.0	48.0	78.0	15.0	1	126.0	126.0	126.0	---	0	---	---	---	---
7/9/2014	28	299	78.4	60	110	6.20	0	---	---	---	---	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	---	---	---	---
7/16/2014	29	264	79.7	50	125	8.23	0	---	---	---	---	4	64.3	58.0	74.0	6.8	0	0.0	0.0	0.0	0.0	0	---	---	---	---
7/23/2014	30	209	79.4	57	122	8.27	0	---	---	---	---	2	73.5	70.0	77.0	4.9	0	0.0	0.0	0.0	0.0	0	---	---	---	---
7/30/2014	31	168	83.2	57	119	10.06	0	---	---	---	---	1	65.0	65.0	65.0	---	0	0.0	0.0	0.0	0.0	0	---	---	---	---
8/6/2014	32	80	84.0	67	120	12.23	0	---	---	---	---	1	83.0	83.0	83.0	---	0	0.0	0.0	0.0	0.0	0	---	---	---	---
8/13/2014	33	96	89.0	62	132	11.38	0	---	---	---	---	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	---	---	---	---
8/20/2014	34	39	94.9	57	165	18.63	0	---	---	---	---	1	73.0	73.0	73.0	---	0	0.0	0.0	0.0	0.0	0	---	---	---	---

¹Natural and Hatchery combined

Appendix 10. Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Chinook Salmon and Coho Salmon fork lengths, 2014.

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			
3/19/2014	12	83	48.6	33	70	11.06	26	96.8	80	118	8.83	0	---	---	---	---	63	108.0	84	198	21.83	17	151.4	77	199	33.08			
3/26/2014	13	93	47.9	33	75	10.63	0	---	---	---	---	0	---	---	---	---	25	108.4	82	174	21.74	50	157.1	120	330	28.14			
4/2/2014	14	207	52.4	31	77	11.05	2	104.5	104	105	0.71	19	36.0	32	40	2.38	43	99.7	64	145	19.54	66	152.1	113	215	16.78			
4/9/2014	15	202	47.3	32	76	13.24	2	94.0	87	101	9.90	2	31.5	28	35	4.95	14	106.5	77	120	10.25	9	162.8	144	200	15.96			
4/16/2014	16	179	57.0	35	85	14.06	0	---	---	---	---	7	39.1	32	50	7.34	11	119.6	105	145	12.67	4	147.8	106	177	30.15			
4/23/2014	17	213	63.6	32	89	12.35	1	115.0	115	115	---	4	45.5	39	52	6.95	41	115.7	78	162	18.54	53	157.9	118	205	15.83			
4/30/2014	18	210	60.5	36	98	10.38	0	---	---	---	---	13	41.9	31	57	9.22	37	109.5	86	144	15.66	63	158.7	131	229	17.66			
5/7/2014	19	180	68.8	36	99	13.57	0	---	---	---	---	3	56.7	55	59	2.08	143	118.7	70	158	11.22	40	158.5	115	200	15.60			
5/14/2014	20	200	73.3	44	116	13.82	1	82.0	82	82	---	4	50.5	47	58	5.20	139	117.2	80	145	11.67	91	158.0	104	200	16.01			
5/21/2014	21	90	74.2	54	99	10.52	0	---	---	---	---	14	49.3	41	61	6.39	57	117.7	94	141	11.23	27	162.4	131	205	17.01			
5/28/2014	22	130	76.5	35	102	12.23	1	81.0	81	81	---	25	54.0	41	65	7.15	34	119.2	98	146	10.78	2	152.5	145	160	10.61			
6/4/2014	23	124	88.8	57	115	13.56	0	---	---	---	---	20	56.1	46	71	6.70	6	115.7	110	124	6.28	0	---	---	---	---			
6/11/2014	24	180	83.9	50	114	11.37	0	---	---	---	---	36	57.4	48	75	6.11	4	112.3	103	120	7.18	0	---	---	---	---			
6/18/2014	25	237	80.0	48	112	9.77	0	---	---	---	---	21	57.9	47	73	6.41	0	---	---	---	---	0	---	---	---	---			
6/25/2014	26	230	81.4	62	103	7.42	0	---	---	---	---	7	61.0	52	68	5.83	2	106.0	105	107	1.41	0	---	---	---	---			
7/2/2014	27	178	79.4	59	99	6.99	0	---	---	---	---	2	56.5	51	62	7.78	0	---	---	---	---	0	---	---	---	---			
7/9/2014	28	193	77.0	53	95	6.77	0	---	---	---	---	2	69.0	68	70	1.41	0	---	---	---	---	0	---	---	---	---			
7/16/2014	29	158	77.2	58	95	7.45	0	---	---	---	---	1	52.0	52	52	---	0	---	---	---	---	0	---	---	---	---			
7/23/2014	30	125	78.5	57	109	7.82	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---			
7/30/2014	31	111	81.4	55	120	8.78	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---			
8/6/2014	32	78	80.1	57	107	8.07	0	---	---	---	---	0	---	---	---	---	1	137.0	137	137	---	0	---	---	---	---			
8/13/2014	33	52	80.0	54	123	9.99	1	187.0	187	187	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---			
8/20/2014	34	28	85.1	51	120	15.59	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---	0	---	---	---	---			

