Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2019 Run

Klamath River Technical Team 25 February 2020

Summary

The number of Klamath River fall Chinook Salmon returning to the Klamath River Basin (Basin) in 2019 was estimated to be:

_	Run Size				
Age	Number	Proportion			
2	9,991	0.21			
3	30,304	0.64			
4	6,867	0.15			
5	99	0.00			
Total	47,261	1.00			

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

		Adults	
Sector	Preseason Forecast	Postseason Estimate	Pre / Post
Run Size	97,900	37,300	2.62
Tribal Harvest	32,400	6,000	5.40
Recreational Harvest Drop-off Mortality _	7,600 3,000	5,400 500	1.41 6.00
Escapement	43,000	11,900	3.61
Hatchery Spawners	14,200	5,200	2.73
Natural Area Spawners	40,700	20,200	2.01
	54,900	25,400	2.16

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 2019. The estimates provided in this report are consistent with the Klamath Basin Megatable (CDFW 2020) and with the 2020 forecast of ocean stock abundance (KRTT 2020).

Age-specific escapement estimates for 2019 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 2020). 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 2020). 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 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 is aged independently by two trained readers. In cases of disagreement, a third read is 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.

In 2019, as in 2018, an opportunistic redd survey was performed on the mainstem Klamath River from Persido Bar to Big Bar, reaches where surveys generally do not occur. A total of 76 redds were identified in this survey in 2019. After substantial discussion, the KRTT decided to be

consistent with the decision made in 2018 to not include the results of this survey in the run size estimate. The KRTT noted that inclusion of this survey would not be consistent with the set of surveys that have contributed to the long term Klamath River fall Chinook dataset that has been used to inform the estimation of biological reference points and parameterize the Klamath Ocean Harvest Model. However, the KRTT appreciates the effort put forth to conduct this survey and is open to potentially including estimates from this area in the future.

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

Results

A total of 6,730 scales from 16 different sectors were aged for this analysis (Table 2). Of these, 537 were from known-age CWT fish. Known-age scales provide a direct check, or "validation", of accuracy of the scale-based age estimates (Table 4, Appendices D and E). Overall, the scale-based ages were generally accurate. Accuracy within the Trinity Basin was 100% for age-2 fish, 97% for age-3 fish, and 90% for age-4 fish. Accuracy within the Klamath River Basin was 100% for age-2 fish, 94% for age-3 fish, and 81% for age-4 fish. The age-5 component of the run was very small in 2019 and no known-age-5 fish were available for the scale validation matrices (Table 4). As a result, accuracy could not be assessed for the age-5 component of the 2019 run. 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.

The final estimates of the 2018 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
WSP	AmeriCorps Watershed Stewards Program
ΥT	Yurok Tribe
YTFP	Yurok Tribal Fisheries Program

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O-malian Lagation	Federation and Osmalian Methods	Aranay
Sampling Location	Estimation and Sampling Methods	Agency
Iron Gate Hatchery (IGH)	Direct count. All fish examined for fin-clips, tags, and marks. Bio-samples ^a collected from a systematic random sample of 10% of the fish. Additionally, all ad-clipped fish were bio-sampled.	CDFW, WSP
Trinity River Hatchery (TRH)	Direct count. All fish examined for fin-clips, tags, and marks. Bio-samples collected from a systematic random sample of 20% of the fish. Additional non-random ad-clipped fish were bio-sampled.	CDFW, HVT
<u>Natural Spawners</u> Salmon River Basin	Redd surveys of the upper and lower mainstem and tributaries, including Wooley Creek. Total redd count in Wooley Creek was adjusted to remove redds thought to be attributed to spring Chinook Salmon. Total run based on expanded redd count and last day live adults (2*total redd count+last day live adults)/(1-proportion of jacks). Bio-samples collected from all carcasses recovered.	CDFW, USFS, USFWS, KT, SRRC, SCS, WSP, MKWC, NCRC
Scott River Basin	Combination SONAR and video count above weir at river mile 18 and redd survey below the weir. Total run based on ARIS acoustic and video count through the weir and redd survey (Total run below the weir = (2*total redd count)/(1-proportion jacks)). Bio-samples collected from all carcasses recovered.	CDFW, QVIR, USFS, KT, NCRC, SRCD, WSP
Shasta River Basin	Video count above weir. Bio-samples collected from all carcasses upstream of video weir site, a 20% systematic random sample of carcasses stranded on weir, and all fish captured in a trap immediately upstream of video chute. No ad-clipped fish were recovered.	CDFW, WSP
Bogus Creek Basin	Video count above weir and twice weekly direct carcass count below weir. Bio-samples collected from all carcasses observed during surveys above and below weir, including all ad-clipped fish.	CDFW, WSP
Klamath River mainstem (IGH to Shasta R.)	Hierarchical latent variable model from weekly mark-recapture carcass surveys. Bio-samples collected from all fresh carcasses encountered.	USFWS, YT
Klamath River mainstem (Shasta R. to Wingate Bar)	Weekly redd surveys. Total run = (2*total redd count)/(1-proportion jacks). Jacks estimated from Klamath River mainstem (IGH to Shasta R.) scale-age data.	USFWS, KT
Klamath Tributaries above Trinity	Periodic redd surveys, Total run = (2*total redd count + last day live adults)/(1-proportion jacks). Jacks estimated from Klamath tributary scale-age data. Bio-samples collected from all carcasses recovered.	USFS, CDFW, KT, YT, MKWC, WSP
Blue Creek	Total estimated using the maximum count from dive surveys conducted between 23 October and 11 December.	YT
Trinity River (mainstem above WCW)	Mark-recapture (unstratified Petersen); marks applied at WCW and recovered at TRH. All fish bio-sampled and scales collected from every other Chinook in good condition. Natural area spawning escapement estimated by subtracting age-specific estimates of hatchery returns and recreational harvest above WCW from age-specific estimates of the total run upstream of WCW.	CDFW, HVT
Trinity River (mainstem below WCW)	Bi-weekly redd surveys. Total run = (2*total redd count)/(1-proportion jacks) using proportion of jacks in natural area spawning in Trinity River mainstem above WCW.	HVT, USFWS
Trinity Tributaries (above Reservation; below WCW)	Periodic redd surveys. Total run = (2*total redd count + last day live adults)/(1-proportion jacks) using proportion of jacks in natural area spawning in Trinity River mainstem above WCW.	CDFW, USFS, WSP
Hoopa Reservation Tributaries	Periodic redd surveys. Total run = (2*total redd count)/(1-proportion jacks) using proportion of jacks in natural area spawning in Trinity River mainstern above WCW.	HVT
Peerestional Harvest		
Klamath River (below Hwy 101 bridge)	Jack and adult estimates based on access point and roving creel survey during 3 randomly selected days per Julian week through JW 40, then 2 days per week after JW 40. Bio-samples collected during angler interviews.	CDFW
Klamath River (Hwy 101 to Weitchpec)	Jack and adult estimates based on access point and roving creel survey during 3 randomly selected days per Julian week through JW 40, then 2 days per week after JW 40. Bio-samples 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). 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 and non-reward tags applied at WCW.	CDFW, HVT
Trinity River Basin (below WCW)	Roving access creel survey during three randomly selected days per statistical week stratified by weekdays (M-Th) and weekend (F-Su) days (1 weekday and 2 weekend). Bio-samples collected during angler interviews.	HVT
Tribal Harvest		
Klamath River (below Hwy 101)	Daily harvest estimates based on effort and catch-per-effort surveys. Bio-samples collected during harvest surveys.	ΥT
Klamath River (Hwy 101 to Trinity mouth)	Daily harvest estimates based on effort and catch-per-effort surveys. Bio-samples collected during harvest surveys.	ΥT
Trinity River (net and hook-and-line)	Roving effort and catch-per-effort surveys during four randomly selected days per statistical week for the net fishery, and three randomly selected days for the hook-and-line fishery, plus census count of hook-and-line and net fishery downstream of harvest weir to Tish Tang Creek. Bio-samples collected during harvest surveys.	HVT
Trinity River (harvest weir)	Direct count of all harvested fish. Bio-samples collected from all harvested fish.	HVT
Fishery Dropoff Mortality Recreational Angling Dropoff Mortality	Not directly estimated. Assumed rate relative to fishery impacts = .02; relative to fishery harvest = .02/(102).	KRTAT
Tribal Net Dropoff Mortality 8.7%	Not directly estimated. Assumed rate relative to fishery impacts = .08; relative to fishery harvest = .08/(108).	KRTAT

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

		Aged			
		b/		Total	•
Sampling Location	Unknown-age	Known-age [~]	lotal	Collected	Agency
Hatchery Spawners					
Iron Gate Hatchery (IGH)	307	35	342	397	CDFW
Trinity River Hatchery (TRH)	227	114	341	345	HVT
Natural Spawners					
Salmon River	144	0	144	148	CDFW/USFS
Scott River Carcass Survey ^{d/}	325	0	325	329	CDFW
Shasta River Carcass Survey ^{e/}	233	0	233	273	CDFW
Bogus Creek	484	26	510	525	CDFW
Klamath River mainstem	325	15	340	348	USFWS
Upper Klamath River tributaries	27	0	27	29	USFS
Blue Creek Dive Survey	0	0	0	2	ΥT
Willow Creek Weir	732	21	753	766	HVT
Lower Trinity River Carcass Survey	0	0	0	0	HVT/USFWS
Lower Trinity River tributaries	0	0	0	2	HVT/USFS
Recreational Harvest					
Lower Klamath River Creel	1,146	71	1,217	1,213	CDFW
Lower Trinity River Creel	79	15	94	95	HVT
Tribal Harvest					
Klamath River (below Hwy 101)	731	60	791	826	ΥT
Klamath River (Hwy 101 to Trinity R)	213	8	221	232	ΥT
Trinity River (Hoopa Reservation)	1,004	172	1,176	1,200	HVT
TOTAL	5,977	537	6,514	6,730	

Table 2. Scale sampling locations and numbers of scales collected for the 2019 Klamath Basin fall Chinook age-composition assessment.

