

## Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2020 Run

Klamath River Technical Team  
15 February 2021

### Summary

The number of Klamath River fall Chinook Salmon returning to the Klamath River Basin (Basin) in 2020 was estimated to be:

<i>Age</i>	<i>Run Size</i>	
	<i>Number</i>	<i>Proportion</i>
2	9,077	0.17
3	37,820	0.69
4	7,579	0.14
5	8	0.00
<b>Total</b>	<b>54,484</b>	<b>1.00</b>

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>	59,100	45,400	1.30
<i>Fishery Mortality</i>			
Tribal Harvest	8,600	5,200	1.65
Recreational Harvest	1,300	5,100	0.25
Drop-off Mortality	800	600	1.33
	10,700	10,900	0.98
<i>Escapement</i>			
Hatchery Spawners	12,200	8,300	1.47
Natural Area Spawners	36,200	26,200	1.38
	48,400	34,500	1.40

## 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 2020. The estimates provided in this report are consistent with the Klamath Basin Megatable (CDFW 2021) and with the 2021 forecast of ocean stock abundance (KRTT 2021).

Age-specific escapement estimates for 2020 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 2021). 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 2021). 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 has relied on analysis of length-frequency histograms. In such 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 could by sector, and is generally based on location of the length-frequency nadir and, if appropriate, the length-frequency of known-age fish. Scales are then used to estimate the age composition of adults (Appendix A). For the 2020 run, there were no instances where the KRTT relied on a fork length cutoff to determine the number of age-2 fish. Scale were used to apportion all age classes in each sector.

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 2020, as in 2018 and 2019, an opportunistic redd survey was performed on the mainstem Klamath River from Persido Bar to Big Bar, reaches where surveys generally have not occurred prior to 2018. A total of 137 redds were identified in the 2020 survey. The KRTT decided to not include results from this survey in 2018 and 2019 because 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, after further discussion, the KRTT decided to include the results of this survey in the estimation of the 2020 run size, and likely into the future. Justification for this decision included an apparent increase in lower mainstem spawning and the desire to capture this contribution to the run size for future estimation of biological reference points.

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 7,215 scales from 16 different sectors were aged for this analysis (Table 2). Of these, 730 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). The scale-based ages were, in general, less accurate in 2020 than prior years. Accuracy within the Trinity Basin was 96% for age-2 fish, 96% for age-3 fish, and 61% for age-4 fish. Accuracy within the Klamath River Basin was 75% for age-2 fish, 80% for age-3 fish, and 82% for age-4 fish (Table 4). The age-5 component of the run was very small in 2020 and scales were not collected from any known-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.

The final estimates of the 2019 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
YT	Yurok Tribe
YTFP	Yurok Tribal Fisheries Program

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## Acknowledgements

The Klamath River Technical Team thanks the following individuals for their expert assistance in compiling and reviewing the data for this report. From the California Department of Fish and Wildlife we thank Wade Sinnen and Brett Kormos. The Yurok Tribe and U.S. Fish and Wildlife Service performed the scale reading analysis for the Klamath River while the Hoopa Valley Tribe performed the scale reading analysis for the Trinity River. Scale collections were provided by the California Department of Fish and Wildlife, Hoopa Valley Tribe, U.S. Fish and Wildlife Service, U.S. Forest Service, and Yurok Tribe. The KRTT would like to express thanks to the Pacific Fishery Management Council for use of the RingCentral meeting platform, and the *expert* technical assistance of Mike Burner.

Table 1. Estimation and sampling methods used for the 2020 Klamath River fall Chinook run assessment.