¹Natural and Hatchery combined.

Appendix 11: Trinity River at Pear Tree Rotary Screw Trap site (PTRST) weekly Steelhead fork lengths, 2014.

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
1/15/2014	3	0	---	---	---	---	3	88.7	69	120	27.43	0	---	---	---	---	0	---	---	---	---
1/22/2014	4	0	---	---	---	---	8	82.1	62	100	12.01	1	188.0	188	188	---	0	---	---	---	---
1/30/2014	5	0	---	---	---	---	134	77.3	49	142	19.44	2	240.0	220	260	28.28	0	---	---	---	---
2/5/2014	6	0	---	---	---	---	111	77.6	50	142	17.36	2	170.0	153	187	24.04	0	---	---	---	---
2/12/2014	7	0	---	---	---	---	66	75.2	53	143	15.36	1	152.0	152	152	---	0	---	---	---	---
2/19/2014	8	0	---	---	---	---	158	76.4	52	150	18.07	3	167.7	155	180	12.50	0	---	---	---	---
2/26/2014	9	0	---	---	---	---	160	87.3	52	149	22.64	4	156.8	153	164	4.92	0	---	---	---	---
3/5/2014	10	0	---	---	---	---	114	82.0	46	138	20.27	0	---	---	---	---	0	---	---	---	---
3/12/2014	11	0	---	---	---	---	132	76.8	55	132	15.21	0	---	---	---	---	0	---	---	---	---
3/19/2014	12	0	---	---	---	---	76	90.0	50	126	18.57	2	164.0	160	168	5.66	0	---	---	---	---
3/26/2014	13	0	---	---	---	---	55	99.4	54	153	28.12	4	168.8	162	173	4.99	0	---	---	---	---
4/2/2014	14	2	25.0	25	25	---	82	94.5	55	160	27.04	7	181.3	165	202	12.01	1	237.0	237	237	---
4/9/2014	15	0	---	---	---	---	70	92.6	64	158	20.23	7	175.0	167	188	7.39	2	266.5	265	268	2.12
4/16/2014	16	0	---	---	---	---	23	96.0	64	156	27.31	6	182.7	170	196	11.72	0	---	---	---	---
4/23/2014	17	11	27.0	26	31	1.55	55	90.0	44	155	20.75	1	177.0	177	177	---	96	205.1	148	253	22.41
4/30/2014	18	122	27.5	25	32	1.40	14	88.4	70	124	14.63	0	---	---	---	---	17	202.8	142	280	38.49
5/7/2014	19	122	27.4	23	43	1.98	14	90.0	59	140	20.91	1	164.0	164	164	---	7	223.1	186	248	21.71
5/14/2014	20	73	28.7	23	46	3.58	15	87.5	65	145	18.88	1	195.0	195	195	---	30	215.2	178	290	22.78
5/21/2014	21	76	28.3	25	38	2.26	20	91.5	63	120	15.26	0	---	---	---	---	30	203.7	169	250	18.73
5/28/2014	22	225	34.3	21	67	7.84	15	103.3	74	159	23.66	3	184.7	169	205	18.45	29	211.1	150	250	21.09
6/4/2014	23	71	37.2	25	60	9.20	5	114.8	86	125	16.60	0	---	---	---	---	9	192.9	165	216	16.21
6/11/2014	24	22	38.7	25	76	14.22	10	103.1	83	135	17.92	0	---	---	---	---	3	205.7	187	240	29.77
6/18/2014	25	35	47.4	32	79	10.52	6	112.3	86	161	27.78	0	---	---	---	---	3	198.3	184	223	21.46
6/25/2014	26	68	47.9	34	73	8.53	3	111.3	102	127	13.65	1	173.0	173	173	---	2	241.5	220	263	30.41
7/2/2014	27	16	48.7	37	68	9.29	4	96.8	88	105	6.99	0	---	---	---	---	1	247.0	247	247	---
7/9/2014	28	6	55.3	44	74	10.07	7	133.6	111	149	13.45	3	188.3	178	207	16.20	0	---	---	---	---
7/16/2014	29	13	54.5	38	70	8.67	4	113.8	107	117	4.57	0	---	---	---	---	1	195.0	195	195	---
7/23/2014	30	11	55.7	44	67	8.44	2	138.5	133	144	7.78	2	181.0	177	185	5.66	0	---	---	---	---
7/30/2014	31	18	60.9	47	83	10.51	2	145.5	132	159	19.09	0	---	---	---	---	0	---	---	---	---
8/6/2014	32	8	69.3	53	95	15.11	1	141.0	141	141	---	0	---	---	---	---	0	---	---	---	---
8/13/2014	33	5	65.4	50	83	13.24	2	159.0	145	173	19.80	0	---	---	---	---	0	---	---	---	---
8/20/2014	34	5	61.4	54	67	4.83	5	150.8	128	174	18.59	0	---	---	---	---	0	---	---	---	---