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/ Weir washback collected scales were read but not used.

e/ Spawning ground survey and weir washback collected scales were read but not used. Scales from the trap were used.

Table 3. Age-	composition metho	Is used for the	2019 Klamath	Basin fall Chi	nook run assessment.
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Sampling Location	Age Composition Method
Hatchery Spawners	
Iron Gate Hatchery (IGH)	Jack/adult structure from scale-age analysis.
Trinity River Hatchery (TRH)	Jack/adult structure from scale-age analysis.
Natural Spawners	
Salmon River Basin	Jack/adult structure from scale-age analysis.
Scott River Basin	Jack/adult structure from scale-age analysis.
Shasta River Basin	Jacks estimated from length-frequency analysis, adult proportions based on scale-age analysis from trap data.
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 (Shasta R. to Wingate Bar)Surrogate: Klamath mainstem (IGH to Shasta R.) age structure.
Klamath tributaries (above Trinity R.)	Jack/adult structure from scale-age analysis.
Blue Creek	Jacks estimated through direct observation. Unweighted average of scale- based adult age structure from Blue Ck. in 2007-2009, 2011-2015, and 2017.
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).
Recreational Harvest	
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: jack/adult weighted average age proportions from Shasta River, IGH, Bogus Creek, and mainstem Klamath (IGH to Shasta R.).
Trinity River Basin (above WCW)	Jack component based on estimated jack harvest rate and total jack run estimate. Adult age structure surrogate from Trinity River recreational harvest below WCW.
Trinity River Basin (below WCW)	Jack/adult structure from scale-age analysis.
Tribal Harvest	
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 (net and hook-and-line)	Jack/adult structure from scale-age analysis.
Trinity River (harvest weir)	Jack/adult structure from scale-age analysis.
Ich Disease Monitoring	
Klamath-Trinity Basin	No additional fish harvested for disease monitoring.

Numbe	<u>er</u>		Known Age	Э		
		2	3	4	5	
	2	10	12	0	0	
Read	3	0	273	15	0	
Age	4	0	5	64	0	
	5	0	1	0	0	Total
	Total	10	291	79	0	380
Percen	itage		Known Age	Э		
		2	3	4	5	
	2	1.00	0.04	0.00	0.00	
Read	3	0.00	0.94	0.19	0.00	
Age	4	0.00	0.02	0.81	0.00	
	5	0.00	0.00	0.00	1.00	
	Total	1.00	1.00	1.00	1.00	

Table 4a. 2019 Klamath River Basin scale validation matrices

Table 4b. 2019 Trinity River Basin scale validation matrices.

Numbe	er		Known Age			
		2	3	4	5	
	2	26	4	0	0	
Read	3	0	253	5	0	
Age	4	0	3	47	0	
	5	0	0	0	0	Total
	Total	26	260	52	0	338
Percer	<u>itage</u>		Known Age	·	_	
		2	3	4	5	
	2	1.00	0.02	0.00	0.00	
Read	3	0.00	0.97	0.10	0.00	
Age	4	0.00	0.01	0.90	0.00	
	<i>_</i>	0 00	0 00	0 00	1 00	
	ວ	0.00	0.00	0.00	1.00	

Table 5. Age composition of the 2019 Klamath Basin fall Chinook run.

2/11/2020

			AGE		Total	Total
Escapement & Harvest	2	3	4	5	Adults	Run
Hatabarry Snownara						
Iron Gate Hatchery (IGH)	249	2 825	072	0	3 797	4 046
Trinity River Hatchery (TRH)	245	2,020	100	0	1 381	4,040
Hatcherv Spawner subtotal	454	4.007	1.171	0	5.178	5.632
		.,	.,	·	•,•	0,002
Natural Spawners						
Salmon River Basin	686	790	167	0	957	1,643
Scott River Basin	409	1,596	85	0	1,681	2,090
Shasta River Basin	78	5,341	585	0	5,926	6,004
Bogus Creek Basin	148	872	118	0	990	1,138
Klamath River mainstem (IGH to Shasta R.)	169	879	262	8	1,149	1,318
Klamath River mainstem (Ash Cr. to Wingate Bar)	310	1,591	475	16	2,082	2,392
Klamath Tributaries (above Trinity River)	488	510	148	0	658	1,146
Blue Creek	26	<u>24</u>	<u>61</u>	<u>6</u>	<u>91</u>	<u>117</u>
Kiamath Basin subtotai	2,314	11,603	1,901	30	13,534	15,848
Trinity River (mainstem above WCW)	3,765	5,545	996	17	6,558	10,323
Trinity River (mainstem below WCW)	22	32	6	0	38	60
Trinity Tributaries (above Reservation; below WCW)	15	22	4	1	27	42
Hoopa Reservation tributaries	<u>51</u>	<u>74</u>	<u>14</u>	<u>0</u>	<u>88</u>	<u>139</u>
Trinity Basin subtotal	3,853	5,673	1,020	18	6,711	10,564
Natural Spawners subtotal	6,167	17,276	2,921	48	20,245	26,412
Total Spawner Escapement	6,621	21,283	4,092	48	25,423	32,044
Recreational Harvest						
<u>Recreational Harvest</u> Klamath River (below Hwy 101 bridge)	246	617	144	3	764	1,010
<u>Recreational Harvest</u> Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec)	246 2,239	617 2,261	144 318	3 0	764 2,579	1,010 4,818
<u>Recreational Harvest</u> Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH)	246 2,239 91	617 2,261 1,408	144 318 275	3 0 2	764 2,579 1,685	1,010 4,818 1,776
<u>Recreational Harvest</u> Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW)	246 2,239 91 54	617 2,261 1,408 178	144 318 275 2	3 0 2 0	764 2,579 1,685 180	1,010 4,818 1,776 234
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW)	246 2,239 91 54 78	617 2,261 1,408 178 155	144 318 275 2 2	3 0 2 0 0	764 2,579 1,685 180 157	1,010 4,818 1,776 234 235
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals	246 2,239 91 54 78 2,708	617 2,261 1,408 178 155 4,619	144 318 275 2 2 741	3 0 2 0 0 5	764 2,579 1,685 180 157 5,365	1,010 4,818 1,776 234 235 8,073
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals	246 2,239 91 54 78 2,708	617 2,261 1,408 178 155 4,619	144 318 275 2 2 741	3 0 2 0 0 5	764 2,579 1,685 180 157 5,365	1,010 4,818 1,776 234 235 8,073
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals	246 2,239 91 54 78 2,708	617 2,261 1,408 178 155 4,619 2 002	144 318 275 2 2 741 1 282	3 0 2 0 0 5 38	764 2,579 1,685 180 157 5,365	1,010 4,818 1,776 234 235 8,073 3,363
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (Hwy 101 to Trinity mouth)	246 2,239 91 54 78 2,708 41 51	617 2,261 1,408 178 155 4,619 2,002 331	144 318 275 2 2 741 1,282 254	3 0 2 0 0 5 38 2	764 2,579 1,685 180 157 5,365 3,322 587	1,010 4,818 1,776 234 235 8,073 3,363 638
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (Hwy 101 to Trinity mouth) Trinity River (net and book-and-line)	246 2,239 91 54 78 2,708 41 51 94	617 2,261 1,408 178 155 4,619 2,002 331 518	144 318 275 2 2 741 1,282 254 158	3 0 2 0 0 5 38 2 0	764 2,579 1,685 180 157 5,365 3,322 587 676	1,010 4,818 1,776 234 235 8,073 3,363 638 770
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (net and hook-and-line) Trinity River (harvest weir)	246 2,239 91 54 78 2,708 41 51 94 405	617 2,261 1,408 178 155 4,619 2,002 331 518 1 209	144 318 275 2 2 741 1,282 254 158 178	3 0 2 0 0 5 38 2 0 2	764 2,579 1,685 180 157 5,365 3,322 587 676 1 389	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1 794
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (Hwy 101 to Trinity mouth) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals	246 2,239 91 54 78 2,708 41 51 94 405 591	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060	144 318 275 2 2 741 1,282 254 158 178 1,872	3 0 2 0 0 5 5 38 2 0 2 42	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (Hwy 101 to Trinity mouth) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals	246 2,239 91 54 78 2,708 41 51 94 405 591 3,299	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613	3 0 2 0 0 5 5 38 2 0 2 2 42 47	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (Hwy 101 to Trinity mouth) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals	246 2,239 91 54 78 2,708 41 51 94 405 591 3,299	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613	3 0 2 0 0 5 5 38 2 0 2 42 42 47	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (below Hwy 101) Klamath River (hwy 101 to Trinity mouth) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals Total Harvest Harvest	246 2,239 91 54 78 2,708 41 51 94 405 591 3,299	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613	3 0 2 0 0 5 5 38 2 0 2 42 47	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (below Hwy 101) Klamath River (net and hook-and-line) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals Total Harvest Harvest and Escapement Pacenting Drapoff Martality 2 049(246 2,239 91 54 78 2,708 41 51 94 405 591 3,299 9,920	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679 29,962	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613 6,705	3 0 2 0 0 5 38 2 0 2 42 47 95 0	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339 36,762	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638 46,682
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (below Hwy 101) Klamath River (her and hook-and-line) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals Total Harvest Image: Total Harvest and Escapement Recreational Angling Dropoff Mortality 2.04% Tribal Net Dropoff Mortality 8 7%	246 2,239 91 54 78 2,708 41 51 94 405 591 3,299 9,920 55 16	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679 29,962 94 248	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613 6,705 15 147	3 0 2 0 5 5 38 2 0 2 42 47 95 0 4	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339 36,762 109 300	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638 46,682 164
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (Hwy 101 to Trinity mouth) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals Total Harvest Harvest and Escapement Recreational Angling Dropoff Mortality 2.04% Tribal Net Dropoff Mortality 8.7%	246 2,239 91 54 78 2,708 41 51 94 405 591 3,299 9,920 55 16	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679 29,962 94 248	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613 6,705 15 147	3 0 2 0 0 5 5 5 38 2 0 2 42 42 47 95 0 4	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339 36,762 109 399	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638 46,682 164 415
Recreational Harvest Klamath River (below Hwy 101 bridge) Klamath River (Hwy 101 to Weitchpec) Klamath River (Weitchpec to IGH) Trinity River Basin (above WCW) Trinity River Basin (below WCW) Subtotals Tribal Harvest Klamath River (below Hwy 101) Klamath River (below Hwy 101) Klamath River (her and hook-and-line) Trinity River (net and hook-and-line) Trinity River (harvest weir) Subtotals Total Harvest Marvest and Escapement Recreational Angling Dropoff Mortality 2.04% Tribal Net Dropoff Mortality 8.7% Klamath-Trinity Basin Ich disease testing	246 2,239 91 54 78 2,708 41 51 94 405 591 3,299 9,920 55 16 0	617 2,261 1,408 178 155 4,619 2,002 331 518 1,209 4,060 8,679 29,962 94 248 0	144 318 275 2 2 741 1,282 254 158 178 1,872 2,613 6,705 15 147 0	3 0 2 0 5 5 38 2 0 2 42 47 95 0 4 0 2	764 2,579 1,685 180 157 5,365 3,322 587 676 1,389 5,974 11,339 36,762 109 399 0	1,010 4,818 1,776 234 235 8,073 3,363 638 770 1,794 6,565 14,638 46,682 164 415 0

