

Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2015 Run

Klamath River Technical Team
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Summary

The number of Klamath River fall Chinook salmon returning to the Klamath River Basin (Basin) in 2015 was estimated to be:

<i>Age</i>	<i>Run Size</i>	
	<i>Number</i>	<i>Proportion</i>
2	6,097	0.07
3	36,702	0.44
4	33,914	0.40
5	7,133	0.09
Total	83,846	1.00

Preseason forecasts of the number of fall Chinook salmon adults returning to the Basin and the corresponding post-season estimates are:

<i>Sector</i>	<i>Adults</i>		
	<i>Preseason Forecast</i>	<i>Postseason Estimate</i>	<i>Pre / Post</i>
<i>Run Size</i>	119,800	77,700	1.54
<i>Fishery Mortality</i>			
Tribal Harvest	43,600	28,000	1.56
Recreational Harvest	14,100	7,800	1.81
Drop-off Mortality	4,100	2,600	1.58
	61,800	38,400	1.61
<i>Escapement</i>			
Hatchery Spawners	17,300	11,100	1.56
Natural Area Spawners	40,700	28,100	1.45
	58,000	39,200	1.48

Introduction

This report describes the data and methods used by the Klamath River Technical Team (KRTT) to estimate age-specific numbers of fall Chinook salmon returning to the Basin in 2015. The estimates provided in this report are consistent with the Klamath Basin Megatable (CDFW 2016) and with the 2016 forecast of ocean stock abundance (KRTT 2016).

Age-specific escapement estimates for 2016 and previous years, coupled with the coded-wire tag (CWT) recovery data from Basin hatchery stocks, allow for a cohort reconstruction of the hatchery and natural components of Klamath River fall Chinook salmon (Goldwasser et al. 2001, Mohr 2006a, KRTT 2016). Cohort reconstruction enables forecasts to be developed for the current year's ocean stock abundance, ocean fishery contact rates, and percent of spawners expected in natural areas (KRTT 2016). These forecasts are necessary inputs to the Klamath Ocean Harvest Model (Mohr 2006b), the model used by the Pacific Fishery Management Council to forecast the effect of fisheries on Klamath River fall Chinook salmon.

Methods

The KRTT obtained estimates of abundance and age composition separately for each sector of harvest and escapement. Random and nonrandom sampling methods of various types were used throughout the Basin (Table 1) to estimate the numbers of fall Chinook salmon in the 2015 run and to obtain the data from which the Klamath Basin Megatable totals and estimates of age composition were derived. The KRTT relied on surrogate data for estimating age composition where the sample of scales was insufficient, or altogether lacking, within a particular sector.

Estimates of age composition were based on random samples of scales (Table 2) whenever possible. Generally, each scale was aged independently by two trained readers. In cases of disagreement, a third read was used to arbitrate. Statistical methods (Cook and Lord 1978, Cook 1983, Kimura and Chikuni 1987) were used to correct the reader-assigned age composition estimates for potential bias based on the known-age vs. read-age validation matrices. The method used to combine the random sample's known ages (for CWT fish) and unknown read ages for estimation of the escapement or harvest age composition is described in Appendix A.

For cases in which scales were believed to be non-representative of the age-2 component, the KRTT relied on analysis of length-frequency histograms. In these cases, all fish less than or equal to a given fork-length "cutoff" were assumed to be age-2, and all fish greater than the cutoff length were assumed to be adults. The cutoff value varied by sector, and was based on location of the length-frequency nadir and, if appropriate, the length-frequency of known-age fish. As before, scales were used to estimate the age composition of adults (Appendix A).

An indirect method was used to estimate age composition for natural spawners in the Trinity River above the Willow Creek Weir (WCW). Age-specific numbers of fall Chinook salmon that immigrated above WCW were estimated by applying the age composition from scales collected at the weir to the estimate of total abundance above the weir. Next, the age composition of returns to Trinity River Hatchery and the harvest above WCW were estimated. The age composition of natural spawners above the weir was then estimated as the age-specific abundances above the WCW, minus the age-specific hatchery and harvest totals.

The specific protocols used to develop estimates of age composition for each sector are provided in Table 3. A summary of the KRTT minutes specific to each sector is given in Appendix B for the Klamath River and Appendix C for the Trinity River.

Results

A total of 8,909 scales from 17 different sectors were aged for this analysis (Table 2). Of these, 524 were from known-age CWT fish. Known-age scales provide a direct check, or “validation”, of accuracy of the scale-based age estimates (Tables 4a and 4b, Appendices D and E). Overall, the scale-based ages were generally accurate. Accuracy within the Trinity Basin was 92% for age-2 fish, 97% for age-3 fish, 99% for age-4 fish, and 100% for age-5 fish. Accuracy within the Klamath River Basin was 97% for age-2 fish, 98% for age-3 fish, 93% for age-4 fish, and 63% for age-5 fish. The statistical bias-adjustment methods employed are intended to correct for scale-reading bias, but the methods assume that the known-age versus read-age validation matrices are themselves well estimated (Kimura and Chikuni 1987).

Table 5 presents estimates of age-specific returns to Basin hatcheries and spawning grounds, as well as Basin harvest by tribal and recreational fisheries and the drop-off mortality associated with those fisheries. Table 6 displays the Table 5 estimates as proportions. Calculations underlying the results summarized in Table 5 are presented in Appendix F.

In 2016, two sampled fish were determined to be age-6 based on scales. One fish was sampled in the Yurok tribal fishery and one was sampled at the Willow Creek Weir. Neither fish was a known-age, CWT fish. We acknowledge the presence of these age-6 fish here, but do not include them in the 2015 run size estimate to be consistent with the other rare instances of age-6 KRFC sampled in previous years.

Also in 2016, sampling was conducted by the Yurok and Hoopa Valley Tribes in the Klamath and Trinity rivers, respectively, to assess the incidence of *Ichthyophthirius multifiliis* (often referred to as Ich) in returning fish. Sampling was conducted using gill nets in a manner similar to the prosecution of those tribal fisheries. All fish caught as part of this effort were examined and killed and therefore no sampling expansion was necessary. Estimated impacts from Ich sampling include net dropoff mortality. The age structure of fish caught in Ich sampling programs in the Klamath and Trinity rivers is reported in Table 5.

The final estimates of the 2014 Klamath Basin age composition are presented in Appendix G.