Sampling Location	Estimation and Sampling Methods	Agency
<b>Hatchery Spawners</b>		
Iron Gate Hatchery (IGH)	Direct count. All fish examined for fin-clips, tags, and marks. Bio-samples <sup>a</sup> collected from a systematic random sample of 20% of the fish. Additionally, ad-clipped males <50 cm FL were bio-sampled opportunistically.	CDFW, WSP
Trinity River Hatchery (TRH)	Direct count. All fish bio-sampled and examined for fin-clips, tags, and marks. Scales collected from fish using a systematic random sample rate of 1:3 (33%) fish.	CDFW, HVT
<b>Natural Spawners</b>		
Salmon River Basin	Redd, carcass, and dive surveys in the upper and lower mainstem and tributaries, including Wooley Creek. Total run based on expanded redd count and last day live adults ( $2 \times \text{total redd count} + \text{last day live adults} / (1 - \text{proportion of jacks})$ ). Bio-samples collected from all carcasses recovered.	CDFW, USFS, KT, SRRC, WSP, MKWC, NCRC
Scott River Basin	Video count above Fish Counting Facility at River Mile 18.2 and twice weekly redd and carcass surveys above and below the counting station. Total run estimated by adding video count to Cormack-Jolly-Seber carcass mark-recapture estimate downstream of the counting station. Bio-samples collected from all recovered carcasses.	CDFW, QVIR, USFS, KT, NCRC, SRCD, WSP
Shasta River Basin	Video count above weir. Bio-samples collected from all spawning ground 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 variables model from weekly mark-recapture carcass surveys. Bio-samples collected from all fresh carcasses encountered.	USFWS, YT
Klamath River mainstem (Ash Cr. to Wingate Bar)	Weekly redd surveys. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$ . Jacks estimated from Klamath River mainstem (IGH to Shasta R.) scale-age data.	USFWS, KT
Klamath River mainstem (Persido Bar to Big Bar)	Single pass redd count. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$ . Jacks estimated from Klamath tributaries (above Trinity R.) scale-age data.	USFS, CDFW, KT, YT, MKWC, WSP
Klamath tributaries (above Trinity R.)	Periodic redd surveys. Total run = $(2 \times \text{total redd count} + \text{last day live adults}) / (1 - \text{proportion jacks})$ . Jacks estimated from Klamath tributaries (above Trinity R.) scale-age data. Bio-samples collected from all carcasses recovered.	USFS, CDFW, KT, YT, MKWC, WSP
Blue Creek	Escapement estimate is the maximum count from weekly dive surveys.	YT
Trinity River mainstem (above WCW)	Mark-recapture (unstratified Petersen); marks applied at WCW and recovered at TRH. Bio-samples and scales collected from all Chinook. 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 = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$ using proportion of jacks in natural areas spawning in Trinity River mainstem above WCW.	HVT, USFWS
Trinity tributaries (above Reservation; below WCW)	Periodic redd surveys. Total run = $(2 \times \text{total redd count} + \text{last day live adults}) / (1 - \text{proportion jacks})$ . Jack proportion from the from scales collected in Trinity tributaries and Hoopa Reservation tributaries.	CDFW, HVT, USFS, WSP
Hoopa Reservation tributaries	Periodic redd surveys. Total run = $(2 \times \text{total redd count}) / (1 - \text{proportion jacks})$ . Jack proportion from the from scales collected in Trinity tributaries and Hoopa Reservation tributaries.	HVT
<b>Recreational Harvest</b>		
Klamath River (below Hwy 101)	Jack and adult estimates based on access point and roving creel survey during three randomly selected days per Julian week (JW) through JW 39, then two days per week after JW 39. 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 three randomly selected days per Julian week (JW) through JW 39, then two days per week after JW 39. 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 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 (one day Monday-Thursday) and weekend days (two days Friday-Sunday). Bio-samples collected during angler interviews.	HVT
<b>Tribal Harvest</b>		
Klamath River (below Hwy 101)	Daily harvest estimates based on effort (net-hours) and catch-per-unit effort surveys. Bio-samples collected during harvest surveys.	YT
Klamath River (Hwy 101 to Weitchpec)	Daily harvest estimates based on effort (net-days) and catch-per-unit effort surveys. Bio-samples collected during harvest surveys.	YT
Trinity River	Roving Tribal creel effort and catch-per-unit 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. Bio-samples collected during harvest surveys.	HVT
<b>Fishery Dropoff Mortality</b>		
Recreational Angling Dropoff Mortality (2.04%)	Not directly estimated. Assumed rate relative to fishery impacts = 0.02; relative to fishery harvest = $0.02 / (1 - 0.02)$ .	KRTT
Tribal Net Dropoff Mortality (8.7%)	Not directly estimated. Assumed rate relative to fishery impacts = 0.08; relative to fishery harvest = $0.08 / (1 - 0.08)$ .	KRTT

<sup>a</sup> Bio-samples 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 scales collected for the 2020 Klamath Basin fall Chinook age-composition assessment.