			AGE	
Escapement & Harvest	2	3	4	5
Hatchery Spawners	0.06	0.70	0.24	0.00
Iron Gale Halchery (IGH)	0.06	0.70	0.24	0.00
	0.13	0.75	0.13	0.00
natchery Spawner Subtotai	0.00	0.71	0.21	0.00
Natural Spawners				
Salmon River Basin	0.42	0.48	0.10	0.00
Scott River Basin	0.20	0.76	0.04	0.00
Shasta River Basin	0.01	0.89	0.10	0.00
Bogus Creek Basin	0.13	0.77	0.10	0.00
Klamath River mainstem (IGH to Shasta R.)	0.13	0.67	0.20	0.01
Klamath River mainstem (Ash Cr. to Wingate Bar)	0.13	0.67	0.20	0.01
Klamath tributaries (above Trinity River)	0.43	0.45	0.13	0.00
Yurok Reservation tributaries	<u>0.22</u>	<u>0.21</u>	<u>0.52</u>	<u>0.05</u>
Klamath Basin subtotal	0.15	0.73	0.12	0.00
Tripity Divor (mainstem above M(C)M)	0.26	0.54	0.10	0.00
Trinity River (mainstern bolow WCW)	0.30	0.54	0.10	0.00
Trinity tributaries (above Recordation)	0.37	0.53	0.10	0.00
Hoopa Reservation tributaries	0.30	0.52	0.10	0.02
Trinity Basin subtotal	0.37	0.53	0.10	0.00
	0.00	0.04	0.10	0.00
Natural Spawners subtotal	0.23	0.65	0.11	0.00
Total Spawner Escapement	0.21	0.66	0.13	0.00
De evention et la munet				
Klemeth River (helew Huw 101 bridge)	0.24	0.61	0.14	0.00
Klamath River (below Hwy 101 bridge)	0.24	0.01	0.14	0.00
Klamath River (Weitchnec to IGH)	0.40	0.47	0.07	0.00
Trinity River Basin (above WCW)	0.00	0.75	0.13	0.00
Trinity River Basin (below WCW)	0.33	0.66	0.01	0.00
Subtotals	0.34	0.57	0.09	0.00
Tribal Harvest				
Klamath River (below Hwy 101)	0.01	0.60	0.38	0.01
Klamath River (Hwy 101 to Trinity mouth)	0.08	0.52	0.40	0.00
Trinity River (net and hook-and-line)	0.12	0.67	0.21	0.00
Trinity River (harvest weir)	<u>0.23</u>	<u>0.67</u>	<u>0.10</u>	<u>0.00</u>
Subtotals	0.09	0.62	0.29	0.01
Total Harvest	0.23	0 59	0 18	0 00
	0.20	0.00	0.10	0.00
Totals				
Harvest and Escapement	0.21	0.64	0.14	0.00
Recreational Angling Dropoff Mortality 2.04%	0.34	0.57	0.09	0.00
Tribal Net Dropoff Mortality 8.7%	0.04	0.60	0.35	0.01
Total Diver Dun	0.04	0.64	0.45	0.00
	U.Z I	0.04	0.10	0.00

Table 6. Age proportion of the 2019 Klamath Basin fall Chinook run.

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):

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

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 – 2019 methodology details.

Iron Gate Hatchery (IGH)

Escapement to IGH is a direct count of the number of fall Chinook Salmon entering the hatchery over the duration of the spawning season. A systematic random bio-sample was obtained from every tenth Chinook Salmon returning to IGH. Heads were also collected for CWT analysis from all ad-clipped fish not included in the systematic sample. Scale-based age compositions were used to apportion all age classes.

<u>Bogus Creek</u>

Escapement was estimated by summing carcasses encountered during spawning ground surveys below the video weir and videography counts above the weir. Spawning ground surveys were also conducted upstream of the weir and bio-samples were collected from every carcass encountered. Scale-based age compositions were used to apportion all age classes.

<u>Shasta River</u>

Escapement was estimated by videography as the net count of fish moving upstream (total observed moving upstream minus total moving downstream). Bio-samples were collected from all carcasses encountered during surveys in the lower seven miles of the Shasta River, five reaches in the upper mainstem Shasta River, Big Springs Creek, Little Springs Creek, and Parks Creek. Bio-samples were also obtained from a 1:5 systematic sample of carcasses that washed back onto the counting weir. A trap was also installed on the upstream end of the video flume to bolster scale sample collection for a total of 68 hours of effort between September 24 and October 23. Every fish was bio-sampled from the video flume trap. No ad-clipped fish were recovered. Scale-based age compositions from samples collected from the trap were used to apportion adult age classes. The age-2 proportion was estimated based on a length-frequency cut-off for jacks (<50 cm FL) because the corrected scale-age proportion produced an unrealistic result of no fish at age-2.

<u>Scott River</u>

Independent estimates from above and below the weir were combined to estimate total escapement. Escapement above the weir was estimated using videography and SONAR as the net count of fish moving upstream. During periods when the video monitoring station was inoperable (6.25 hours in total), fish passage was interpolated by averaging the two days prior and two days following the outage. Adult escapement below the weir was estimated by expanding the total redd count (redds X 2). Total escapement below the weir was then estimated by applying the scale-based age-2 proportion to adult escapement. Bio-samples were obtained from all non-deteriorated carcasses recovered above and below the weir. Scale-based age compositions were used to apportion all age classes.

<u>Salmon River</u>

Adult escapement was estimated by expanding the total redd count (redds X 2) and then adding the number of live adult fish observed on the last survey. Total escapement was then estimated by expanding adult escapement by the scale-based age-2 proportion. Bio-samples

were obtained from recovered carcasses. Scale-based age compositions were used to apportion all age classes. Total redd count in Wooley Creek was adjusted to remove redds thought to be attributed to spring-run Chinook Salmon.

Klamath River Tributaries

Adult escapement was estimated by expanding the total redd count (redds X 2) and then adding the number of live adult fish observed on the last survey. Total escapement was then estimated by expanding adult escapement by the scale-based age-2 proportion. Scale-based age compositions were used to apportion all age classes.

Klamath River Mainstem (IGH to Shasta River)

A hierarchical latent variable model based on weekly carcass counts and mark-recapture data was used to estimate escapement. All surveyed fresh carcasses were bio-sampled. Scale-based age proportions were used to assign all age classes.

Klamath River Mainstem (Ash Creek to Wingate Bar)

Adult escapement was estimated by expanding total redd counts (redds X 2) from weekly surveys. Total escapement was then estimated by expanding adult escapement by the scale-based age-2 proportion from the upper reach. Age assignments were based on age proportions from scales collected in the IGH-Shasta reach.

Lower Klamath River Creel

Total harvest was estimated by combining creel estimates from the two sub-areas (above the Highway 101 Bridge to Weitchpec and below the Highway 101 Bridge to the mouth). In each sub-area, jack and adult estimates were based on access point and roving creel surveys during three randomly selected days per Julian week (JW) through JW 40, then during two days per week after JW 40. Bio-samples were collected from every fish possible during angler interviews. Scale-based age proportions from scale samples were used to apportion all age classes in each sub-area.

Upper Klamath River Recreational Fishery

A creel survey in this sub-area was not conducted in 2019. Creel data were available for the lower and upper river fisheries from 1999 to 2002. The ratio of average adult harvest in the entire Klamath mainstem to average harvest in the lower Klamath River creel area from these years was applied to the 2019 lower Klamath River creel harvest to estimate total adult harvest in the Klamath River mainstem. Adult harvest for the upper Klamath River recreational fishery was then estimated by subtracting the estimated lower Klamath River creel estimate from the Klamath mainstem 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 mainstem (IGH to Shasta River), Shasta River, Bogus Creek, and IGH. This weighted scale-based age composition was used to apportion all age classes in this fishery.

Yurok Tribal Estuary Fishery (Klamath mouth to Hwy 101)

Subsistence Yurok harvest in this sub-area was estimated by hourly net-fishing effort and catchper-effort (fish per net-hour) analyses, stratified by day and night. The commercial harvest period was not diurnally stratified. Scale-based age composition was used to apportion all age classes.

Yurok Tribal Fishery Above Hwy 101

Yurok harvest in this sub-area was estimated by daily net-fishing effort and catch-per-effort (fish per net-day) analyses. Scale-based age composition was used to apportion all age classes.