List of Acronyms and Abbreviations

ad-clipped	adipose fin removed
CDFW	California Department of Fish and Wildlife
CWT	coded-wire tag
EST	Klamath River estuary
FL	fork length
HVT	Hoopa Valley Tribe
IGH	Iron Gate Hatchery
KRTAT	Klamath River Technical Advisory Team
KRTT	Klamath River Technical Team
KT	Karuk Tribe
LRC	Lower Klamath River Creel
MKWC	Mid-Klamath Watershed Council
M&U	Klamath River below Weitchpec: “middle” section (Hwy 101–Surpur Cr.) and “upper” section (Surpur Cr.—Trinity River)
NCRC	Northern California Resource Center
QVIR	Quartz Valley Indian Reservation
SCS	Siskiyou County Schools
SRCD	Siskiyou Resource Conservation District
SRRC	Salmon River Restoration Council

TRH	Trinity River Hatchery
UR TRIBS	Upper Klamath River Tributaries
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WCW	Willow Creek Weir
YT	Yurok Tribe
YTFP	Yurok Tribal Fisheries Program

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Table 1. Estimation and sampling methods used for the 2015 Klamath River fall Chinook run assessment.

Sampling Location	Estimation and Sampling Methods	Agency
Hatchery Spawners		
Iron Gate Hatchery (IGH)	Direct count. All fish examined for fin clips, tags, and marks. Bio-data collected from a systematic random sample of 10% of the fish. Additionally, all ad-clipped fish were bio-sampled.	CDFW
Trinity River Hatchery (TRH)	Direct count. All fish examined for fin clips, tags, and marks. Bio-data collected from a systematic random sample of 20% of the fish.	CDFW, HVT
Natural Spawners		
Salmon River Basin	Carcass mark-recapture survey (Cormack-Jolly-Seber) within the mainstem above Nordheimer Campground combined with redd surveys of the lower mainstem and tributaries. Total run based on mark-recapture estimate and expanded redd count ($2 \times \text{total redd count} / (1 - \text{proportion of jacks})$) + live fish observed on last day surveyed. Jacks estimated from scale-age data from this area. Bio-data collected from all carcasses recovered.	CDFW, USFS, YT, KT, SRRC, SCS
Scott River Basin	Video count above weir at river mile 18 and carcass mark-recapture (Cormack-Jolly-Seber) below weir. Total run based on video count through the weir and mark-recapture estimate below the weir. Bio-samples were obtained from all non-deteriorated carcasses recovered above and below the weir with a daily maximum scale sample collection of 25 per reach.	CDFW, QVIR, USFS, KT, NCRC, SRCD
Shasta River Basin	Video count above weir. Bio-data collected from all carcasses upstream of video weir site, and 10% of mortalities stranded on weir.	CDFW
Bogus Creek Basin	Video count above weir and twice weekly direct carcass count below weir. Bio-data collected from a systematic random sample (1:4) of all carcasses observed during surveys above and below weir. Additionally, all ad-clipped fish were bio-sampled.	CDFW, SCS
Klamath River mainstem (IGH to Shasta R.)	Area-under-the-curve estimate from weekly carcass surveys. Bio-data collected from fresh carcasses.	USFWS, YT
Klamath River mainstem (Shasta R. to Indian Cr.)	Weekly redd survey. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$. Jacks estimated from the Klamath River mainstem (IGH to Shasta R.) scale-age data.	USFWS, KT
Klamath Tributaries above Trinity River	Periodic redd surveys, the majority of which were performed weekly. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$ + live fish observed on last day surveyed. Jacks estimated from Klamath tributary scale-age data. Bio-data collected from all carcasses recovered.	USFS, CDFW, KT, YT, SRRC, MKWC
Blue Creek	Weekly dive counts. Total estimated as the peak count during surveys. Bio-data collected from carcasses and gill-netted and released live fish.	YT
Trinity River (mainstem above WCW)	Mark-recapture (Petersen); marks applied at WCW and recovered at TRH. All fish bio-sampled and scales collected by systematic random sampling (1:2). Age composition of total run past WCW based on scale-age data from the weir. Natural spawning escapement estimated by subtracting age-specific estimates of hatchery returns and recreational harvest above WCW from the total run.	CDFW, HVT
Trinity River (mainstem below WCW)	Bi-weekly redd survey. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$. Jacks estimated from the natural area above WCW. Bio-data from all recovered carcasses.	HVT, USFWS
Trinity Tributaries (above Reservation; below WCW)	Periodic redd survey. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$ + live fish observed during last survey. Jacks estimated from the natural area above WCW. Bio-data collected from all recovered carcasses.	USFS
Hoopla Reservation Tributaries	Periodic redd survey. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$. Jacks estimated from the natural area above WCW. Bio-data collected from all recovered carcasses.	HVT
Recreational Harvest		
Klamath River (below Hwy 101 bridge)	Jack and adult estimates based on access point creel survey during three randomly selected days per statistical week. Bio-data collected during angler interviews.	CDFW
Klamath River (Hwy 101 to Weitchpec)	Jack and adult estimates based on access point creel survey during three randomly selected days per statistical week. Bio-data collected during angler interviews.	CDFW
Klamath River (Weitchpec to IGH)	No survey. Upper Klamath adult harvest estimated using the ratio of lower river to total adult river harvest during the years 1999-2002 (Appendix B). Upper river adult harvest = total adult harvest minus lower river adult harvest. Total harvest = adults / (1 - proportion jacks). Jacks estimated from IGH, Klamath mainstem, Shasta River, and Bogus Creek weighted average age compositions.	CDFW
Trinity River Basin (above WCW)	Jack and adult harvest estimates based on estimated harvest rates from angler return of reward tags applied at WCW.	CDFW
Trinity River Basin (below WCW)	Roving access creel survey during three randomly selected days per statistical week stratified by weekdays and weekend days (1 weekday and 2 weekend days). Bio-data collected during angler interviews.	HVT
Tribal Harvest		
Klamath River (below Hwy 101)	Daily harvest estimates based on effort and catch-per-effort surveys. Bio-data collected during harvest and buying station interviews.	YT
Klamath River (Hwy 101 to Trinity mouth)	Daily harvest estimates based on effort and catch-per-effort surveys. Bio-data collected during harvest interviews.	YT
Trinity River (Hoopla Reservation)	Effort and catch-per-effort surveys during four randomly selected days per statistical week. Bio-data collected during net harvest interviews.	HVT
Fishery Dropoff Mortality		
Recreational Angling Dropoff Mortality: 2.04%	Not directly estimated. Assumed rate relative to fishery impacts = .02; relative to fishery harvest = $.02 / (1 - .02)$.	KRTAT
Tribal Net Dropoff Mortality: 8.7%	Not directly estimated. Assumed rate relative to fishery impacts = .08; relative to fishery harvest = $.08 / (1 - .08)$.	KRTAT

^a Bio-data generally includes: fork length, scale, sex, tags or marks, and CWT recovery from dead ad-clipped fish.

Table 2. Scale sampling locations and numbers of scale samples collected for the 2015 Klamath Basin fall Chinook age-composition assessment.