Appendix 12: Trinity River at Willow Creek Rotary Screw Trap site (WCRST) weekly Steelhead fork lengths, 2014.

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
3/19/2014	12	0	---	---	---	----	76	91.3	62	149	18.80	23	191.9	150	233	20.45	1	305.0	305	305	---
3/26/2014	13	0	---	---	---	----	71	93.7	63	147	20.87	17	180.9	155	223	22.69	0	---	---	---	---
4/2/2014	14	3	33.7	26	39	6.81	141	90.5	67	138	12.20	15	178.8	150	223	22.50	0	---	---	---	---
4/9/2014	15	0	---	---	---	----	122	90.6	53	149	14.66	26	176.3	157	210	14.40	0	---	---	---	---
4/16/2014	16	0	---	---	---	----	41	92.4	77	114	10.15	15	176.4	150	210	18.06	0	---	---	---	---
4/23/2014	17	0	---	---	---	----	100	95.3	65	148	16.59	60	174.6	151	208	15.04	143	204.8	119	250	19.84
4/30/2014	18	0	---	---	---	----	103	101.2	67	149	18.55	81	178.5	150	226	18.09	210	206.5	126	257	18.01
5/7/2014	19	0	---	---	---	----	62	102.2	75	148	17.12	32	169.2	150	198	14.31	72	205.7	175	250	16.17
5/14/2014	20	0	---	---	---	----	85	107.1	76	143	16.77	61	167.5	150	195	12.32	153	198.3	155	259	18.68
5/21/2014	21	1	52.0	52	52	---	25	108.8	77	145	22.27	16	167.5	153	200	14.12	75	194.8	114	236	20.46
5/28/2014	22	16	45.8	34	60	5.27	7	109.3	97	126	12.01	11	172.6	160	189	8.64	53	193.5	148	227	15.25
6/4/2014	23	10	44.4	30	54	7.21	4	112.8	96	130	15.17	3	181.3	165	194	14.84	24	199.8	174	235	15.73
6/11/2014	24	19	55.3	44	68	6.69	12	107.6	91	116	7.84	1	158.0	158	158	----	11	187.7	157	235	21.27
6/18/2014	25	15	50.8	41	64	5.60	4	101.3	83	128	20.69	2	191.5	185	198	9.19	7	195.3	171	223	16.95
6/25/2014	26	17	53.8	34	66	8.37	4	122.0	115	131	7.39	2	182.0	167	197	21.21	2	208.0	192	224	22.63
7/2/2014	27	8	52.5	44	59	5.48	2	106.0	105	107	1.41	1	219.0	219	219	----	0	---	---	---	----
7/9/2014	28	3	67.3	59	74	7.64	0	---	---	---	----	1	167.0	167	167	----	0	---	---	---	----
7/16/2014	29	0	---	---	---	----	4	122.3	107	137	13.70	0	---	---	---	----	0	---	---	---	----
7/23/2014	30	0	---	---	---	----	7	119.6	97	145	15.09	0	---	---	---	----	0	---	---	---	----
7/30/2014	31	2	46.5	38	55	12.02	8	131.5	112	149	12.48	0	---	---	---	----	0	---	---	---	----
8/6/2014	32	0	---	---	---	----	4	121.3	115	128	5.38	0	---	---	---	----	0	---	---	---	----
8/13/2014	33	0	---	---	---	----	0	---	---	---	----	0	---	---	---	----	0	---	---	---	----
8/20/2014	34	2	51.0	47	55	5.66	2	133.5	120	147	19.09	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, 2014.