<u>Blue Creek</u>

Total escapement was estimated using the maximum single-day count from dive surveys conducted between October 23 and December 11. Bio-samples were collected from two recovered carcasses. Jacks were identified by visual determination during dive surveys and apportioned from the total count. Adult age proportions were estimated as the unweighted average of age-specific proportions in Blue Creek from years when scales were used to apportion adult age classes (2007-2009, 2011-2015, and 2017).

Appendix C. Trinity River – 2019 methodology details.

Trinity River Natural Escapement (above WCW)

Escapement was estimated using a 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 into three general recovery areas: TRH, Trinity basin natural spawning escapement above WCW, and recreational harvest. Scales were collected from every other Chinook Salmon (1:2 systematic sample) at WCW. Validation of WCW scales was accomplished with known-age fish recovered throughout all sectors of the Trinity River.

The age structure for fish passing above WCW was estimated using scales collected at WCW and TRH. Age-specific abundances for all fish passing above WCW were estimated from scales collected at WCW. Next, age-specific abundances of fish returning to TRH and fish harvested in the recreational fishery were estimated. Finally, age-specific abundances from TRH and the recreational fishery were subtracted from age-specific abundances of fish passing above WCW to yield age-specific abundances of fish returning to natural spawning areas above WCW.

Trinity River Hatchery (TRH)

Escapement to TRH is a direct count of the number of fall Chinook Salmon entering the hatchery over the duration of the spawning season. Scales were sampled systematically (1:5), ad-clipped and non-ad-clipped fish included. Additionally, a non-random sample of ad-clipped fish was drawn during the latter three weeks of spawning to further validate scale ages. Scale samples were used to apportion the hatchery return into age classes.

Upper Trinity River Recreational Harvest

The method for estimating the upper Trinity River recreational harvest depends on the application of program tags at WCW and subsequent returns by anglers. In 2019 CDFW estimated a 2.213% harvest rate on adult Chinook Salmon based on the return of program reward and non-reward tags (22 of 994) applied at WCW. The jack harvest rate of 1.344% was based on return of program reward tags (7 of 521). No scales were recovered from this fishery since no creel survey was implemented in 2019. Adult age proportions were determined using surrogate scales aged from recreational harvest below WCW.

Lower Trinity River Creel

A roving creel survey was implemented in the Trinity River downstream of WCW. Sampling was temporally stratified by weekend (Friday-Sunday) and weekday, with sampling occurring on 2 and 1 randomly selected days per stratum, respectively. Scale samples were used to apportion all age classes.

Trinity Mainstem Natural Escapement (below WCW)

Total escapement was estimated by expanding total redd counts (redds X 2) from surveys conducted biweekly as conditions allowed and applying the jack proportion from the upper Trinity River natural escapement. No scales were collected in this sector. The upper Trinity River natural escapement age structure was used as a surrogate to apportion all ages.

Trinity Tributaries (above Reservation; below WCW)

Total escapement was estimated by expanding total redd counts (redds X 2) and applying the jack proportion from the upper Trinity River natural escapement. Only one scale sample was collected in this sector, therefore age proportions from the upper Trinity River natural escapement sector were used to apportion all age classes.

Hoopa Reservation Tributaries

Total escapement was estimated by expanding total redd counts (redds X 2) and applying the jack proportion from the upper Trinity River natural escapement. Only one scale sample was collected in this sector, therefore age proportions from the upper Trinity River natural escapement sector were used to apportion all age classes.

Hoopa Valley Tribal Harvest (net and hook-and-line)

Hoopa Valley Tribal member gill net and hook-and-line harvest is monitored by estimating effort and catch from three (hook-and-line) or four (gill net) randomly selected days per week. Total harvest was estimated by expanding randomly selected days and effort to weekly totals. A census of the Tribal net and hook-and-line fisheries was also implemented in the area immediately downstream of the Hoopa selective harvest weir to Tish Tang Creek. Scale-age proportions were used to apportion all ages.

Hoopa Valley Tribal Harvest (harvest weir)

Total harvest was a direct count of all Chinook Salmon taken at the weir. Scale samples were attempted to be taken from every other harvested fish. Scale-age proportions were used to apportion all ages.

Appendix D. 2019 Klamath age analysis.

Unknown scales age composition as read										
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL					
BOGUS	68	13	0	144	225					
IGH	237	15	0	326	578					
SALMON	128	14	0	147	289					
SCOTT	215	56	3	325	599					
SHASTA	12	3	0	27	42					
MAINSTEM	214	46	2	363	625					
UR TRIBS	333	42	0	742	1,117					
LRC EST	447	217	9	699	1,372					
LRC UP	119	70	1	212	402					
YTFP EST	0	0	0	0	0					
YTFP M&U	128	14	0	147	289					
BLUE CRK	0	0	0	0	0					
	1,901	490	15	3,132	5,538					

Unknown scales corrected age proportions (Kimura method)

	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	0.1337	0.7651	0.1012	0.0000	1.0
IGH	0.0695	0.6834	0.2471	0.0000	1.0
SALMON	0.4177	0.4810	0.1013	0.0000	1.0
SCOTT	0.1955	0.7639	0.0406	0.0000	1.0
SHASTA	0.0000	0.9014	0.0986	0.0000	1.0
MAINSTEM	0.1295	0.6650	0.1986	0.0069	1.0
UR TRIBS	0.4260	0.4461	0.1278	0.0000	1.0
LRC EST	0.2480	0.6062	0.1427	0.0032	1.0
LRC UP	0.4697	0.4642	0.0661	0.0000	1.0
YTFP EST	0.0123	0.5970	0.3791	0.0116	1.0
YTFP M&U	0.0818	0.5207	0.3946	0.0029	1.0
BLUE CRK	0.2077	0.2068	0.5286	0.0569	1.0
Known CWT ages	a/				
-	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	1	29	6	0	36
IGH	20	573	158	0	751
SALMON	0	0	0	0	0
SCOTT	0	0	0	0	0
SHASTA	0	0	0	0	0
MAINSTEM	0	13	3	0	16
UR TRIBS	0	0	0	0	0
LRC	6	70	6	0	82
YTFP EST	0	36	33	0	69
YTFP M&U	0	6	7	0	13
BLUE CRK	0	0	0	0	0
	27	727	213	0	967
Breakout within strata					
Bogus1	1	19	5	0	25
Bogus2	0	10	1	0	11
LRC - lo	0	16	2	0	18
LRC - mid	6	54	4	0	64
YTFP MID	0	0	0	0	0
YTFP UP	0	6	7	0	13

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

Appendix E. 2019 Trinity age analysis.