Sampling Location	Aged			Total Collected <sup>c/</sup>	Agency
	Unknown-age <sup>a/</sup>	Known-age <sup>b/</sup>	Total		
<b><u>Hatchery Spawners</u></b>					
Iron Gate Hatchery (IGH)	678	119	797	889	CDFW
Trinity River Hatchery (TRH)	1,789	485	2,274	2,340	HVT
<b><u>Natural Spawners</u></b>					
Salmon River	134	0	134	147	CDFW/USFS
Scott River	237	0	237	246	CDFW
Shasta River <sup>d/</sup>	259	0	259	275	CDFW
Bogus Creek	962	15	977	1,009	CDFW
Upper Klamath River mainstem	395	8	403	408	USFWS
Upper Klamath River tributaries	58	0	58	61	USFS
Blue Creek	9	0	9	9	YT
Willow Creek Weir	127	4	131	139	HVT
Lower Trinity River mainstem	0	0	0	0	HVT/USFWS
Lower Trinity River tributaries	13	0	13	13	HVT/USFS
<b><u>Recreational Harvest</u></b>					
Lower Klamath River creel	288	22	310	349	CDFW
Lower Trinity River creel	21	4	25	26	HVT
<b><u>Tribal Harvest</u></b>					
Klamath River (below Hwy 101) <sup>e/</sup>	650	27	677	697	YT
Klamath River (Hwy 101 to Weitchpec)	670	18	688	705	YT
Trinity River	195	28	223	235	HVT
<b>TOTAL</b>	<b>6,485</b>	<b>730</b>	<b>7,215</b>	<b>7,548</b>	

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

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

c/ Total scales collected from the area, including those that were not successfully aged.

d/ Scales collected from carcass surveys and weir washbacks were aged but not used. Scales from the trap were used.

e/ Scales collected before the spring/fall cutoff date were aged but not used.

Table 3. Age-composition methods used for the 2020 Klamath Basin fall Chinook run assessment.

Sampling Location	Age Composition Method
<b><u>Hatchery Spawners</u></b>	
Iron Gate Hatchery (IGH)	Jack/adult structure from scale-age analysis.
Trinity River Hatchery (TRH)	Jack/adult structure from scale-age analysis.
<b><u>Natural Spawners</u></b>	
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 Wingate Bar)	Surrogate: Klamath mainstem (IGH to Shasta R.) age structure.
Klamath River mainstem (Persido Bar to Big Bar)	Surrogate: Klamath mainstem (Persido Bar to Big Bar) and tributaries (Rock, Red Cap, and Camp creeks) age structure.
Klamath tributaries (above Trinity R.)	Jack/adult structure from scale-age analysis.
Blue Creek	Jack/adult structure from scale-age analysis.
Trinity River Basin (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: Trinity Basin (above WCW) age structure.
Trinity tributaries (above Reservation to WCW)	Jack/adult structure from scale-age analysis.
Hoopa Reservation tributaries	Jack/adult structure from scale-age analysis.
<b><u>Recreational Harvest</u></b>	
Klamath River (below Hwy 101)	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: weighted average age proportions from Shasta River, IGH, Bogus Creek, and Klamath mainstem (IGH to Shasta R.).
Trinity River Basin (above WCW)	Jack component based on estimated jack harvest rate and total jack run above WCW estimate. Adult age structure surrogate from Trinity River recreational harvest below WCW.
Trinity River Basin (below WCW)	Jack/adult structure from scale-age analysis.
<b><u>Tribal Harvest</u></b>	
Klamath River (below Hwy 101)	Jack/adult structure from scale-age analysis.
Klamath River (Hwy 101 to Weitchpec)	Jack/adult structure from scale-age analysis.
Trinity River	Jack/adult structure from scale-age analysis.



**Table 4a. 2020 Klamath River Basin scale validation matrices.**

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	27	2	0	0	Total 398
	3	9	221	14	0	
	4	0	50	71	0	
	5	0	2	2	0	
Total		36	275	87	0	

  

<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	0.75	0.01	0.00	0.00	Total 1.00
	3	0.25	0.80	0.16	0.00	
	4	0.00	0.18	0.82	0.00	
	5	0.00	0.01	0.02	1.00	
Total		1.00	1.00	1.00	1.00	

**Table 4b. 2020 Trinity River Basin scale validation matrices.**

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	201	6	0	0	Total 521
	3	9	267	13	0	
	4	0	5	20	0	
	5	0	0	0	0	
Total		210	278	33	0	

  

<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	0.96	0.02	0.00	0.00	Total 1.00
	3	0.04	0.96	0.39	0.00	
	4	0.00	0.02	0.61	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 2020 Klamath Basin fall Chinook run.