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
1/15/2014	3	0	---	---	0	----	----
1/22/2014	4	0	---	---	0	----	----
1/30/2014	5	0	---	---	0	----	----
2/5/2014	6	1	0.92	---	0	----	----
2/12/2014	7	0	---	---	0	----	----
2/19/2014	8	20	0.95	0.059	0	----	----
2/26/2014	9	31	1.00	0.139	0	----	----
3/5/2014	10	22	1.07	0.098	0	----	----
3/12/2014	11	60	1.13	0.125	----	----	----
3/19/2014	12	132	1.13	0.100	36	1.10	0.198
3/26/2014	13	143	1.11	0.079	25	1.08	0.185
4/2/2014	14	122	1.11	0.081	122	1.14	0.185
4/9/2014	15	253	1.13	0.087	73	1.14	0.175
4/16/2014	16	253	1.13	0.095	120	1.09	0.258
4/23/2014	17	95	1.12	0.093	176	1.13	0.206
4/30/2014	18	0	---	---	170	1.17	0.194
5/7/2014	19	184	1.10	0.083	160	1.12	0.218
5/14/2014	20	195	1.08	0.090	188	1.13	0.241
5/21/2014	21	115	1.06	0.071	88	1.13	0.271
5/28/2014	22	289	1.11	0.121	126	1.11	0.195
6/4/2014	23	487	1.12	0.107	58	1.01	0.244
6/11/2014	24	271	1.08	0.077	87	1.10	0.265
6/18/2014	25	448	1.08	0.096	117	1.08	0.144
6/25/2014	26	236	1.03	0.066	114	1.03	0.140
7/2/2014	27	113	1.09	0.105	90	1.04	0.202
7/9/2014	28	119	1.06	0.084	119	1.08	0.139
7/16/2014	29	119	1.07	0.074	109	1.13	0.164
7/23/2014	30	119	1.07	0.078	107	1.09	0.140
7/30/2014	31	90	1.05	0.062	90	1.13	0.191
8/6/2014	32	30	1.07	0.089	75	1.09	0.219
8/13/2014	33	5	1.10	0.078	46	1.05	0.220
8/20/2014	34	30	1.06	0.103	26	1.03	0.140

Appendix 14. Fulton's condition factor (K) for natural age-1 Coho Salmon from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2014.