WCW = Willo	ow Ck. Weir		0	Cwt Age			I	LOWTRINREC =	Lower Trini	y Recreation	al Cw	t Age			
		no cwt age	2	3	4	5	Total			no cwt age	2	3	4	5	Total
	Scale unreadable	249	0	0	0	0	13	Scale	e unreadable	28		0	0	0	1
Scale	3	412	4	15	1	0	428	Scale	3	50	0	11	0	0	61
Ages	4	70	0	0	1	0	71	Ages	4	- 1	0	1	1	0	3
21	5	1	0	0	0	0	1	15	5	(0	0	0	0	0
732	2	745	4	15	2	0	766	79		80) 2	12	1	0	95
	= Hoona Tribal Not I	Jarvoet plue Tribal F	look-and-Line (Cwt Age				TPH = Trinity Pi	iver Hatcherv		0	wt Ago			
HUFAHARV		no cwt age	2	3 3 SwirAge	4	5	Total		iver natchery	no cwt age	2	3	4	5	Total
	Scale unreadable	12	0	0	1	0	13	Scale	e unreadable		0	1	1	0	6
	2	50	3	1	0	0	54		2	33	3 7	2	0	0	42
Scale	3	242	0	41	1	0	284	Scale	3	166	0	86	0	0	252
Ages	4	68	0	0	14	0	82	Ages	4	28	0	2	17	0	47
61	5	372		12	16	0	433	116 227	5	231		0	18	0	347
500)	572	5	42	10	0	400	221		25	1 1	51	10	0	547
LOWTRINTR	RIBS = Lower Trinity	Tribs - Includes san	nples taken by U (Cwt Age				0			Cv	vt Age			
		no cwt age	2	3	4	5	Total	NO DATA		no cwt age	2	3	4	5	Total
	Scale unreadable	0	0	0	0	0	0	Scale	e unreadable						
Saala	2	1	0	0	0	0	1	Saala	2						
Scale Ages	3	0	0	0	0	0	1	Scale Ares	3						
0		0	0 0	Ő	Ő	Ő	0	0	5						
2	2	2	0	0	0	0	2	0) 0	0	0	0	0
HVTSELECT	'HARV = Hoopa Trib	al Weir Harvest		Cwt Age		5	T =4=1	0			Cv	vt Age		5	T-4-1
	Scale unreadable	no cwt age	2	3	4	5	10tai 8	NO DATA Scale	e unreadable	no cwt age	2	3	4	<u>></u>	Totai
	2	196	10	1	0	0	207	Coun	2						
Scale	3	501	0	100	3	0	604	Scale	3						
Ages	4	71	0	0	14	0	85	Ages	4						
128	5 5	1	0	0	0	0	1	0	5						
769	9	///	10	101	17	0	905	0		l	0	0	0	0	0
		POOLED data from	all areas: Scale a	ge-CWT age matrix				(D)						
		FOOLED uata nom													
		(Includes only fish v	with both scale ag	je and CWT known a	ge.)			S	Bcale-CWT ag	e matrix of p	roportions of colu	nn sums.			
	VA	(Includes only fish v LIDATION MATRIX	with both scale ag 2	je and CWT known ag 3	ge.) 4	5		S	Scale-CWT ag	je matrix of p	roportions of colu 2	mn sums. 3	4	5	
	VA	(Includes only fish v LIDATION MATRIX	with both scale ag 26	je and CWT known a 3 4	ge.) 4 0	5 0		S	B) Scale-CWT aç	je matrix of p	2 1.0000	mn sums. <u>3</u> 0.0154	4	5 0.0000	
	VA	(Includes only fish v LIDATION MATRIX 2 3	with both scale ag 26 0	ge and CWT known ag 3 4 253	ge.) 4 0 5	5 0 0		S	B) Scale-CWT aç	je matrix of p	2 1.0000 0.0000	mn sums. 0.0154 0.9731	4 0.0000 0.0962	5 0.0000 0.0000	
	VA 4x4	(Includes only fish v LIDATION MATRIX 2 3 4	with both scale ag 26 0 0 0	and CWT known ag 4 253 3 0	ge.) 4 0 5 47 0	5 0 0 1E-10	39 0	S	B) Scale-CWT aç	je matrix of p 2 3 4	2 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	mn sums. 0.0154 0.9731 0.0115 0.0000	4 0.0000 0.0962 0.9038 0.0000	5 0.0000 0.0000 0.0000 1.0000	
	VA 4x4	(Includes only fish v LIDATION MATRIX 2 3 4 5	with both scale ag 26 0 0 0	e and CWT known ay 3 4 253 3 0	ge.) 4 0 5 47 0	5 0 0 1E-10	0.96	ŝ	ອງ Scale-CWT ag	je matrix of p 2 3 2 5	2 1.0000 3 0.0000 4 0.0000 5 0.0000	mn sums. 0.0154 0.9731 0.0115 0.0000	4 0.0000 0.0962 0.9038 0.0000	5 0.0000 0.0000 0.0000 1.0000	
	VA 4x4	(Includes only fish LIDATION MATRIX 2 3 4 5	with both scale ag 26 0 0	e and CWT known av 3 4 253 3 0	ge.) 0 5 47 0	5 0 0 1E-10	0.96	ŝ	B) Scale-CWT ag	je matrix of p 2 3 4 5	2 1.0000 3 0.0000 4 0.0000 5 0.0000	nn sums. 0.0154 0.9731 0.0115 0.0000	4 0.0000 0.0962 0.9038 0.0000	5 0.0000 0.0000 0.0000 1.0000	
Corrected So	VA 4x4 cale age proportion	Vectors for scale-ag	with both scale ag 26 0 0 0 19 19 19 19 19 19 19 19 19 19	ie and CWT known a 3 4 253 3 0	ge.) 0 5 47 0	5 0 0 1E-10	0.96	Š	B) Scale-CWT aç	ye matrix of p 3 2 5	2 1.0000 3 0.0000 4 0.0000 5 0.0000	nn sums. 0.0154 0.9731 0.0115 0.0000	4 0.0000 0.0962 0.9038 0.0000	5 0.0000 0.0000 0.0000 1.0000	
Corrected St # known scales	VA 4x4 cale age proportion	(includes only fish v LIDATION MATRIX 2 3 4 5 vectors for scale-ag 61	vith both scale ag 26 0 0 0 15 15 	ie and CWT known a 3 4 253 3 0 116	ge.)	5 0 0 0 1E-10	0.96	0	128	je matrix of p 3 2 5	roportions of colu 2 1.0000 0.0000 0.0000 Correction Matrix	nn sums. 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5.	4 0.000 0.0962 0.9038 0.0000	5 0.0000 0.0000 0.0000 1.0000	
Corrected St # known scales f unknown scales	VA 4x4 cale age proportion 5 21 732 Willow Crook Woir	(includes only fish v LIDATION MATRIX 2 3 4 5 vectors for scale-ag 61 360 Henor Tibel	vith both scale ag 2 26 0 0 0 0 0 0 0 0 0 0 0 0 0	e and CWT known a 4 253 3 0 116 227 TPU	ge.) 4 0 5 47 0 1 2 2 47 0 1 2 4 4 5 47 0 1 4 4 4 5 47 0 5 47 1 1 1 1 1 1 1 1 1 1 1 1 1	5 0 0 1E-10	0.96	0 2	128 769	je matrix of p 2 2 2 5	Correction Matrix (Inverse of Scale	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion	4 0.0000 0.0962 0.9038 0.0000	5 0.0000 0.0000 1.0000	
Corrected St # known scales ≰ unknown scales	VA 4x4 cale age proportion 21 732 Willow Creek Weir WCW	Vectors for scale-ag 4 5 vectors for scale-ag 61 360 Hoopa Tribal NET HARV	ed 2 - 5 fish. 15 15 15 15 79 Lower Trinity REC HARV	e and CWT known a 4 253 3 0 116 227 TRH HATCHERY	ge.) 4 0 5 47 0 Uower Trinity Mainstem	5 0 0 1E-10 Upper Trinity REC HARV	0.96 Upper Trin NATURAI	0 2 Lower Trin Trins	128 769	je matrix of p	coportions of columnation 2 1.0000 3 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000	nn sums. 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158	4 0.0000 0.0962 0.9038 0.0000	5 0.0000 0.0000 1.0000 5 0.0000	
Corrected St # known scales # unknown scales Age 2	VA 4x4 cale age proportion 2 21 732 Willow Creek Weir WCW 0.3314	Vectors for scale-age 4 5 vectors for scale-age 61 360 Hoopa Tribal NET HARV 0.1286	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.3444	e and CWT known a 3 4 253 3 0 116 227 TRH HATCHERY 0.1340	ge.) 4 0 5 47 0 Lower Trinity Mainsterm 0.0000	5 0 0 1E-10 Upper Trinity REC HARV	0.96 Upper Trin NATURAL 0.3648	0 2 Lower Trin Tribs 0.5000	128 769	je matrix of p	coportions of columnation 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000	nn sums. 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095	5 0.0000 0.0000 1.0000 1.0000 5 0.0000 0.0000	
Corrected So # known scales £ unknown scales Age 2 3	VA 4x4 cale age proportion 3 732 Willow Creek Weir 9 WCW 0.3314 3 0.5687	vectors for scale-ag 61 360 451 500 451 500 455 455 455 455 455 455 455 455 455	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.3444 0.6499	ie and CWT known a 3 4 253 3 0 116 <u>227</u> TRH HATCHERY 0.1340 0.7390	ge.) 4 0 5 47 0 47 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913	0.96 Upper Trin NATURAL 0.3648 0.5372	0 2 Lower Trin Tribs 0.5000 0.0000	128 769	je matrix of p	coportions of columnation 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 2 1.0000 2 0.0000 0.0000 0.0000 0.0000	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000	
Corrected So # known scales t unknown scales Age 2 3 4	VA 4x4 cale age proportion 2 21 732 Willow Creek Weir WCW 0.3314 0.5687 0.0985	vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.6499 0.0057	e and CWT known a 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270	ge.) 4 0 5 47 0 47 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 1E-10	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964	0 2 Lower Trin Tribs 0.5000 0.5000	128 769	je matrix of p 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	coportions of columnia 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000	4 0.0000 0.9962 0.9038 0.0000 1 matrix.) 4 0.0017 -0.1095 1.1078 0.0000	5 0.0000 0.0000 1.0000 5 0.0000 0.0000 0.0000 0.0000 0.0000 1.0000	
Corrected So # known scales t unknown scales 2 3 4 5	VA 4x4 cale age proportion 2 21 732 Willow Creek Weir 2 0.3314 0.5687 0.0014	Vectors for scale-ag vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.3444 0.6499 0.0057 0.0000	e and CWT known a 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000	ge.) 4 0 5 47 0 Lower Trinity Mainstem 0.0000 0.0000 0.0000 0.0000	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0087	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964 0.0016	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000	128 128 769	je matrix of p	coportions of columnia 2 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale-2 2 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000	4 0.0000 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000	5 0.0000 0.0000 1.0000 5 0.0000 0.0000 0.0000 0.0000 1.0000	
Corrected St # known scales £ unknown scales Age 2 3 4 5	VA 4x4 cale age proportion 3 21 732 Willow Creek Weir 9 0.3314 0.5687 0.0985 0.0014 1.00000	Vectors for scale-ag (includes only fish v LIDATION MATRIX 2 3 4 5 vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2000 1.00000	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.3444 0.6499 0.0057 0.0000 1.00000	e and CWT known a 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000	ge.) 4 0 5 47 0 47 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0000 1.00000	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964 0.0016 1.00000	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000 0.0000 1.00000	128 128 769	je matrix of p	coportions of columnia 2 1.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000	5 0.0000 0.0000 1.0000 1.0000 0.0000 0.0000 0.0000 1.0000	
Corrected St # known scales # unknown scales Age 2 3 4 5	VA 4x4 cale age proportion 3 21 3 732 Willow Creek Weir 9 0.3314 0.5687 0.0985 0.0014 1.00000	Vectors for scale-ag (includes only fish v LIDATION MATRIX 2 3 4 5 vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.6210 0.2004 0.0000 1.00000	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.3444 0.6499 0.0057 0.0000 1.00000	e and CWT known ay 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000	ge.) 4 0 0 5 47 0 Unitset Lower Trinity Mainstem 0.0000 0.000	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0000 1.00000	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964 0.0016 1.00000	0 2 Lower Trin Tribs 0.5000 0.0000 0.0000 1.00000	128 769	je matrix of p	coportions of columnation 2 1.0000 3 0.0000 4 0.0000 5 0.0000 6 0.0000 7 0.0000 8 0.0000 9 0.0000 1.0000 0.0000 9 0.0000 9 0.0000 9 0.0000 9 0.0000 9 0.0000 9 0.0000	a 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0000 1.1078 0.0000	5 0.0000 0.0000 1.0000 1.0000 0.0000 0.0000 0.0000 1.0000	
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Corrected So # known scales 4 unknown scales Age 2 3 4 5 CWTS	VA 4x4 cale age proportion 3 21 3 732 Willow Creek Weir 0.03314 0.0587 0.0985 0.0014 1.00000	Includes only fish v LIDATION MATRIX 2 3 4 5 vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000	with both scale age 2 26 0 0 0 15 79 100000 100000 1.00000 1.00000 1.00000 1.00000	e and CWT known a 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 TRH	ge.) 4 0 5 47 0 5 47 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5 0 0 1E-10	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964 0.0016 1.00000 (Estimated) Upper Trinity	0 2 Lower Trin Tribs 0.5000 0.5000 0.0000 1.00000 Hoopa	128 769	je matrix of p	coportions of columnia 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scales) 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000 known age	4 0.0000 0.9962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000 Total age	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000	
Corrected So # known scales t unknown scales 2 3 3 4 5 CWTS Age	VA 4x4 cale age proportion 2 21 732 Willow Creek Weir 0.0885 0.0014 1.00000 Willow Creek Weir WCW	Vectors for scale-ag vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.0204 0.0000 1.00000 Hoopa Tribal NET HARV	with both scale age 2 26 0 0 0 15 79 Lower Trinity REC HARV 0.0557 0.0000 1.00000 1.00000	e and CWT known ay 4 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 TRH HATCHERY	ge.) 4 0 5 47 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV	0.96	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000 0.0000 1.00000 Hoopa Hook&Line	128 769	je matrix of p	coportions of columnia 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000 known age cwts scales	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000 0.0000	
Corrected St # known scales # unknown scales 2 3 4 5 CWTS Age 2 3 3 4 5	VA 4x4 cale age proportion 3 21 732 Willow Creek Weir 0.0385 0.0014 1.00000 Willow Creek Weir Willow Creek Weir 0.0985 0.0014 0.0985 0.0014 0.0985 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0014 0.0000 0.0000 0.0014 0.0000 0.0000 0.0014 0.0000 0.0014 0.0000 0.0000 0.0000 0.0014 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.000000 0.00000000	Vectors for scale-ag LIDATION MATRIX 2 3 4 5 Vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal NET HARV	with both scale age 2 26 0 0 0 0 0 15 79 Lower Trinity REC HARV 0.0057 0.0000 1.00000 1.00000 Lower Trinity REC HARV 2 2	e and CWT known ay a 4 263 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 TRH HATCHERY 4 224	ge.) 4 0 0 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 - 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 2	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964 0.0016 1.00000 (Estimated) Upper Trinity NATURAL 109 644	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.0000 1.00000 Hoopa Hook&Line 0	128 769	Je matrix of p	coportions of columner 2 1.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000 known age cwts scales 0 0	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.0000	