Sampling Location	Aged			Total Collected ^{c/}	Agency
	Unknown-age ^{a/}	Known-age ^{b/}	Total		
<u>Hatchery Spawners</u>					
Iron Gate Hatchery (IGH)	610	75	685	830	CDFG
Trinity River Hatchery (TRH)	517	138	655	668	HVT
<u>Natural Spawners</u>					
Salmon River Carcass Survey	232	0	232	298	CDFW
Scott River Carcass Survey	938	0	938	1,036	CDFW
Shasta River Carcass (includes weir)	209	0	209	225	CDFW
Bogus Creek	271	36	307	320	CDFW
Klamath River mainstem	517	0	517	578	USFWS
Upper Klamath River tributaries	95	0	95	110	USFS
Blue Creek	24	0	24	24	YT
Willow Creek Weir	396	29	425	521	CDFW, HVT
Lower Trinity River Carcass	13	0	13	13	HVT
Lower Trinity River tributaries	3	0	3	3	HVT, USFS
<u>Recreational Harvest</u>					
Lower Klamath River Creel	1,554	7	1,561	1,801	CDFW
Lower Trinity River Creel	4	1	5	5	HVT
<u>Tribal Harvest</u>					
Klamath River (below Hwy 101)	1,449	160	1,609	1,643	YT
Klamath River (Hwy 101 to Trinity R)	987	26	1,013	1,050	YT
Trinity River (Hoopa Reservation) ^{d/}	558	52	610	614	HVT
TOTAL	8,377	524	8,901	9,739	

a/ Scales from non-ad-clipped fish and ad-clipped fish without CWTs, mounted and read.

b/ Scales from all mounted and aged ad-clipped CWT fish; non-random CWT fish used for validation but not age composition.

c/ Scales collected from the area.

d/ Collection includes 20 samples taken in a directed effort for disease assessment.

Table 3. Age-composition methods used for the 2015 Klamath Basin fall Chinook run assessment.

Sampling Location	Age Composition Method
<u>Hatchery Spawners</u>	
Iron Gate Hatchery (IGH)	Jack/adult structure from scale-age analysis.
Trinity River Hatchery (TRH)	Jack/adult structure from scale-age analysis.
<u>Natural Spawners</u>	
Salmon River Basin	Jack/adult structure from scale-age analysis.
Scott River Basin	Jack/adult structure from scale-age analysis.
Shasta River Basin	Jack/adult structure from scale-age analysis.
Bogus Creek Basin	Jack/adult structure from scale-age analysis.
Klamath River mainstem (IGH to Shasta R)	Jack/adult structure from scale-age analysis.
Klamath River mainstem (Ash Cr to Indian Cr)	Surrogate: Klamath mainstem (IGH to Shasta R.) age structure.
Klamath tributaries (above Trinity River)	Jack/adult structure from scale-age analysis.
Blue Creek	Jacks estimated from dive counts, adult structure from scale-age analysis.
Trinity River (above WCW)	Jack/adult structure derived from subtracting age-specific TRH counts and recreational harvest estimate above WCW from the age-specific total run estimate above WCW derived from scale-age analysis.
Trinity River (mainstem below WCW)	Surrogate: Jack/adult structure from Trinity River (above WCW).
Trinity Tributaries (above Reservation to WCW)	Surrogate: Jack/adult structure from Trinity River (above WCW).
Hoopa Reservation Tributaries	Surrogate: Jack/adult structure from Trinity River (above WCW).
<u>Recreational Harvest</u>	
Klamath River (below Hwy 101 bridge)	Jack/adult structure from scale-age analysis.
Klamath River (Hwy 101 to Weitchpec)	Jack/adult structure from scale-age analysis.
Klamath River (Weitchpec to IGH)	Surrogate: IGH, Bogus Creek, Shasta River, and Klamath River mainstem (IGH to Shasta River) weighted age composition.
Trinity River Basin (above WCW)	Jack component based on estimated jack harvest rate and total jack run estimate. Adult surrogate: adult age composition from Trinity River Basin recreational harvest (below WCW).
Trinity River Basin (below WCW)	Jack component based upon angler interview. Adult age composition from scale-age analysis.
<u>Tribal Harvest</u>	
Klamath River (below Hwy 101)	Jack/adult structure from scale-age analysis.
Klamath River (Hwy 101 to Trinity mouth)	Jack/adult structure from scale-age analysis.
Trinity River (Hoopa Reservation)	Jack/adult structure from scale-age analysis.
<u>ICH Disease Testing</u>	
Klamath River (Yurok Reservation)	Surrogate: Tribal Harvest Klamath River (Hwy 101 to Trinity mouth).
Trinity River (Hoopa Reservation)	Jack/adult structure from scale-age analysis.

Table 4a. 2015 Klamath River Basin scale validation matrices.

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	61	0	0	0	Total 756
	3	2	256	28	0	
	4	0	4	395	3	
	5	0	0	2	5	
Total	63	260	425	8		

<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	0.97	0.00	0.00	0.00	Total 1.00
	3	0.03	0.98	0.07	0.00	
	4	0.00	0.02	0.93	0.38	
	5	0.00	0.00	0.00	0.63	
Total	1.00	1.00	1.00	1.00		

Table 4b. 2015 Trinity River Basin scale validation matrices.

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	12	0	0	0	Total 220
	3	1	101	1	0	
	4	0	3	94	0	
	5	0	0	0	8	
Total	13	104	95	8		

<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	0.92	0.00	0.00	0.00	Total 1.00
	3	0.08	0.97	0.01	0.00	
	4	0.00	0.03	0.99	0.00	
	5	0.00	0.00	0.00	1.00	
Total	1.00	1.00	1.00	1.00		

Table 5. Age composition of the 2015 Klamath Basin fall Chinook run. (02/04/2016)

