

Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2022 Run

Klamath River Technical Team
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Summary

The number of Klamath River fall Chinook Salmon returning to the Klamath River Basin (Basin) in 2022 was estimated to be:

<i>Age</i>	<i>Run Size</i>	
	<i>Number</i>	<i>Proportion</i>
2	7,581	0.14
3	32,178	0.59
4	14,340	0.26
5	172	0.00
Total	54,271	1.00

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

<i>Sector</i>	<i>Preseason Forecast</i>	<i>Postseason Estimate</i>	<i>Pre / Post</i>
<i>Run Size</i>	66,800	46,700	1.43
<i>Fishery Mortality</i>			
Tribal Harvest	9,400	8,000	1.18
Recreational Harvest	2,100	2,500	0.84
Drop-off Mortality	900	700	1.29
	12,400	11,200	1.11
<i>Escapement</i>			
Hatchery Spawners	16,200	13,200	1.23
Natural Area Spawners	38,200	22,100	1.73
	54,400	35,300	1.54

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 2022. The estimates provided in this report are consistent with the Klamath Basin Megatable (CDFW 2023) and with the 2023 forecast of ocean stock abundance (KRTT 2023).

Age-specific escapement estimates for 2022 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 2023). 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 2023). 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 experienced scale 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 analyses 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 varied by sector, and was generally based on the first length-frequency nadir. Scales were then used to estimate the age composition of adults (Appendix A).

An indirect method was used to estimate the age composition of 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. 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 addition to Klamath River mainstem redd and carcass surveys from Iron Gate Dam to Wingate Bar, redd surveys were performed on the mainstem from Persido Bar to Green Riffle in 2022. From 2018-2021, such supplemental redd surveys were performed from Persido Bar to Big Bar, where surveys generally had not occurred prior to 2018. 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 beginning in 2020. 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 8,250 scales from 16 different sectors were aged for this analysis (Table 2). Of these, 525 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). Accuracy within the Trinity Basin was 100% for age-2 fish, 96% for age-3 fish, and 89% for age-4 fish. Accuracy within the Klamath River Basin was 100% for age-2 fish, 78% for age-3 fish, and 80% for age-4 fish (Table 4). 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.

Marking and tagging of Chinook Salmon releases from Trinity River Hatchery did not occur for brood year 2019 due to restrictions related to COVID-19. As such, no known-age-3 CWT fish from the Trinity River Hatchery returned to the Basin in 2022. Methods needed to be developed to account for a lack of known-age 3 returns to the Trinity River for use in scale validation matrices. Appendix G described how known-age CWT fish were included in scale validation matrices for the Klamath and Trinity basins.

The final estimates of the 2021 Klamath Basin age composition are presented in Appendix H.

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
SRCD	Siskiyou Resource Conservation District
SRRC	Salmon River Restoration Council
TRH	Trinity River Hatchery
UR TRIBS	Upper Klamath River Tributaries
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WCW	Willow Creek Weir
YT	Yurok Tribe
YTFP	Yurok Tribal Fisheries Program

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Table 1. Estimation and sampling methods used for the 2022 Klamath River Chinook Salmon fall run assessment.