Corrected St # known scales # unknown scales 2 3 4 5 CWTS Age 2 3 4 5	VA 4x4 cale age proportion 2 21 732 Willow Creek Weir WCW 2 0.3314 1.00000 Willow Creek Weir WCW 2 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rectors for scale-ag scale and scale ag (includes scale ag (includes scale ag (includes and scale ag (includes ag (includes and scale ag (includes ag (inclu	ed 2 - 5 fish. 15 79 Lower Trinity REC HARV 0.3444 0.6499 0.0057 0.0000 1.00000 1.00000 1.00000 2 2 12 12 12 12 12 12 12 12	e and CWT known a 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 TRH HATCHERY 42 284 45	ge.) 4 0 5 47 0 0 2 2 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3	0.96 Upper Trin NATURAL 0.3648 0.5372 0.0964 1.00000 (Estimated) Upper Trinity NATURAL 109 641 102	0 2 Lower Trin Tribs 0.5000 0.0000 1.00000 1.00000 Hoopa Hook&Line 0 0	128 769	Age 2 3 4	coportions of colum 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72	a 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 -0.0158 1.0290 -0.0131 0.0000 known age cwts scales 0 0 0	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.3314 0.3314 0.3314 0.3314	
Corrected St # known scales 4 unknown scales 3 4 5 CWTS Age 2 3 4 5 2 3 4 5	VA 4x4 cale age proportion 2 21 Willow Creek Weir WCW 2 0.3314 0.5687 0.0985 0.0014 1.00000 Willow Creek Weir WCW 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Vectors for scale-ag 3 4 5 vectors for scale-ag 61 360 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 1.00000 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 1.00000	vith both scale ag 26 0 0 0 0 0 0 0 0 0 0 0 0 0	je and CWT known aj 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 1.00000	ge.) 4 0 5 47 0 Uwer Trinity Mainstem 0.00000 0.00000 0.000000	5 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0	0.96	0 2 Lower Trin Tribs 0.5000 0.0000 1.00000 1.00000 Hoopa Hook&Line 0 0 0 0	128 769	Age Age 3 4 5 5	coportions of colum 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0151 1.0290 -0.0131 0.0000 known age cwts scales 0 0 0 0 0	4 0.0000 0.9038 0.0000 1 matrix.) 4 0.0017 -0.1095 -0.1095 -0.1095 -0.1095 -0.1095 -0.1095 -0.1095 -0.1095 -0.1095 -0.1095 -0.0000 -0.	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 1.0000 1.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	
Corrected So # known scales 4 unknown scales 2 3 4 5 CWTS Age 2 3 4 5 2 3 4 5	VA 4x4 cale age proportion 2 21 3 732 Willow Creek Weir 0.0314 0.5687 0.0855 0.0014 1.00000 Willow Creek Weir WCW 0 0 0 0 0 0 0 0 0 0 0 0 0	Vectors for scale-ag 61 36 61 36 61 360 10004 10004 1100 10004 1100 10004 1100 10000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000	with both scale age 26 0	e and CWT known as 4 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 TRH HATCHERY 284 45 0 371	ge.) 4 0 5 47 0 0 Lower Trinity Mainstem 0.00000 0.00000 0.000000	5 0 0 0 1E-10 Upper Trinity REC HARV - 0.0913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 0 26	0.96	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 1.00000 1.00000 Hook&Line 0 0 0 0 0 0 0 0 0 0	128 769	Age Age 3 4 5	coportions of columnation 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1 732	sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131	4 0.0000 0.0962 0.9038 0.0000 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72 1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 1.0000 1.0000 1.0000 0.3314 0.3314 0.5687 0.9885 0.0014 1.0000	
Corrected Sr # known scales # unknown scales 2 3 4 5 CWTS Age 2 3 4 5 CWTS Age 2 3 4 5 *	VA 4x4 cale age proportion 2 21 732 Willow Creek Weir 0.0385 0.0014 1.00000 Willow Creek Weir WCW 0 0 0 0 0 0 0 0 0 0 0 0 0	Vectors for scale-ag 61 360 4 5 360 Vectors for scale-ag 61 360 360 Hoopa Tribal 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal NET HARV 32 42 16 0 0 61 5 5	with both scale age 26 0.0000 1.00000 Lower Trinity REC HARV 2 12 1 0 15 2	e and CWT known a 4 263 3 4 263 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 TRH HATCHERY 42 284 45 0 371 6	ge.) 4 0 0 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 2 21 3 0 0 26 0	0.96	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000 0.0000 1.00000 Hoopa Hook&Line 0 0 0 0 0	128 769	Age Age 2 3 4 5	coportions of columnation 1.0000 1.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1 732	known age cwts scales 0 0.0154 0.9731 0.0115 0.0000	4 0.0000 0.0962 0.9038 0.0000 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72 1.732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.314 0.5687 0.3314 0.5687 0.0985 0.0014 1.0000	
Corrected St # known scales # unknown scales # unknown scales 2 3 4 5 CWTS Age 2 3 4 5 # unknown ads # total ads Naturel Ecco	VA 4x4 cale age proportion 3 21 732 Willow Creek Weir 0.0385 0.0014 1.00000 Willow Creek Weir WCW 0.0385 0.0014 1.00000 0 0 0 0 0 0 0 0 0 0 0	Focueb data solution (Includes conly fish v LIDATION MATRIX 2 3 4 5 vectors for scale-age 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal NET HARV 3 42 16 0 61 5 66 61 5 66	with both scale age 2 26 0 0 0 0 0 15 79 Lower Trinity REC HARV 0.0057 0.0000 1.00000 1.00000 Lower Trinity REC HARV 2 12 10 15 2 17 0 15 2 17	e and CWT known ag a 4 263 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 TRH HATCHERY 42 284 45 0 371 6 377 turture	ge.) 4 0 0 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0007 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 26 0 paper C RH + Bec back	0.96	0 2 Lower Trin Tribs 0.5000 0.0000 1.00000 1.00000 Hook&Line Hook&Line 0 0 0 0 0 0 0 0 0	128 769	Age 2 3 4 5	coportions of columner 2 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 2 1.0000 3 0.0000 4 0.0000 5 0.0000 4 0.0000 5 0.0000 4 0.0000 4 72 1 732	known age cwts scales 0 0.0154 0.9731 0.0115 0.0000	4 0.0000 0.0962 0.9038 0.0000 1.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72 1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.0000 1.0000 1.0000 1.0000	
Corrected St # known scales # unknown scales 2 3 4 5 CWTS Age 2 3 4 5 CWTS Age 2 3 4 5 4 4 5 4 5 5 4 4 5 5 4 5 5 2 3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	4x4 cale age proportion 3 21 732 Willow Creek Weir 0.0314 1.00000 Willow Creek Weir 0.014 1.00000 Willow Creek Weir 0.0314 0.0000 0.014 0.0010 0.0010 0.0011 0.0012 Willow Creek Weir 0.0014 0.0000 0.0014	Vectors for scale-ag 3 4 5 vectors for scale-ag 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal NET HARV 3 42 16 0 0 61 5 66 0 61	autor boots could age 2 26 0 1.00000 <	e and CWT known ag a ad CWT known ag 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 1.00000 TRH HATCHERY 42 284 45 0 371 6 377 tructure.	ge.) 4 0 0 5 47 0 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV 0.9913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 0 26 0 paper C RH + Rec above WCW+Natural	0.96	0 2 Lower Trin Tribs 0.5000 0.0000 0.0000 1.00000 1.00000 1.00000 0 0 0	128 769 769 769	Age 2 3 4 5	coportions of columner 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1 732	known age cwts scales 0	4 0.0000 0.0962 0.9038 0.0000 1 matrix.) 4 0.0017 -0.1095 1.1078 0.0000 1.1078 0.0000 1.1078 2.43 4.16 72 243 4.16 72 2.1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.3314 0.5687 0.3314 0.5687 0.0985 0.0014 1.0000	
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Corrected So # known scales # unknown scales 2 2 3 4 5 CWTS Age 2 3 4 5 * * * * * * * * * * * * * * * * * *	VA 4x4 cale age proportion 2 732 Willow Creek Weir 0.03314 0.5687 0.0014 1.00000 Willow Creek Weir WCW 0 0 0 0	Vectors for scale-ag 3 4 5 vectors for scale-ag 61 360 4 9 3 4 5 vectors for scale-ag 61 360 1002 NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal X2 16 0 0 61 56 66 in above WCW: App Total Run 234	awith both scale age 26 0 1.00000 1.00000 1.00000 Lower Trinity REC HARV 2 1 0 15 2 17 ortioned to age si	e and CWT known as a 4 3 4 253 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 1.00000 1.00000 TRH HATCHERY 42 284 45 0 371 6 377 tructure. Age 2	ge.) 4 0 0 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 0 26 0 0 0 0 0 0 0 0 0 0 0 0 0	0.96	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000 1.00000 1.00000 1.00000 0 0 0 0 0 0	128 769 verment V creel #s	Age Age Age S Age S Age	coportions of columnation 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1 732	xn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131 0.0000 -0.0131	4 0.0000 0.9962 0.9038 0.0000 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72 1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 1.0000 1.0000 1.0000 0.3314 0.5867 0.9855 0.0014 1.0000	
Corrected St # known scales # unknown scales 2 3 4 5 CWTS Age 2 3 4 5 * Unknown ads # total ads Natural Esca	VA 4x4 cale age proportion 2 1 732 Willow Creek Weir 0.0385 0.0014 1.00000 Willow Creek Weir WCW 0 0 0 0 0 0 0 0 0 0 0 0 0	Vectors for scale-ag 3 4 5 vectors for scale-ag 61 360 4 Hoopa Tribal 8 NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal 82 NET HARV 3 42 16 0 61 56 66 in above WCW: App Total Run 234 1886 1886	with both scale age 2 26 0 0 0 15 79 Lower Trinity REC HARV 0.0057 0.0000 1.00000 1.00000 Lower Trinity REC HARV 2 12 1 0 1.00000 1.00000	je and CWT known aj 3 4 263 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 TRH HATCHERY 42 284 45 0 371 6 377 tructure. Age 2 3	ge.) 4 0 0 5 47 0 0 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV - 0.9913 0.087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 0 paper C RH + Rec above WCW+Natural Escapement 4024 6005	0.96	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000 0.0000 1.00000 1.00000 1.00000 0 0 0	128 769 9ement V creel #s	Age Age 2 3 4 5	coportions of columnia 1.0000 1.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1 732	known age cwts scales 0	4 0.0000 0.0962 0.9038 0.0000 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72 1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.3314 0.5687 0.0385 0.0014 1.0000	
Corrected St # known scales & unknown scales 2 3 4 5 CWTS Age 2 3 4 5 # unknown ads # total ads Natural Esca	VA 4x4 cale age proportion 3 732 Willow Creek Weir 0.0314 0.5687 0.0014 1.00000 Willow Creek Weir WCW 0.014 1.00000 Automatic Creek Weir WCW 0	Vectors for scale-ag 3 4 5 vectors for scale-ag 61 360 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 1.00000 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 1.00000 Hoopa Tribal NET HARV 3 42 16 0 0.61 5 66 61 5 66 0 61 5 66 10 51 61 52 66 10323 10323 10425	with both scale age 2 26 0 0 0 0 0 15 79 Lower Trinity REC HARV 0.0057 0.0000 1.00000 1.00000 Lower Trinity REC HARV 2 12 10 15 2 17 ortioned to age si	je and CWT known aj 3 4 263 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.00000 1.00000 1.00000 TRH HATCHERY 42 28 45 0 371 6 377 tructure. Age 2 3 4 5	ge.) 4 0 0 1 5 47 0 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV 0.9913 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 0 paper C RH + Rec above WCW+Natural Escapement 4024 6905 1197 17	0.96	0 2 Lower Trin Tribs 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.0000 1.00000 0 0 0 0 0 0 0 0 0 0 0	128 769 v creel #s	Age 2 3 4 5	coportions of columner 1.0000 0.0000 0.0000 0.0000 0.0000 Correction Matrix (Inverse of Scale- 2 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 WCW scales WCW no cwts 243 416 72 1 732	known age cwts scales 0	4 0.0000 0.0962 0.9038 0.0000 n matrix.) 4 0.0017 -0.1095 1.1078 0.0000 Total age all scales 243 416 72 1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 1.0000 1.0000 0.0000 1.0000 1.0000	
Corrected St # known scales & unknown scales 2 3 4 5 CWTS Age 2 3 4 5 * * * * * * * * * * * * * * * * * *	4x4 cale age proportion 3 21 732 Willow Creek Weir 0.0985 0.0014 1.00000 Willow Creek Weir 0.0985 0.0985 0.014 1.00000 Willow Creek Weir 0 <	For Libb data solution (Includes only fish v LIDATION MATRIX 2 3 4 5 vectors for scale-age 61 360 Hoopa Tribal NET HARV 0.1286 0.6710 0.2004 0.0000 1.00000 Hoopa Tribal NET HARV 3 42 16 0 61 5 66 0 61 5 66 10 216 0 61 56 in above WCW: App Total Run 234 1586 10323 12143	with both scale age 2 26 0 0 0 15 79 Lower Trinity REC HARV 0.3444 0.6499 0.0057 0.0000 1.00000 1.00000 Lower Trinity 2 12 1 0 15 2 1 0 15 17 0	e and CWT known a 3 4 263 3 0 116 227 TRH HATCHERY 0.1340 0.7390 0.1270 0.0000 1.000000 1.000000 1.000000 1.000000000 1.0000000000	ge.) 4 0 5 47 0 5 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 0 0 0 1E-10 Upper Trinity REC HARV 0.9913 0.0087 0.0000 1.00000 (Estimated) Upper Trinity REC HARV 2 21 3 0 26 0 paper C RH + Rec above 0 paper C RH + Rec above 0 0 0 0 0 0 10 10 10 10 10	0.96	0 2 Lower Trin Tribs 0.5000 0.0000 0.5000 0.0000 1.00000 1.00000 0 0 0 0 0 0 0	128 769 769 vement V creel #s	Age 2 3 4 5	vertical and the second seco	nn sums. 3 0.0154 0.9731 0.0115 0.0000 for ages 2,3,4,5. CWT age proportion 3 -0.0158 1.0290 -0.0131 0.0000 known age cwts scales 0 0 0 0 0 0 0	4 0.0000 0.9038 0.0000 1 matrix.) 4 0.0017 -0.1095 0.0000 Total age all scales 243 416 72 1 732	5 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 1.0000 1.0000 1.0000 1.0000 1.0000	