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
Hatchery Spawners						
Iron Gate Hatchery (IGH)	220	3,657	4,073	226	7,956	8,176
Trinity River Hatchery (TRH)	224	1,832	1,258	39	3,129	3,353
Hatchery Spawner subtotal	444	5,489	5,331	265	11,085	11,529
Natural Spawners						
Salmon River Basin	92	846	981	150	1,978	2,070
Scott River Basin	21	1,053	829	210	2,092	2,113
Shasta River Basin	133	5,752	658	202	6,612	6,745
Bogus Creek Basin	45	1,314	974	20	2,308	2,353
Klamath River mainstem (IGH to Shasta R)	84	1040	1261	123	2,423	2,507
Klamath River mainstem (Shasta R to Indian Cr)	175	2131	2601	252	4,984	5,159
Klamath Tributaries (above Trinity River)	50	1,265	870	109	2,244	2,294
Blue Creek	149	141	491	0	632	781
Klamath Basin subtotal	749	13,542	8,665	1,066	23,273	24,022
Trinity River (mainstem above WCW)	2,509	1,425	2,602	433	4,459	6,968
Trinity River (mainstem below WCW)	155	88	161	27	276	431
Trinity Tributaries (above Reservation; below WCW)	26	15	27	4	46	72
Hoopla Reservation tributaries	37	21	39	6	66	103
Trinity Basin subtotal	2,727	1,549	2,829	470	4,847	7,574
Natural Spawners subtotal	3,476	15,091	11,494	1,535	28,120	31,596
Total Spawner Escapement	3,920	20,580	16,825	1,800	39,205	43,125
Recreational Harvest						
Klamath River (below Hwy 101 bridge)	292	1,396	1,118	400	2,914	3,206
Klamath River (Hwy 101 to Weitchpec)	1,224	1,492	602	164	2,258	3,482
Klamath River (Weitchpec to IGH)	64	1,562	925	76	2,563	2,627
Trinity River Basin (above WCW)	21	18	17	0	35	56
Trinity River Basin (below WCW)	3	14	14	0	28	31
Subtotals	1,604	4,482	2,676	640	7,798	9,402
Tribal Harvest						
Klamath River (below Hwy 101)	405	8,945	9,923	3,615	22,483	22,888
Klamath River (Hwy 101 to Trinity mouth)	44	1,033	1,929	552	3,514	3,558
Trinity River (Hoopla Reservation)	47	614	1,294	112	2,020	2,067
Subtotals	496	10,592	13,146	4,279	28,017	28,513
Total Harvest	2,100	15,074	15,822	4,919	35,815	37,915
Totals						
Harvest and Escapement	6021	35690	32716	6737	75,143	81164
Recreational Angling Dropoff Mortality 2.04%	33	91	55	13	159	192
Tribal Net Dropoff Mortality 8.7%	43	921	1,143	383	2,447	2,490
Klamath River ICH disease testing	1	30	56	16	103	104
Trinity River ICH disease testing	0	6	13	1	20	20
Total River Run	6,097	36,702	33,914	7,133	77,749	83,846

Table 6. Age proportion of the 2015 Klamath Basin fall Chinook run.

Escapement & Harvest	AGE			
	2	3	4	5
Hatchery Spawners				
Iron Gate Hatchery (IGH)	0.03	0.45	0.50	0.03
Trinity River Hatchery (TRH)	0.07	0.55	0.38	0.01
Hatchery Spawner subtotal	0.04	0.48	0.46	0.02
Natural Spawners				
Salmon River Basin	0.04	0.41	0.47	0.07
Scott River Basin	0.01	0.50	0.39	0.10
Shasta River Basin	0.02	0.85	0.10	0.03
Bogus Creek Basin	0.02	0.56	0.41	0.01
Klamath River mainstem (IGH to Shasta R)	0.03	0.41	0.50	0.05
Klamath River mainstem (Shasta R to Indian Cr)	0.03	0.41	0.50	0.05
Klamath tributaries (above Reservation)	0.02	0.55	0.38	0.05
Yurok Reservation tributaries	<u>0.19</u>	<u>0.18</u>	<u>0.63</u>	<u>0.00</u>
Klamath Basin subtotal	0.03	0.56	0.36	0.04
Trinity River (mainstem above WCW)	0.36	0.20	0.37	0.06
Trinity River (mainstem below WCW)	0.36	0.20	0.37	0.06
Trinity tributaries (above Reservation)	0.36	0.20	0.37	0.06
Hoopa Reservation tributaries	<u>0.36</u>	<u>0.20</u>	<u>0.37</u>	<u>0.06</u>
Trinity Basin subtotal	0.36	0.20	0.37	0.06
Natural Spawners subtotal	0.11	0.48	0.36	0.05
Total Spawner Escapement	0.09	0.48	0.39	0.04
Recreational Harvest				
Klamath River (below Hwy 101 bridge)	0.09	0.44	0.35	0.12
Klamath River (Hwy 101 to Weitchpec)	0.35	0.43	0.17	0.05
Klamath River (Weitchpec to IGH)	0.02	0.59	0.35	0.03
Trinity River Basin (above WCW)	0.38	0.32	0.31	0.00
Trinity River Basin (below WCW)	<u>0.10</u>	<u>0.44</u>	<u>0.46</u>	<u>0.00</u>
Subtotals	0.17	0.48	0.28	0.07
Tribal Harvest				
Klamath River (below Hwy 101)	0.02	0.39	0.43	0.16
Klamath River (Hwy 101 to Trinity mouth)	0.01	0.29	0.54	0.16
Trinity River (Hoopa Reservation)	<u>0.02</u>	<u>0.30</u>	<u>0.63</u>	<u>0.05</u>
Subtotals	0.02	0.37	0.46	0.15
Total Harvest	0.06	0.40	0.42	0.13
Totals				
Harvest and Escapement	0.07	0.44	0.40	0.08
Recreational Angling Dropoff Mortality 2.04%	0.17	0.47	0.29	0.07
Tribal Net Dropoff Mortality 8.7%	0.02	0.37	0.46	0.15
Total River Run	0.07	0.44	0.40	0.09

Appendix A: Estimation of escapement age-composition from a random sample containing known-age (CWT) and unknown read-age fish.

Denote the escapement at age as $\{N_a, a = 2, 3, 4, 5\}$, $N = \sum N_a$, and for the random sample of size $(n + m)$ fish, denote the following quantities:

- known-age fish: number at age $\{n_a, a = 2, 3, 4, 5\}$, $n = \sum n_a$, $p_a = n_a / n$.
- unknown read-age fish: number at age $\{m_a, a = 2, 3, 4, 5\}$, $m = \sum m_a$, $r_a = m_a / m$.
- bias-corrected unknown read-age proportions: $\{r_a^*, a = 2, 3, 4, 5\}$, $r_A^* = r_3^* + r_4^* + r_5^*$.
- age-2 proportion as estimated by size-frequency: s_2 .

1. Age 2–5 escapement by scales. Estimate N_a as the sample of known-age a fish plus the unknown age portion of the escapement times the estimated age a proportion (bias-corrected):

$$N_a = np_a + (N - n)r_a^*, \quad a = 2, 3, 4, 5.$$

2. Age-2 escapement by size-frequency; age 3–5 escapement by scales. Estimate N_2 as the total escapement times the size-frequency based estimated age-2 proportion. Estimate N_a for $a = 3, 4, 5$ as the sample known-age a fish plus the unknown age portion of the adult escapement times the age a proportion among adults (bias-corrected):

$$N_a = \begin{cases} Ns_2, & a = 2 \\ np_a + [N(1 - s_2) - n(1 - p_2)](r_a^* / r_A^*), & a = 3, 4, 5 \end{cases}$$

Appendix B. Klamath River – 2015 details.

Iron Gate Hatchery (IGH)

A systematic random bio-sample^a was obtained from every tenth Chinook salmon returning to IGH in 2015. A total of 685 scale samples were aged, of which 75 were from known-age, CWT fish. 36 non-random scales were collected from known-age CWT fish <56 cm to assist in validation. Scale-based age compositions were used to apportion all age classes.