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
1/15/2014	3	4	0.99	0.057	0	----	----
1/22/2014	4	19	1.04	0.122	0	----	----
1/30/2014	5	12	0.98	0.094	0	----	----
2/5/2014	6	3	0.99	0.059	0	----	----
2/12/2014	7	8	1.07	0.087	0	----	----
2/19/2014	8	14	1.04	0.081	0	----	----
2/26/2014	9	17	1.07	0.070	0	----	----
3/5/2014	10	30	1.05	0.075	0	----	----
3/12/2014	11	40	1.09	0.064	0	----	----
3/19/2014	12	12	1.08	0.078	62	1.13	0.11
3/26/2014	13	3	0.98	0.048	10	1.05	0.26
4/2/2014	14	5	1.02	0.108	43	1.1	0.13
4/9/2014	15	5	0.96	0.117	14	1.15	0.13
4/16/2014	16	9	0.99	0.111	10	1.07	0.12
4/23/2014	17	13	1.02	0.052	41	1.11	0.17
4/30/2014	18	0	---	---	36	1.06	0.14
5/7/2014	19	4	1.06	0.030	143	1.03	0.1
5/14/2014	20	25	0.98	0.083	135	1.05	0.14
5/21/2014	21	13	1.05	0.109	56	1.09	0.14
5/28/2014	22	16	1.01	0.123	34	1.07	0.2
6/4/2014	23	8	1.07	0.046	6	0.95	0.06
6/11/2014	24	4	0.96	0.053	4	0.97	0.21
6/18/2014	25	1	0.92	---	0	----	----
6/25/2014	26	0	---	---	2	1.01	0.11
7/2/2014	27	1	0.96	---	0	----	----
7/9/2014	28	0	---	---	0	----	----
7/16/2014	29	0	---	---	0	----	----
7/23/2014	30	0	---	---	0	----	----
7/30/2014	31	0	---	---	0	----	----
8/6/2014	32	0	---	---	1	1.03	----
8/13/2014	33	0	---	---	0	----	----
8/20/2014	34	0	---	---	0	----	----

Appendix 15. Fulton's condition factor (K) for natural age-1+ Steelhead from the Pear Tree and Willow Creek Rotary Screw Trap sites, 2014.

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
1/15/2014	3	0	---	---	0	---	---
1/22/2014	4	8	1.00	0.047	0	---	---
1/30/2014	5	71	1.04	0.098	0	---	---
2/5/2014	6	112	1.05	0.099	0	---	---
2/12/2014	7	67	1.06	0.084	0	---	---
2/19/2014	8	125	1.06	0.081	0	---	---
2/26/2014	9	103	1.10	0.097	0	---	---
3/5/2014	10	55	1.12	0.094	0	---	---
3/12/2014	11	77	1.15	0.091	0	---	---
3/19/2014	12	48	1.12	0.113	81	1.11	0.201
3/26/2014	13	59	1.03	0.110	45	1.18	0.276
4/2/2014	14	70	1.04	0.110	151	1.12	0.154
4/9/2014	15	75	1.04	0.095	146	1.12	0.211
4/16/2014	16	23	1.04	0.108	47	1.08	0.213
4/23/2014	17	46	1.07	0.070	156	1.11	0.231
4/30/2014	18	0	---	---	180	1.05	0.186
5/7/2014	19	15	1.08	0.089	93	1.08	0.157
5/14/2014	20	16	1.06	0.098	144	1.04	0.175
5/21/2014	21	15	1.11	0.066	39	1.10	0.280
5/28/2014	22	12	1.03	0.118	18	0.96	0.202
6/4/2014	23	4	1.08	0.018	7	1.01	0.184
6/11/2014	24	6	1.11	0.067	13	1.11	0.186
6/18/2014	25	4	1.10	0.057	6	1.10	0.208
6/25/2014	26	2	1.03	0.089	6	1.13	0.130
7/2/2014	27	4	1.11	0.142	2	1.03	0.042
7/9/2014	28	8	1.03	0.108	1	1.02	---
7/16/2014	29	4	1.22	0.128	4	1.13	0.056
7/23/2014	30	4	1.07	0.027	7	1.10	0.077
7/30/2014	31	1	1.10	---	8	0.95	0.141
8/6/2014	32	0	---	---	4	1.10	0.060
8/13/2014	33	0	---	---	0	---	---
8/20/2014	34	5	1.07	0.096	2	1.03	0.014