Appendix F. 2019 Klamath Basin fall Chinook age-composition calculation worksheet.

Appendix F. 2019 Klar	math	Basir	n fall (Chinoc	ok age	e-com	iposi	tion o	alculation worksheet.	
Hatchery spawners	# Grilse	# Adults	Total Run	2	CALCULA [®] 3	TED AGE 4	5	Total	SCALE AGE PROPORTIONS (unknowns) Unk. Age Redd Surveys 2 3 4 5 Total Scales Read Redds Live Video Ca	arcass
Iron Gate Hatchery (IGH)	249	3797	4046	249	2825	972	0	4046	scales 0.06954 0.68338 0.24708 0.00000 1.0 578 IGH cwts 20 573 158 0 751	
Trinity River Hatchery (TRH) Hatchery spawner subtotal:	205 454	1381 5178	1586 5632	205 454	1182 4007	199 1171	0	1586 5632	scales 0.13401 0.73896 0.12704 0.00000 1.0 227 TRH cwts 42 284 45 0 371	
Natural Spawners	prop. hate	chery grilse	0.081			proportion	hatchery	0	LAST DAY LIVES ARE ADULTS ON	ίLΥ
Trinity River mainstem above WCW	3765 22	6558 38	10323 60	3765 22	5545 32	996 6	17 0	10323 60	scales 0.36476 0.53719 0.09644 0.00161 1.0 732	
Salmon River Basin (includes Wooley Cr)	686	957 1681	1643	686	790	167	0	1643	scales 0.41766 0.48100 0.10133 0.00000 1.0 289 468 21	264
	409	5000	2090	409	1090	505	0	2090	Scales 0.19549 0.76560 0.04004 0.00000 1.0 599 210 1555	200
	/8	5926	6004	78	5341	585	0	6004	Adult scales only 0.90135 0.09865 0.00000 1.0 42 6004 Shasta CWT 0 <t< td=""><td></td></t<>	
Bogus Creek	148	990	1138	148	872	118	0	1138	scales 0.13374 0.76507 0.10119 0.00000 1.0 225 971 Bogus CWT 1 29 6 0 36	167
Mainstem Klamath (IGH to Shasta R)	169	1149	1318	169	879	262	8	1318	scales 0.12950 0.66496 0.19859 0.00695 1.0 625 KR main CWT 0 13 3 0 16	
Mainstem Klamath (Ash Cr to Wingate Bar) Mainstem Klamath (Persido Bar to Big Bar)	310 113	2082 152	2392 265	310 113	1591 118	475 34	16 0	2392 265	Up K main 0.12950 0.66496 0.19859 0.00695 1.0 IGH to Shasta 1041 Klam tribs 0.42605 0.44614 0.12781 0.00000 1.0 Klam tribs 76	
Main basin subtotals:	5,587	19,381	24,968	5,587	16,646	2,694	41	24,968		
Klamath Tributaries	0		0	0	0	0	0	0		
Beaver Cr	48	65	113	48	50	15	0	113	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0 0 0 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 32 1	
Bluff Cr Boise Cr	13 0	17 0	30 0	13 0	13 0	4 0	0 0	30 0	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 1 15 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0	
Camp Cr Clear Cr	79 53	107 72	186 125	79 53	83 56	24 16	0	186 125	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 53 1	
Dillon Cr	37	50	87	37	39	11	0	87	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 25 0	
Ft. Goff Cr	30 0	40	70 0	30	0	9	0	70 0	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 19 2 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0	
Grider Cr Horse Cr	45 28	61 38	106 66	45 28	47 30	14 8	0	106 66	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 30 1 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 19 0	
Independence Cr Indian Cr	0	0 83	0 145	0	0	0	0	0 145	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0 scales 0.42605 0.44614 0.12781 0.00000 1.0 1.117 39 5	
Irving Cr	0	0	0	0	0	0	0	0	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0	
Red Cap Cr	53	71	0 124	53	55	16	0	0 124	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 35 1	
Rock Cr Slate Cr	3 0	4	7 0	3 0	3 0	1 0	0	7	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 2 0 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0	
Swillup Cr	0	0	0	0	0	0	0	0	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117	
Ti Cr	0	42	0	0	0	0	0	0	scales 0.42005 0.44014 0.12781 0.00000 1.0 1,117 0 21 0 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0	
Ukonom Cr Other	6 0	8	14 0	6 0	6 0	2 0	0	14 0	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 2 4 scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 0	
Pine Cr (formerly in Hoopa tribs) Klamath trib subtotal:	0 488	0 658	0 1146	0 488	0 510	0 148	0	0 1146	scales 0.42605 0.44614 0.12781 0.00000 1.0 1,117 0 312 34	
Trinity Tributaries			-							
Horse Linto Cr	13	23	36	13	19	3	1	36	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 9 5	
Other (Willow & Madden creeks in Up TR nat estim)	0	4	0	0	0	0	0	0	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 2 2 0 Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2	
Trinity trib subtotal: Non-reservation trib subtotal:	15 503	27 685	42 1188	15 503	22 532	4 152	1	42 1188	11	
Reservation Tributaries-Hoopa Valley										
Campbell Cr Hostler Cr	0	0	0	0	0	0	0	0	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 0	
Mill Cr	14	24	38	14	20	4	0	38	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 12	
Pine Cr. (moved in 2007 to Klam tribs) Soctish Cr	0	0	0	0	0	0	0	0	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 0	
Supply Cr Tish Tang Cr	30 7	52 12	82 19	30 7	44 10	8 2	0	82 19	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 26 Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 6	
Other (Hospital Cr.) HVT reservation trib subtotal:	0 51	0 88	0 139	0 51	0 74	0 14	0	0 139	Up T main 0.36476 0.53719 0.09644 0.00161 1.0 2 44	
Posonuation Tributation Vurok				0.			0		SURROGATE - Unweighted avg of Blue Ck adults from 2007-09, 11-15, 17 (years w/ surrogates omitted)	
Blue Cr	26	91	117	26	24	61	6	117	count 0.26099 0.66715 0.07186 1.0 0	
Reservation tributaries subtotal:	77	179	256	77	98	75	6	256	0.222	
Natural spawner subtotal:	6167	20245	26412	6167	17276	2921	48	26412		
Angler Harvest	0021	20423	32044	0021	21203	4092	40	32044		
Klamath River (below Hwy 101)	246	/64	1010	246	617	144	3	1010	scales 0.24797 0.60621 0.14265 0.00317 1.0 1372 est-LRC CWT 0 16 2 0 18	
Klamath River (Hwy 101 to Weitchpec)	2239	2579	4818	2239	2261	318	0	4818	scales 0.46975 0.46420 0.06606 0.00000 1.0 402 mid-LRC CWT 6 54 4 0 64	
		Upper Klar ratio estim	m ator						SURROGATE - IGH+Bogus+Klamath Mainstem+Shasta Weighted Totals IGH+BOG+Kmain+Shasta	
Klamath River (Weitchpec to IGH)	91	1685	1776	91	1408	275	2	1776	0.0515 0.7930 0.1549 0.0006 1.0 1776 0.14201 SURROGATE - Trinity Rec. Harvest below WCW - adults only	
Trinity River (above Willow Cr. Weir)	54	180	234	54	178	2	0	234	TR LRC count 0.99129 0.00871 0.00000 1.0	
Trinity River (below Willow Cr. Weir)	78	157	235	78	155	2	0	235	scales 0.34443 0.64986 0.00571 0.00000 1.0 79	
Angler harvest subtotal:	2,708	5365	8,073	2,708	4,619	741	5	8073	TR-low CWT 2 12 1 0 15	
Tribal Harvest										
Klamath River (Estuary)	41	3322	3363	41	2002	1282	38	3363	scales 0.01232 0.59696 0.37910 0.01163 1.0 0 YTFP EST CWT 0 36 33 0 69 Yurok harvest	
Klamath River (101 to Trinity R)	51	587	638	51	331	254	2	638	scales 0.08182 0.52066 0.39462 0.00291 1.0 289 189 MidKim	
Trinity River (net and hook-and-line)	94	676	770	94	518	158	0	770	net scales 0.12857 0.67102 0.20042 0.00000 1.0 360	
Trinity River (harvest weir)	405	1389	1794	405	1209	178	2	1794	weir scales 0.24472 0.66026 0.09372 0.00130 1.0 769	
Tribal harvest subtotal:	591	5974	6565	591	4060	1872	42	6565	HVIWerCWI 20 170 30 0 220	
Total harvest:	3299	11339	14638	3299	8679	2613	47	14638		
Totals Harvest and Escapement	9920	36762	46682	9920	29962	6705	95	46682		
Angling drop-off mortality (2.04%) Net drop-off mortality (8.7%)*	55	109	164 415	55	94 248	15 147	0	164 415	0.0204 angling drop-off mortality rate on harvest 0.0870 net drop-off mortality rate on harvest	
Ich Disease Testing (Tribel)	10	000	413	10	240	.+/	4	413		
Klamath River	0	0	0	0	0	0	0	0	VTFP MU scales 0.0818 0.507 0.3946 0.0029 1.0000	
Total disease testing:	0 0	0	0	0	0	0	0	0	HV I scales 0.1286 0.6710 0.2004 0.0000 1.0000 Trin CWTs 0 0 0 0 0	
Total in-river run	9991	37270	47261	9991	30304	6867	99	47261		