2/4/2021

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
<b>Hatchery Spawners</b>						
Iron Gate Hatchery (IGH)	413	3,198	843	1	4,042	4,455
Trinity River Hatchery (TRH)	2,815	4,070	219	0	4,289	7,104
<b>Hatchery Spawner subtotal</b>	<b>3,228</b>	<b>7,268</b>	<b>1,062</b>	<b>1</b>	<b>8,331</b>	<b>11,559</b>
<b>Natural Spawners</b>						
Salmon River Basin	122	862	110	0	972	1,094
Scott River Basin	43	564	248	0	812	855
Shasta River Basin	393	2,948	827	0	3,775	4,168
Bogus Creek Basin	88	1,908	324	0	2,232	2,320
Klamath River mainstem (IGH to Shasta R.)	55	1,087	83	0	1,170	1,225
Klamath River mainstem (Ash Cr. to Wingate Bar)	75	1,474	110	0	1,584	1,659
Klamath River mainstem (Persido Bar to Big Bar)	20	249	25	0	274	294
Klamath tributaries (above Trinity River)	34	836	38	0	874	908
Blue Creek	<u>99</u>	<u>46</u>	<u>78</u>	<u>0</u>	<u>124</u>	<u>223</u>
<b>Klamath Basin subtotal</b>	<b>929</b>	<b>9,974</b>	<b>1,843</b>	<b>0</b>	<b>11,817</b>	<b>12,746</b>
Trinity River Basin (above WCW)	3,792	12,182	1,559	0	13,741	17,533
Trinity River mainstem (below WCW)	93	298	38	0	336	429
Trinity tributaries (above Reservation, below WCW)	97	139	75	0	214	311
Hoopla Reservation tributaries	<u>37</u>	<u>53</u>	<u>29</u>	<u>0</u>	<u>82</u>	<u>119</u>
<b>Trinity Basin subtotal</b>	<b>4,019</b>	<b>12,672</b>	<b>1,701</b>	<b>0</b>	<b>14,373</b>	<b>18,392</b>
<b>Natural Spawners subtotal</b>	<b>4,948</b>	<b>22,646</b>	<b>3,544</b>	<b>0</b>	<b>26,190</b>	<b>31,138</b>
<b>Total Spawner Escapement</b>	<b>8,176</b>	<b>29,914</b>	<b>4,606</b>	<b>1</b>	<b>34,521</b>	<b>42,697</b>
<b>Recreational Harvest</b>						
Klamath River (below Hwy 101)	39	168	38	0	206	245
Klamath River (Hwy 101 to Weitchpec)	343	2,718	228	0	2,946	3,289
Klamath River (Weitchpec to IGH)	134	1,294	294	1	1,589	1,723
Trinity River Basin (above WCW)	0	322	0	0	322	322
Trinity River Basin (below WCW)	17	53	1	0	54	71
<b>Subtotals</b>	<b>533</b>	<b>4,555</b>	<b>561</b>	<b>1</b>	<b>5,117</b>	<b>5,650</b>
<b>Tribal Harvest</b>						
Klamath River (below Hwy 101)	85	915	809	6	1,730	1,815
Klamath River (Hwy 101 to Weitchpec)	156	1,433	1,070	0	2,503	2,659
Trinity River	87	649	330	0	979	1,066
<b>Subtotals</b>	<b>328</b>	<b>2,997</b>	<b>2,209</b>	<b>6</b>	<b>5,212</b>	<b>5,540</b>
<b>Total Harvest</b>	<b>861</b>	<b>7,552</b>	<b>2,770</b>	<b>7</b>	<b>10,329</b>	<b>11,190</b>
<b>Totals</b>						
Harvest and Escapement	9,037	37,466	7,376	8	44,850	53,887
Recreational Angling Dropoff Mortality 2.04%	11	93	11	0	104	115
Tribal Net Dropoff Mortality 8.7%	29	261	192	0	453	482
<b>Total River Run</b>	<b>9,077</b>	<b>37,820</b>	<b>7,579</b>	<b>8</b>	<b>45,407</b>	<b>54,484</b>

Table 6. Age proportion of the 2020 Klamath Basin fall Chinook run.