Bogus Creek

Escapement was estimated by summing carcasses encountered below the video weir and videography counts (since 2002) above the weir. Bio-data were obtained at a 1:4 systematic random sampling rate. Additionally, biological data, but no scale samples, were obtained from every (i.e., non-random) ad-clipped fish encountered. A total of 307 scale samples were aged, of which 36 were from known-age CWT fish. Scale-based age compositions were used to apportion all age classes.

Shasta River

Escapement was estimated by videography (since 1998) while bio-data were collected from all recovered carcasses during surveys on public and private lands where access is granted. Bio-data were also obtained from systematically sampled (1:10) carcasses that washed back onto the counting weir. Additionally, all ad-clipped fish not falling within the systematic sample were bio-sampled. A total of 209 scales samples were aged, of which none were from known-age fish. Scale-based age compositions collected from the spawning ground surveys were used to apportion all age classes.

Scott River

Independent estimates from above and below the weir were combined to produce total escapement. Escapement above the weir was estimated using videography (since 2008). Escapement below the weir was calculated using the Cormack-Jolly-Seber estimator with data from twice weekly mark-recapture carcass surveys. Bio-data were obtained from all non-deteriorated carcasses recovered above and below the weir with a daily maximum scale sample collection of 25 per reach. A total of 938 scale samples were aged, of which none were from known-age fish. Scale-based age compositions were used to apportion all age classes.

Salmon River

Total escapement was estimated by combining the Cormack-Jolly-Seber estimate from the carcass survey within the main stem upstream of Nordheimer campground, and a redd count expansion $[(\text{redds} \times 2) / (1 - \text{jack proportion})]$ plus live fish observed during the last survey ('last day lives') from tributaries and the lowest three reaches of the main stem. Bio-data were obtained from all recovered carcasses. A total of 232 scale samples were aged, of which none were from known-age CWT fish. Scale-based age compositions were used to apportion all age classes.

Klamath River Tributaries

Adult escapement was estimated by expanding the total redd count (redds $\times 2$) and adding the number of live fish observed during the final survey in each tributary. A total of 95 scale samples were aged, of which none were from known-age CWT fish. Total escapement (including jacks) was estimated by expanding the adult estimate by the scale-based age-2 proportion. Scale-based age compositions were used to apportion all age classes.

Klamath River Mainstem

For the upper reach (IGH to Shasta River), weekly carcass counts without removal were used to calculate an area-under-the-curve escapement estimate. Observation efficiency was derived from recapture histories of marked carcasses. Carcass 'life' (residence time) was derived from recapture histories and a

^a Biological samples ('bio-data') of live fish or carcasses generally included: sex, fork length, tags or marks, a scale sample, and CWT codes from adipose fin-clipped fish.

5-point scale for appraisal of carcass condition. A total of 517 scales were aged, of which none were from known-age CWT fish. Scale-based age proportions were used to assign all age classes.

For the lower reach (Shasta River to Indian Creek), adult escapement was estimated by expanding the total redd count (redds X 2). Total escapement was estimated by expanding the adult estimate by the scale-based age-2 proportion from the upper reach. Scale-based age proportions from the upper reach were used as a surrogate to assign all age classes.

Lower Klamath River Creel

Total harvest was estimated by combining creel survey estimates from the two sub-areas (above the Highway 101 Bridge to Weitchpec and below the Highway 101 Bridge to the mouth). A total of 1,561 scale samples were aged, of which 7 were from known-age CWT fish. Scale-based age proportions for each sub-area were used to apportion all age classes in their respective sub-areas.

Upper Klamath River Recreational Fishery

A creel survey in this sub-area was not conducted in 2015. Creel survey data were available for the lower and upper river fisheries in 1999 through 2002. The ratio of average adult harvest in the entire Klamath main stem to the average harvest in the lower Klamath River Creel area from these years was applied to the 2015 lower Klamath River Creel harvest estimate to estimate total adult harvest in the Klamath River main stem. Adult harvest for the upper Klamath River recreational fishery was then estimated by subtracting the estimated lower Klamath River Creel estimate from the Klamath main stem total harvest. Finally, the combined adult and jack harvest was obtained by dividing the adult harvest by the proportion of adults from the weighted-average scale-age composition of the Upper Klamath River main stem (IGH to Shasta River), Bogus Creek, Shasta River, and Iron Gate Hatchery. These weighted scale-based age compositions were used to apportion all age classes in this fishery.

Yurok Tribal Estuary Fishery (Klamath mouth to Hwy 101)

Yurok harvest in this sub-area was estimated by daily fishing effort and catch-per-effort analyses. A total of 1,609 scales were aged, of which 160 were from known-age CWT fish. Scale-based age compositions were used to apportion all age classes. Bio-data collected during harvest and buying station interviews.

Yurok Tribal Fishery Above Hwy 101

Yurok harvest in this sub-area was estimated by daily fishing effort and catch-per-effort analyses. A total of 1,013 scale samples were aged, of which 26 came from known-age CWT fish. Scale-based age compositions were used to apportion all age classes. Bio-data collected during harvest interviews.

Blue Creek

The peak dive count of live fish was used as the estimate of escapement. A total of 24 scale samples were aged, of which none were from known-age CWT fish. Bio-data were obtained from netted live fish (n = 19) and recovered carcasses (n = 5). Age-2 composition was estimated through direct observation dive surveys and scale-based age compositions were used to apportion all adult age classes.

Appendix C. Trinity River – 2015 details.

Trinity River Hatchery (TRH)

Systematic random sampling (1:5) of scales included ad-clipped and non-ad-clipped fish (non-random ad-clipped fish scales were not collected). A total of 655 scales were aged, of which 138 scales came from known-age CWT fish. Scale samples were used to apportion the hatchery return into age classes.

Upper Trinity River Recreational Harvest

The method for estimating the upper Trinity recreational harvest depends on the application of reward and non-reward program tags at the Willow Creek Weir (WCW) and subsequent returns by anglers. In 2015, only reward tags were used to estimate harvest. CDFW estimated a 0.46% harvest rate on adult Chinook salmon based on the return of program reward tags (2 of 439) applied at WCW. The jack harvest rate of 0.76% was based on return of program reward tags (1 of 132 applied). There were no scales recovered from this fishery since no creel survey was implemented in 2015. The age-2 recreational harvest was determined by multiplying the jack harvest rate by the age-2 run size estimated from scales aged at WCW. The adult age proportions were determined by scales aged from the lower Trinity River creel survey.

Lower Trinity River Creel

A roving creel survey was implemented in Trinity River below the location of the WCW. A total of five scales were aged, of which one came from a known-age CWT fish. Jacks were determined from angler interviews and adult scale-age proportions were used to apportion the adult component.