Appendix G.	Final age	composition	of the	2018 Klam	ath Basin	fall Chinook run.
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2/3/2020

			AGE		Total	Total
Escapement & Harvest	2	3	4	5	Adults	Run
Hatchery Spawners						
Iron Gate Hatchery (IGH)	435	10,666	759	0	11,425	11,860
Trinity River Hatchery (TRH)	171	7,057	85	0	7,142	7,313
Hatchery Spawner subtotal	606	17,723	844	0	18,567	19,173
Natural Spawners						
Salmon River Basin	285	1,169	59	0	1,228	1,513
Scott River Basin	71	1,085	115	8	1,208	1,279
Shasta River Basin	2,017	17,715	960	0	18,675	20,692
Bogus Creek Basin	196	3,379	103	0	3,482	3,678
Klamath River mainstem (IGH to Shasta R)	453	6,973	736	0	7,709	8,162
Klamath River mainstem (Ash Cr to Wingate Bar)	220	3,381	357	0	3,738	3,958
Klamath Tributaries (above Trinity River)	131	1,202	67	0	1,269	1,400
Blue Creek	<u>118</u>	<u>181</u>	<u>14</u>	<u>1</u>	<u>196</u>	<u>314</u>
Klamath Basin subtotal	3,491	35,085	2,411	9	37,505	40,996
Trinity River (mainstem above WCW)	4.075	14.355	144	0	14.499	18.574
Trinity River (mainstem below WCW)	58	206	2	0	208	266
Trinity Tributaries (above Reservation: below WCW)	21	75	1	0	76	97
Hoopa Reservation tributaries	18	64	0	0	64	82
Trinity Basin subtotal	4,172	14,700	147	0	14,847	19,019
Natural Spawners subtotal	7,663	49,785	2,558	9	52,352	60,015
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Total Spawner Escapement	8,269	67,508	3,402	9	70,919	79,188
Recreational Harvest						
Klamath River (below Hwy 101 bridge)	121	380	55	0	435	556
Klamath River (Hwy 101 to Weitchpec)	1,780	1,543	60	0	1,603	3,383
Klamath River (Weitchpec to IGH)	77	963	64	0	1,027	1,104
Trinity River Basin (above WCW)	200	761	0	0	761	961
Trinity River Basin (below WCW)	59	284	0	0	284	343
Subtotals	2,237	3,931	179	0	4,110	6,347
Tribal Harvest						
Klamath River (below Hwv 101)	86	7,637	1.028	0	8.665	8,751
Klamath River (Hwy 101 to Trinity mouth)	42	3.084	695	Ő	3,779	3.821
Trinity River (net and hook-and-line)	7	1.035	66	Õ	1.101	1.108
Trinity River (harvest weir)	173	1,198	26	0	1,224	1,397
Subtotals	308	12,954	1,815	0	14,769	15,077
Total Harvest	2.545	16.885	1.994	0	18.879	21.424
		,	,		, -	, -
Totals	10	.		-	aa -	
Harvest and Escapement	10,814	84,393	5,396	9	89,798	100,612
Recreational Angling Dropoff Mortality 2.04%	46	80	4	0	84	130
Tribal Net Dropoff Mortality 8.7%	12	1,023	155	0	1,178	1,190
Klamath-Trinity Basin Ich disease testing	0	0	0	0	0	0
Total River Run	10,872	85,496	5,555	9	91,060	101,932