Escapement & Harvest	AGE			
	2	3	4	5
<b>Hatchery Spawners</b>				
Iron Gate Hatchery (IGH)	0.09	0.72	0.19	0.00
Trinity River Hatchery (TRH)	0.40	0.57	0.03	0.00
<b>Hatchery Spawner subtotal</b>	0.28	0.63	0.09	0.00
<b>Natural Spawners</b>				
Salmon River Basin	0.11	0.79	0.10	0.00
Scott River Basin	0.05	0.66	0.29	0.00
Shasta River Basin	0.09	0.71	0.20	0.00
Bogus Creek Basin	0.04	0.82	0.14	0.00
Klamath River mainstem (IGH to Shasta R.)	0.04	0.89	0.07	0.00
Klamath River mainstem (Ash Cr. to Wingate Bar)	0.05	0.89	0.07	0.00
Klamath River mainstem (Persido Bar to Big Bar)	0.07	0.85	0.09	0.00
Klamath tributaries (above Trinity River)	0.04	0.92	0.04	0.00
Blue Creek	<u>0.44</u>	<u>0.21</u>	<u>0.35</u>	<u>0.00</u>
<b>Klamath Basin subtotal</b>	0.07	0.78	0.14	0.00
Trinity River Basin (above WCW)	0.22	0.69	0.09	0.00
Trinity River mainstem (below WCW)	0.22	0.69	0.09	0.00
Trinity tributaries (above Reservation, below WCW)	0.31	0.45	0.24	0.00
Hoopa Reservation tributaries	<u>0.31</u>	<u>0.45</u>	<u>0.24</u>	<u>0.00</u>
<b>Trinity Basin subtotal</b>	0.22	0.69	0.09	0.00
<b>Natural Spawners subtotal</b>	0.16	0.73	0.11	0.00
<b>Total Spawner Escapement</b>	0.19	0.70	0.11	0.00
<b>Recreational Harvest</b>				
Klamath River (below Hwy 101)	0.16	0.69	0.16	0.00
Klamath River (Hwy 101 to Weitchpec)	0.10	0.83	0.07	0.00
Klamath River (Weitchpec to IGH)	0.08	0.75	0.17	0.00
Trinity River Basin (above WCW)	0.00	1.00	0.00	0.00
Trinity River Basin (below WCW)	<u>0.24</u>	<u>0.75</u>	<u>0.01</u>	<u>0.00</u>
<b>Subtotals</b>	0.09	0.81	0.10	0.00
<b>Tribal Harvest</b>				
Klamath River (below Hwy 101)	0.05	0.50	0.45	0.00
Klamath River (Hwy 101 to Weitchpec)	0.06	0.54	0.40	0.00
Trinity River	<u>0.08</u>	<u>0.61</u>	<u>0.31</u>	<u>0.00</u>
<b>Subtotals</b>	0.06	0.54	0.40	0.00
<b>Total Harvest</b>	0.08	0.67	0.25	0.00
<b>Totals</b>				
Harvest and Escapement	0.17	0.70	0.14	0.00
Recreational Angling Dropoff Mortality 2.04%	0.10	0.81	0.10	0.00
Tribal Net Dropoff Mortality 8.7%	0.06	0.54	0.40	0.00
<b>Total River Run</b>	0.17	0.69	0.14	0.00

## 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 – 2020 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 fifth Chinook Salmon returning to IGH. Heads were also collected for CWT analysis from all ad-clipped fish. Scale-based age compositions were used to apportion all age classes.

### Bogus Creek

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.

### Shasta River

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 73 hours of effort between September 15 and October 22. 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 all age classes.

### Scott River

Independent estimates from above and below the weir were combined to estimate total escapement. Escapement above the weir was estimated using videography as the net count of fish moving upstream. During periods when the video monitoring station was inoperable (26.25 hours in total), fish passage was interpolated by averaging the two days prior and two days following the outage. Escapement below the weir was calculated using the Cormack Jolly Seber estimator with data from twice weekly mark-recapture carcass surveys. 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.

### Salmon River

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.

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 variables 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.

Klamath River Mainstem (Persido Bar to Big Bar)

Adult escapement was estimated by expanding total redd counts (redds X 2) from single pass survey. Total escapement was then estimated by expanding adult escapement by the scale-based age-2 proportion from mainstem (Persido Bar to Big Bar) and tributaries (Rock, Camp and Red Cap Creeks). Age assignments were based on age proportions from scales collected in the same areas.