Upper Trinity River Natural Escapement

Total run size was estimated using a non-stratified Petersen mark-recapture estimator. The methods used for estimating age structure within the Trinity River run above WCW were similar to those used in the population estimate, apportioned to three general recovery areas: TRH, Trinity upper basin natural spawning escapement, and recreational harvest. At WCW a systematic random sample (1:2) of all Chinook salmon examined yielded a collection of scales for program-marked fish, some of which were ad-clipped (TRH origin). Validation of WCW scales is accomplished with known-age fish recovered throughout all sectors of the Trinity River. A total of 425 scales were aged, of which 29 were from known-age CWT fish subsequently recovered at TRH.

The age structure for fish passing above WCW was estimated using scales collected at WCW minus those from known-age fish later recovered at TRH. Next, specific age structures were estimated for fish returning to TRH and the recreational fishery. These proportions were applied to the total hatchery escapement and estimated fishery harvest, respectively, providing totals by age within area. These totals were then deducted from the WCW run apportioned by age resulting in an age structure for the natural escapement in the upper Trinity River.

Lower Trinity River Natural Escapement:

The lower Trinity River natural escapement estimate included total spawners estimated in both main stem and tributary sub-areas (redds X 2)/(1 - proportion jacks). In the tributaries, a total of 3 scales were aged, none of which were from known-age CWT fish. In the main stem, a total of 13 scales were aged, none of which were from known-age fish. The upper Trinity River natural age structure was used to apportion all age classes in both the tributaries and the main stem below WCW.

Hoopa Valley Tribal Harvest

Hoopa Valley Tribal harvest is a composite of the gill net and hook-and-line fisheries prosecuted by Tribal members. A total of 610 scales were aged, of which 52 were from known-age CWT fish. Of this total collection, 20 scale samples were taken from fish captured by Hoopa Valley Tribal Fisheries staff for Ich disease incidence testing. The total harvest was apportioned by age using these scale-age proportions. Age structure for fish taken for the Ich investigation was also apportioned by age from this composite scale collection.

Appendix D. 2015 Klamath age analysis.

Unknown scales age composition as read					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	5	155	109	2	271
IGH	17	286	294	13	610
SALMON	10	101	110	11	232
SCOTT	9	485	384	60	938
SHASTA	4	177	24	4	209
MAINSTEM	17	228	255	17	517
UR TRIBS	2	54	36	3	95
LRC EST	69	353	288	62	772
LRC UP	268	346	144	24	782
YTFP EST	25	601	676	147	1,449
YTFP M&U	12	317	559	99	987
BLUE CRK	2	6	16	0	24
	440	3109	2895	442	6886

Unknown scales corrected age proportions (Kimura method)					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	0.0191	0.5522	0.4201	0.0086	1.0
IGH	0.0288	0.4419	0.4990	0.0303	1.0
SALMON	0.0445	0.4090	0.4742	0.0723	1.0
SCOTT	0.0099	0.4986	0.3921	0.0994	1.0
SHASTA	0.0198	0.8530	0.0974	0.0299	1.0
MAINSTEM	0.0340	0.4131	0.5042	0.0488	1.0
UR TRIBS	0.0217	0.5512	0.3794	0.0477	1.0
LRC EST	0.0923	0.4384	0.3433	0.1259	1.0
LRC UP	0.3539	0.4265	0.1718	0.0478	1.0
YTFP EST	0.0178	0.3918	0.4313	0.1591	1.0
YTFP M&U	0.0126	0.2896	0.5415	0.1564	1.0
BLUE CRK	0.0861	0.2036	0.7103	0.0000	1.0

Known CWT ages ^{/a}					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	2	82	36	1	121
IGH	31	756	796	27	1610
SALMON	0	0	0	0	0
SCOTT	0	0	0	0	0
SHASTA	0	0	1	0	1
MAINSTEM	0	18	14	2	34
UR TRIBS	0	0	0	0	0
LRC	9	41	47	3	100
YTFP EST	0	43	124	1	168
YTFP M&U	0	14	23	1	38
BLUE CRK	0	0	0	0	0
	42	954	1041	35	2072

Breakout within strata					
Bogus1	0	17	9	1	27
Bogus2	2	65	27	0	94
LRC - lo	1	14	35	3	53
LRC - mid	8	27	12	0	47
YTFP MID	0	1	8	0	9
YTFP UP	0	13	15	1	29

^{/a} Table includes known-age fish whose scales were not mounted / read.

Appendix E. 2015 Trinity age analysis.

WCW = Willow Ck. Weir

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable		11	0	0	1	0	12
2		97	4	0	0	0	101
3		131	0	17	0	0	148
4		150	0	0	7	0	157
5		18	0	0	0	1	19
30							
396		407	4	17	8	1	437

LOWTRINREC = Lower Trinity Recreational

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable		0	0	0	0	0	0
2		0	0	0	0	0	0
3		2	0	0	0	0	2
4		2	0	0	1	0	3
5		0	0	0	0	0	0
1							
4		4	0	0	1	0	5

HUPAHARV = Hoopa Tribal Net Harvest plus Tribal Hook-and-Line

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable		4	0	0	0	0	4
2		12	0	0	0	0	12
3		166	0	14	0	0	180
4		349	0	0	38	0	387
5		31	0	0	0	0	31
52							
558		562	0	14	38	0	614

TRH = Trinity River Hatchery

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable		11	0	2	0	0	13
2		33	8	0	0	0	41
3		282	1	70	1	0	354
4		198	0	3	48	0	249
5		4	0	0	0	7	11
140							
517		528	9	75	49	7	668

LOWTRINTRIBS = Lower Trinity Tribs - Includes samples taken by U

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable		0	0	0	0	0	0
2		0	0	0	0	0	0
3		0	0	0	0	0	0
4		0	0	0	0	0	0
5		3	0	0	0	0	3
0							
3		3	0	0	0	0	3

UPKLAMREC Upper Klamath Recreational

NO DATA

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable							
2							
3							
4							
5							
0							
0							

LOWTRINMAINSTEM = Lower Trinity Mainstem

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable		0	0	0	0	0	0
2		0	0	0	0	0	0
3		1	0	0	0	0	1
4		11	0	0	0	0	11
5		1	0	0	0	0	1
0							
13		13	0	0	0	0	13

UPKLAMREC Upper Klamath Recreational

NO DATA

		Cwt Age					
		no cwt age	2	3	4	5	Total
Scale unreadable							
2							
3							
4							
5							
0							
0							

POOLED data from all areas: Scale age-CWT age matrix.
(Includes only fish with both scale age and CWT known age.)

VALIDATION MATRIX

		2	3	4	5	
2		12	0	0	0	
3		1	101	1	0	
4		0	3	94	0	
5		0	0	0	8	0.98

4x4

(B) Scale-CWT age matrix of proportions of column sums.

		2	3	4	5
2		0.9231	0.0000	0.0000	0.0000
3		0.0769	0.9712	0.0105	0.0000
4		0.0000	0.0288	0.9895	0.0000
5		0.0000	0.0000	0.0000	1.0000

Corrected Scale age proportion vectors for scale-aged 2 - 5 fish.

# known scales	30	52	1	140	0	223
# unknown scales	396	558	4	517	3	1491

Correction Matrix for ages 2,3,4,5.
(Inverse of Scale-CWT age proportion matrix.)

		2	3	4	5
2		1.0138	-0.0040	0.0001	0.0000
3		-0.0144	1.0535	-0.0380	0.0000
4		0.0007	-0.0494	1.0378	0.0000
5		0.0000	0.0000	0.0000	1.0000

Age	Willow Creek Weir WCW	Hoopa Tribal NET HARV	Lower Trinity REC HARV	TRH HATCHERY	Lower Trinity Mainstem CARCASS	Upper Trinity REC HARV	Upper Trin NATURAL	Lower Trin Tribs
2	0.2654	0.0233	0.0000	0.0691	0.0000	-	0.3600	0.0000
3	0.3156	0.2977	0.5095	0.5522	0.0700	0.5095	0.2044	0.0000
4	0.3736	0.6234	0.4905	0.3710	0.8531	0.4905	0.3735	0.0000
5	0.0455	0.0556	0.0000	0.0077	0.0769	0.0000	0.0621	1.0000
	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

CWTS Age

	Willow Creek Weir WCW	Hoopa Tribal NET HARV	Lower Trinity REC HARV	TRH HATCHERY	Lower Trinity CARCASS	Upper Trinity REC HARV	Upper Trinity NATURAL	Hoopa Hook&Line
2	0	0	0	44	0	1	96	0
3	0	13	0	395	0	2	109	0
4	0	35	1	292	0	2	80	0
5	0	0	0	19	0	0	5	0
# unknown ads	0	48	1	750	0	5	291	0
# total ads	0	49	1	769	0	paper CWTS	0	0

WCW scales

Age	WCW no cwts	known age cwts scales	Total age all scales	WCW age proportions
2	105	0	105	0.2654
3	125	0	125	0.3156
4	148	0	148	0.3736
5	18	0	18	0.0455
	396	0	396	1.0000

Natural Escapement, Trinity basin above WCW: Apportioned to age structure.

	Total Run	Age	WCW proportions	TRH + Rec above WCW+Natural Escapement	Apportioned Natural Escapement minus TRH #s minus above WCW creel #s	Proportions
Rec above WCW	56	2	0.2654	2754	2509	0.3600
TRH	3353	3	0.3156	3275	1425	0.2044
Naturals	6968	4	0.3736	3877	2602	0.3735
Total	10377	5	0.0455	472	433	0.0621

10377

Appendix F. 2015 Klamath Basin fall Chinook age-composition calculation worksheet.

2/5/2016

Hatchery spawners	# Grilse	# Adults	Total Run	CALCULATED AGE					SCALE AGE PROPORTIONS (unknowns)					Unk. Age Scales Read	Length Freq or Redds	Live	
				2	3	4	5	Total	2	3	4	5	Total				
Iron Gate Hatchery (IGH)	220	7956	8176	220	3657	4073	226	8176	scales	0.02878	0.44186	0.49902	0.03034	1.0	610		
Trinity River Hatchery (TRH)	224	3129	3353	224	1832	1258	39	3353	IGH cwt	0.06915	0.55216	0.37096	0.00774	1.0	517		
<i>Hatchery spawner subtotal:</i>	<i>444</i>	<i>11085</i>	<i>11529</i>	<i>444</i>	<i>5489</i>	<i>5331</i>	<i>265</i>	<i>11529</i>	TRH cwt	0.00991	0.49858	0.39212	0.09939	1.0	938		
<i>prop. hatchery grilse</i>	<i>0.039</i>							<i>0.138</i>	0	0	0	0	0	0	0		
Natural Spawners									scales	0.36003	0.20444	0.37346	0.06208	1.0	396		
Trinity River mainstem above WCW	2509	4459	6968	2509	1425	2602	433	6968	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	13	138	
Trinity River mainstem below WCW	155	276	431	155	88	161	27	431	scales	0.04452	0.40898	0.47421	0.07229	1.0	232	297	28
Salmon River Basin (includes Woolley Cr)	92	1978	2070	92	846	981	150	2070	scales	0.00991	0.49858	0.39212	0.09939	1.0	938		
Scott River	21	2092	2113	21	1053	829	210	2113	Scott CWT	0	0	0	0	0	0		
Shasta River	133	6612	6745	133	5752	658	202	6745	scales	0.0198	0.8530	0.0974	0.0299	1.0	209		
Bogus Creek	45	2308	2353	45	1314	974	20	2353	Shasta CWT	0	0	1	0	1	0		
Mainstem Klamath (IGH to Shasta R)	84	2423	2507	84	1040	1261	123	2507	scales	0.01906	0.55217	0.42013	0.00864	1.0	271		
Mainstem Klamath (Ash Cr to Indian Cr)	175	4984	5159	175	2131	2601	252	5159	Bogus CWT	2	82	36	1	121	517		
<i>Main basin subtotal:</i>	<i>3,214</i>	<i>25,132</i>	<i>28,346</i>	<i>3,214</i>	<i>13,649</i>	<i>10,067</i>	<i>1,416</i>	<i>28,346</i>	scales	0.03396	0.41307	0.50416	0.04882	1.0	517		
									KR main CWT	0	18	14	2	34			
									Up K main	0.03396	0.41307	0.50416	0.04882	1.0	IGH to Shasta	2492	
Klamath Tributaries																	
Aiken Cr	0	2	2	0	1	1	0	2	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	1	0
Beaver Cr	7	300	307	7	169	116	15	307	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	150	0
Bluff Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Boise Cr	0	6	6	0	3	2	0	6	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	2	2
Camp Cr	7	313	320	7	177	122	15	320	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	145	24
Clear Cr	6	286	292	6	161	111	14	292	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	143	0
Dillon Cr	2	84	86	2	47	32	4	86	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	35	14
Elk Cr	5	246	251	5	139	95	12	251	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	123	0
Ft. Goff Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Grider Cr	4	177	181	4	100	69	9	181	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	87	3
Horse Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Independence Cr	0	4	4	0	2	2	0	4	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	2	0
Indian Cr	8	350	358	8	197	136	17	358	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	175	0
Irving Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Perch Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Red Cap Cr	4	190	194	4	107	74	9	194	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	95	0
Rock Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Slate Cr	0	14	14	0	8	5	1	14	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	6	2
Swillup Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Seiad Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Thompson Cr	5	224	229	5	126	87	11	229	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	112	0
Ti Cr	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Unkonom Cr	1	48	49	1	27	19	2	49	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	10	29
Other (China Cr)	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
Pine Cr (formerly in Hoopa trib)	0	0	0	0	0	0	0	0	scales	0.02174	0.55122	0.37937	0.04767	1.0	95	0	0
<i>Klamath trib subtotal:</i>	<i>50</i>	<i>2244</i>	<i>2294</i>	<i>50</i>	<i>1265</i>	<i>870</i>	<i>109</i>	<i>2294</i>								1086	74
Trinity Tributaries																	
Horse Linto Cr	19	34	53	19	11	20	3	53	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3	17	0
Cedar Cr (trib to Horse Linto)	7	12	19	7	4	7	1	19	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3	6	0
<i>Other (Willow & Madden creeks in Up TR nat estm)</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3		
<i>Trinity trib subtotal:</i>	<i>26</i>	<i>46</i>	<i>72</i>	<i>26</i>	<i>15</i>	<i>27</i>	<i>4</i>	<i>72</i>									
<i>Non-reservation trib subtotal:</i>	<i>76</i>	<i>2290</i>	<i>2366</i>	<i>76</i>	<i>1280</i>	<i>897</i>	<i>113</i>	<i>2366</i>									
Reservation Tributaries-Hoopa Valley																	
Campbell Cr	0	0	0	0	0	0	0	0	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3		
Hostler Cr	0	0	0	0	0	0	0	0	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3		
Mill Cr	23	40	63	23	13	23	4	63	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3	20	
<i>Pine Cr. (moved in 2007 to Klam trib)</i>																	
Soclish Cr	0	0	0	0	0	0	0	0	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3	0	
Supply Cr	10	18	28	10	6	11	2	28	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3	9	
Tish Tang Cr	5	8	13	5	3	5	1	13	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3	4	
Other (Hospital Cr.)	0	0	0	0	0	0	0	0	Up T main	0.36003	0.20444	0.37346	0.06208	1.0	3		
<i>HVT reservation trib subtotal:</i>	<i>37</i>	<i>66</i>	<i>103</i>	<i>37</i>	<i>21</i>	<i>39</i>	<i>6</i>	<i>103</i>									
Reservation Tributaries-Yurok																	
Blue Cr	149	632	781	149	141	491	0	781	Adult scales only	0.22280	0.77720	0.00000		1.0	22		
<i>Reservation tributaries subtotal:</i>	<i>186</i>	<i>698</i>	<i>884</i>	<i>186</i>	<i>162</i>	<i>530</i>	<i>6</i>	<i>884</i>									
<i>Natural spawner subtotal:</i>	<i>3476</i>	<i>28120</i>	<i>31596</i>	<i>3476</i>	<i>15091</i>	<i>11494</i>	<i>1535</i>	<i>31596</i>									
<i>Total spawners:</i>	<i>3920</i>	<i>39205</i>	<i>43125</i>	<i>3920</i>	<i>20580</i>	<i>16825</i>	<i>1800</i>	<i>43125</i>									
Angler Harvest																	
Klamath River (below Hwy 101)	292	2914	3206	292	1396	1118	400	3206	scales	0.09231	0.43845	0.34333	0.12591	1.0	772		
Klamath River (Hwy 101 to Weitchpec)	1224	2258	3482	1224	1492	602	164	3482	est-LRC CWT	1	14	35	3	53			
									scales	0.35395	0.42646	0.17178	0.04781	1.0	782		
									mid-LRC CWT	8	27	12	0	47			
									SURROGATE - Iron Gate+Bogus+Shasta+Klamath Mainstem Weighted Totals								
									IGH+Bog+Klam	482	11764	6965	571	19781			
										0.0244	0.5947	0.3521	0.0289	1.0			
									SURROGATE - Trinity Rec. Harvest below WCW - adults only								
									TR LRC	count	0.50954	0.49046	0.00000	1.0			
									TR-up CWT	1	2	2	0	5	Paper CWTs		