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 39, then during two days per week after JW 39. 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 2020. 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 2020 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 catch-per-effort (fish per net-hour) analyses, stratified by day and night. 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.

Blue Creek

Total escapement was estimated using the maximum single-day count from dive surveys conducted between November 3 and December 15. Bio-samples were collected from nine recovered carcasses. Jacks were identified by visual determination during dive surveys and apportioned from the total count. Scale-based age composition was used to apportion all age classes.

## Appendix C. Trinity River – 2020 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 was 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 Chinook Salmon at WCW.

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 (1:3), ad-clipped and non-ad-clipped fish included. 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 2020 CDFW estimated a 1.75% harvest rate on adult Chinook Salmon based on the return of program reward tags (1 of 57) applied at WCW. No jacks were estimated to have been harvested in 2020 (0 tag returns). No scales were recovered from this fishery since no creel survey was implemented in 2020. 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)

Adult escapement was estimated by expanding total redd counts (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 from scales collected in Trinity Tributaries and Hoopa Reservation Tributaries combined. All age classes were apportioned using the combined set of scales from Trinity Tributaries and Hoopa Reservation Tributaries.

Hoopa Reservation Tributaries

Total escapement was estimated by expanding total redd counts (redds X 2) and applying the jack proportion from scales collected in Trinity Tributaries and Hoopa Reservation Tributaries combined. All age classes were apportioned using the combined set of scales from Trinity Tributaries and Hoopa Reservation Tributaries.

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. Scale-age proportions were used to apportion all ages.

## Appendix D. 2020 Klamath age analysis.

<b>Unknown scales age composition as read</b>					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	33	669	259	1	962
IGH	55	420	203	0	678
SALMON	12	91	31	0	134
SCOTT	10	140	86	1	237
SHASTA	16	132	63	0	211
MAINSTEM	16	291	86	2	395
UR TRIBS	2	44	12	0	58
LRC EST	17	83	35	0	135
LRC UP	12	108	32	1	153
YTFP EST	24	305	286	11	626
YTFP M&U	32	343	288	7	670
BLUE CRK	3	3	3	0	9
	232	2,629	1,384	23	4,268
<b>Unknown scales corrected age proportions (Kimura method)</b>					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	0.0378	0.8237	0.1385	0.0000	1.0
IGH	0.1015	0.6967	0.2018	0.0000	1.0
SALMON	0.1119	0.7878	0.1003	0.0000	1.0
SCOTT	0.0499	0.6602	0.2899	0.0000	1.0
SHASTA	0.0943	0.7072	0.1985	0.0000	1.0
MAINSTEM	0.0454	0.8884	0.0662	0.0000	1.0
UR TRIBS	0.0371	0.9215	0.0414	0.0000	1.0
LRC EST	0.1615	0.6812	0.1574	0.0000	1.0
LRC UP	0.0965	0.8341	0.0694	0.0000	1.0
YTFP EST	0.0462	0.5022	0.4479	0.0036	1.0
YTFP M&U	0.0585	0.5376	0.4039	0.0000	1.0
BLUE CRK	0.4429	0.2054	0.3517	0.0000	1.0
<b>Known CWT ages <sup>a/</sup></b>					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	1	13	5	0	19
IGH	32	587	87	1	707
SALMON	0	0	0	0	0
SCOTT	0	0	0	0	0
SHASTA	0	0	0	0	0
MAINSTEM	0	6	2	0	8
UR TRIBS	0	0	0	0	0
LRC	30	11	2	0	43
YTFP EST	2	17	8	0	27
YTFP M&U	2	20	8	0	30
BLUE CRK	0	0	0	0	0
	67	654	112	1	834
<u>Breakout within strata</u>					
Bogus1	0	9	1	0	10
Bogus2	1	4	4	0	9
LRC - lo	0	3	0	0	3
LRC - mid	30	8	2	0	40
YTFP MID	0	5	4	0	9
YTFP UP	2	15	4	0	21

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

Appendix E. 2020 Trinity age analysis.