Appendix G. Age composition of the 2014 Klamath Basin fall Chinook run. (02/05/2016)

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
Hatchery Spawners						
Iron Gate Hatchery (IGH)	1,039	12,864	11,276	160	24,300	25,339
Trinity River Hatchery (TRH)	221	3,653	3,271	51	6,975	7,196
Hatchery Spawner subtotal	1,260	16,517	14,547	211	31,275	32,535
Natural Spawners						
Salmon River Basin	527	865	1,674	167	2,706	3,233
Scott River Basin	2,051	2,977	7,159	283	10,419	12,470
Shasta River Basin	3,945	4,064	10,265	83	14,412	18,357
Bogus Creek Basin	323	6,119	6,448	40	12,607	12,930
Klamath River mainstem (IGH to Shasta R)	1269	6491	8847	114	15,451	16,720
Klamath River mainstem (Shasta R to Indian Cr)	575	2932	4010	50	6,992	7,567
Klamath Tributaries (above Trinity River)	1,498	1,649	4,987	241	6,877	8,375
Blue Creek	332	105	1,108	32	1,245	1,577
Klamath Basin subtotal	10,520	25,202	44,498	1,010	70,709	81,229
Trinity River (mainstem above WCW)	6,546	10,155	11,901	994	23,050	29,596
Trinity River (mainstem below WCW)	74	115	135	11	262	336
Trinity Tributaries (above Reservation; below WCW)	47	123	361	31	515	562
Hoopa Reservation tributaries	52	135	398	34	568	620
Trinity Basin subtotal	6,719	10,528	12,795	1,070	24,395	31,114
Natural Spawners subtotal	17,239	35,730	57,293	2,081	95,104	112,343
Total Spawner Escapement	18,499	52,247	71,840	2,292	126,379	144,878
Recreational Harvest						
Klamath River (below Hwy 101 bridge)	268	249	775	69	1,093	1,361
Klamath River (Hwy 101 to Weitchpec)	2,847	365	1,438	71	1,875	4,722
Klamath River (Weitchpec to IGH)	75	728	759	9	1,496	1,571
Trinity River Basin (above WCW)	171	410	406	51	867	1,038
Trinity River Basin (below WCW)	3	26	26	3	55	58
Subtotals	3,364	1,778	3,404	204	5,386	8,750
Tribal Harvest						
Klamath River (below Hwy 101)	153	2,269	16,716	1,111	20,096	20,249
Klamath River (Hwy 101 to Trinity mouth)	130	593	2,783	56	3,432	3,562
Trinity River (Hoopa Reservation)	65	524	1,804	111	2,439	2,504
Subtotals	348	3,386	21,303	1,278	25,967	26,315
Total Harvest	3,712	5,164	24,707	1,482	31,353	35,065
Totals						
Harvest and Escapement	22,221	57,458	96,767	3,778	158,004	180,225
Recreational Angling Dropoff Mortality 2.04%	69	36	69	5	110	179
Tribal Net Dropoff Mortality 8.7%	31	298	1,871	113	2,282	2,313
Klamath River disease testing	10	47	220	4	272	282
Total River Run	22,321	57,792	98,707	3,896	160,396	182,717