WCW = Willow Ck. Weir							LOWTRINREC = Lower Trinity Recreational								
		Cwt Age					Total			Cwt Age					Total
		no cwt age	2	3	4	5				no cwt age	2	3	4	5	
Scale unreadable		7	1	0	0	0	8	Scale unreadable		1	0	0	0	0	1
2		34	0	0	0	0	34	2		5	1	0	0	0	6
3	Scale	86	0	4	0	0	90	3	Scale	16	0	2	0	0	18
4	Ages	7	0	0	0	0	7	4	Ages	0	0	0	1	0	1
5		0	0	0	0	0	0	5		0	0	0	0	0	0
127		134	1	4	0	0	139	21		22	1	2	1	0	26

  

HUPAHARV = Hoopa Tribal Net Harvest plus Tribal Hook-and-Line							TRH = Trinity River Hatchery								
		Cwt Age					Total			Cwt Age					Total
		no cwt age	2	3	4	5				no cwt age	2	3	4	5	
Scale unreadable		10	0	2	0	0	12	Scale unreadable		56	1	9	0	0	66
2		17	7	0	0	0	24	2		701	193	6	0	0	900
3	Scale	139	0	14	0	0	153	3	Scale	1038	9	247	13	0	1307
4	Ages	39	0	0	7	0	46	4	Ages	50	0	5	12	0	67
5		0	0	0	0	0	0	5		495	0	0	0	0	495
30		205	7	16	7	0	235	1789		1845	203	267	25	0	2340

  

LOWTRINTRIBS = Lower Trinity Tribs - Includes samples taken by I Cwt Age							NO DATA								
		Cwt Age					Total			Cwt Age					Total
		no cwt age	2	3	4	5				no cwt age	2	3	4	5	
Scale unreadable		0	0	0	0	0	0	Scale unreadable							
2		4	0	0	0	0	4	2							
3	Scale	7	0	0	0	0	7	3							
4	Ages	2	0	0	0	0	2	4							
5		0	0	0	0	0	0	5							
0		13	0	0	0	0	13	0							

  

HVTSELECTHARV = Hoopa Tribal Weir Harvest							NO DATA								
		Cwt Age					Total			Cwt Age					Total
		no cwt age	2	3	4	5				no cwt age	2	3	4	5	
Scale unreadable		0	0	0	0	0	0	Scale unreadable							
2		0	0	0	0	0	0	2							
3	Scale	0	0	0	0	0	0	3							
4	Ages	0	0	0	0	0	0	4							
5		0	0	0	0	0	0	5							
0		0	0	0	0	0	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		201	6	0	0
3		9	267	13	0
4		0	5	20	0
5		0	0	0	0
4x4					0.94

  

(B) Scale-CWT age matrix of proportions of column sums.					
		2	3	4	5
2		0.9571	0.0216	0.0000	0.0000
3		0.0429	0.9604	0.3939	0.0000
4		0.0000	0.0180	0.6061	0.0000
5		0.0000	0.0000	0.0000	1.0000

  

Corrected Scale age proportion vectors for scale-aged 2 - 5 fish.									
# known scales	5	30	4	495	0	0	0	0	0
# unknown scales	127	195	21	1789	13	0	0	0	0
Age	Willow Creek Weir WCW	Hoopa Tribal NET HARV	Lower Trinity REC HARV	TRH HATCHERY	Lower Trinity Mainstem	Upper Trinity REC HARV	Upper Trin NATURAL	Lower Trin Tribs	
2	0.2647	0.0773	0.2316	0.3964	0.0000	-	0.2163	0.3114	
3	0.6640	0.6108	0.7684	0.5745	0.0000	1.0000	0.6948	0.4481	
4	0.0712	0.3119	0.0000	0.0291	0.0000	0.0000	0.0889	0.2405	
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	

  

Correction Matrix for ages 2,3,4,5. (Inverse of Scale-CWT age proportion matrix.)					
		2	3	4	5
2		1.0458	-0.0238	0.0155	0.0000
3		-0.0472	1.0551	-0.6858	0.0000
4		0.0014	-0.0313	1.6704	0.0000
5		0.0000	0.0000	0.0000	1.0000

  

WCW scales									
Age	WCW no cwts	known age cwts scales	Total age all scales	WCW age proportions					
2	34	0	34	0.2647					
3	84	0	84	0.6640					
4	9	0	9	0.0712					
5	0	0	0	0.0000					
	127	0	127	1.0000					

  

Natural Escapement, Trinity basin above WCW: Apportioned to age structure.									
		WCW			TRH + Rec above WCW+Natural Escapement		Apportioned Natural Escapement minus TRH #s minus above WCW creel #s		
		proportions		Escapement		Escapement		Proportions	
Rec above WCW	Total Run	322		6607		3792		0.2163	
TRH		7104		16574		12182		0.6948	
Naturals		17533		1778		1559		0.0889	
Total		24959		0		0		0.0000	
				24959					



## Appendix G. Final age composition of the 2019 Klamath Basin fall Chinook run.

1/26/2021

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
<b>Hatchery Spawners</b>						
Iron Gate Hatchery (IGH)	249	2,820	977	0	3,797	4,046
Trinity River Hatchery (TRH)	205	1,182	199	0	1,381	1,586
<b>Hatchery Spawner subtotal</b>	<b>454</b>	<b>4,002</b>	<b>1,176</b>	<b>0</b>	<b>5,178</b>	<b>5,632</b>
<b>Natural Spawners</b>						
Salmon River Basin	686	789	168	0	957	1,643
Scott River Basin	409	1,596	85	0	1,681	2,090
Shasta River Basin	78	5,338	588	0	5,926	6,004
Bogus Creek Basin	149	872	118	0	990	1,139
Klamath River mainstem (IGH to Shasta R)	169	877	263	9	1,149	1,318
Klamath River mainstem (Ash Cr to Wingate Bar)	309	1,583	477	16	2,076	2,385
Klamath Tributaries (above Trinity River)	488	509	149	0	658	1,146
Blue Creek	<u>26</u>	<u>24</u>	<u>61</u>	<u>6</u>	<u>91</u>	<u>117</u>
<b>Klamath Basin subtotal</b>	<b>2,314</b>	<b>11,588</b>	<b>1,909</b>	<b>31</b>	<b>13,528</b>	<b>15,842</b>
Trinity River Basin (above WCW)	3,644	5,352	973	16	6,341	9,985
Trinity River mainstem (below WCW)	22	32	6	0	38	60
Trinity Tributaries (above Reservation; below WCW)	15	22	5	0	27	42
Hoopla Reservation tributaries	<u>51</u>	<u>74</u>	<u>14</u>	<u>0</u>	<u>88</u>	<u>139</u>
<b>Trinity Basin subtotal</b>	<b>3,732</b>	<b>5,480</b>	<b>998</b>	<b>16</b>	<b>6,494</b>	<b>10,226</b>
<b>Natural Spawners subtotal</b>	<b>6,046</b>	<b>17,068</b>	<b>2,907</b>	<b>47</b>	<b>20,022</b>	<b>26,068</b>
<b>Total Spawner Escapement</b>	<b>6,500</b>	<b>21,070</b>	<b>4,083</b>	<b>47</b>	<b>25,200</b>	<b>31,700</b>
<b>Recreational Harvest</b>						
Klamath River (below Hwy 101)	252	609	146	3	758	1,010
Klamath River (Hwy 101 to Weitchpec)	2,266	2,260	292	0	2,552	4,818
Klamath River (Weitchpec to IGH)	91	1,393	274	1	1,668	1,759
Trinity River Basin (above WCW)	98	239	2	0	241	339
Trinity River Basin (below WCW)	78	155	2	0	157	235
<b>Subtotals</b>	<b>2,785</b>	<b>4,656</b>	<b>716</b>	<b>4</b>	<b>5,376</b>	<b>8,161</b>
<b>Tribal Harvest</b>						
Klamath River (below Hwy 101)	40	2,022	1,258	36	3,316	3,356
Klamath River (Hwy 101 to Weitchpec)	53	340	266	2	608	661
Trinity River (net and hook-and-line)	94	518	158	0	676	770
Trinity River (harvest weir)	405	1,209	178	2	1,389	1,794
<b>Subtotals</b>	<b>592</b>	<b>4,089</b>	<b>1,860</b>	<b>40</b>	<b>5,989</b>	<b>6,581</b>
<b>Total Harvest</b>	<b>3,377</b>	<b>8,745</b>	<b>2,576</b>	<b>44</b>	<b>11,365</b>	<b>14,742</b>
<b>Totals</b>						
Harvest and Escapement	9,877	29,815	6,659	91	36,565	46,442
Recreational Angling Dropoff Mortality 2.04%	57	95	15	0	110	167
Tribal Net Dropoff Mortality 8.7%*	16	251	147	3	401	417
Klamath-Trinity Basin Ich disease testing	1	5	3	0	8	9
<b>Total River Run</b>	<b>9,951</b>	<b>30,166</b>	<b>6,824</b>	<b>94</b>	<b>37,084</b>	<b>47,035</b>