Sampling Location	Estimation and Sampling Methods	Agency
Hatchery Spawners		
Iron Gate Hatchery (IGH)	Direct count. All fish examined for fin clips, tags, and marks. Bio-samples collected from fish at a systematic random sample rate of 1:10 (10%). 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 at a systematic random sample rate of 1:5 (20%).	CDFW, HVT
Natural Spawners		
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-proportion of jacks). Bio-samples collected from all carcasses recovered.	CDFW, USFS, KT, SRRC, MKWC, NCRC
Scott River Basin	Video count above fish counting facility at river mile 18.2 and twice weekly redd and carcass surveys below the counting station. Total run estimated by adding video count to Cormack-Jolly-Seber (CJS) mark-recapture estimate of carcasses 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 carcasses stranded on weir at a systematic random sample rate of (1:5) 20%, all fish captured in a trap immediately upstream of video chute, and all fish encountered during spawning ground surveys.	CDFW, WSP
Bogus Creek Basin	Video count above weir and twice weekly direct carcass count below weir. Bio-samples collected from 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 (Ash Cr. to Wingate Bar)	Weekly redd surveys. Total run = ($2 \times \text{total redd count}$)/(1-proportion jacks).	USFWS, KT
Klamath River mainstem (Persido Bar to Green Riffle)	Single pass redd count. Total run = ($2 \times \text{total redd count}$)/(1-proportion jacks).	USFS
Klamath Tributaries above Trinity R.	Periodic redd surveys. Total run = ($2 \times \text{total redd count} + \text{last day live adults}$)/(1-proportion jacks). Bio-samples collected from all carcasses recovered.	USFS, CDFW, KT, MKWC
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. All fish bio-sampled and scales collected from every other Chinook Salmon 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 = ($2 \times \text{total redd count}$)/(1-proportion jacks) using the proportion of jacks from natural spawning areas 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-proportion jacks) using the proportion of jacks from natural spawning areas in Trinity River mainstem above WCW.	CDFW, USFS
Hoopa Reservation Tributaries	Periodic redd surveys. Total run = ($2 \times \text{total redd count}$)/(1-proportion jacks) using the proportion of jacks from natural spawning areas in Trinity River mainstem above WCW.	HVT
Recreational Harvest		
Klamath River (below Hwy 101)	Jack and adult estimates based on access point and roving creel survey during 3 randomly selected days per Julian week through JW 39, then 2 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 3 randomly selected days per Julian week through JW 39, then 2 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, Klamath tributaries Shasta River, Scott 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
Tribal Harvest		
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 (net, hook-and-line and tribal creel)	Roving 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 tribal creel and hook-and-line fishery. Bio-samples collected during harvest surveys.	HVT
Trinity River (Selective harvest weir)	Direct count of all harvested fish. Bio-samples collected from all harvested fish.	HVT
Fishery Dropoff Mortality		
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

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

Table 2. Scale sampling locations and numbers of scales collected for the 2022 Klamath Basin fall Chinook age-composition assessment.

Sampling Location	Aged			Total Collected ^{c/}	Agency
	Unknown-age ^{a/} d/	Known-age ^{b/}	Total		
<u>Hatchery Spawners</u>					
Iron Gate Hatchery (IGH)	548	118	666	919	CDFW
Trinity River Hatchery (TRH)	839	105	944	981	HVT
<u>Natural Spawners</u>					
Salmon River Carcass Survey	110	0	110	119	CDFW
Scott River Carcass Survey	183	0	183	191	CDFW
Shasta River Carcass	399	1	400	424	CDFW
Bogus Creek	385	33	418	456	CDFW
Klamath River mainstem	539	19	558	582	USFWS
Upper Klamath River tributaries	35	0	35	37	USFS
Blue Creek Snorkle	11	0	11	11	YT
Willow Creek Weir	562	22	584	613	HVT, CDFW
Lower Trinity River Carcass	0	0	0	0	HVT, USFWS
Lower Trinity River tributaries	6	0	6	6	HVT, USFS
<u>Recreational Harvest</u>					
Lower Klamath River Creel	691	55	746	765	CDFW
Lower Trinity River Creel	33	1	34	34	HVT
<u>Tribal Harvest</u>					
Klamath River (below Hwy 101)	797	41	838	846	YT
Klamath River (Hwy 101 to Trinity R)	734	17	751	747	YT
Trinity River (Hoopa Reservation)	835	79	914	936	HVT
Hoopa Weir	403	30	433	434	HVT
Ich^{e/}	145	4	149	149	YT
TOTAL	7,255	525	7,780	8,250	

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/ Total scales collected from the area.

d/ Weir washback collected scales were read but not used

e/ Scales collected from Ich disease monitoring

Table 3. Age-composition methods used for the 2022 Klamath Basin Chinook Salmon fall run assessment.

Sampling Location	Age Composition Method
<u>Hatchery Spawners</u>	
Iron Gate Hatchery (IGH)	Jacks (<48cm) from length frequency and adult structure from scale-age analysis.
Trinity River Hatchery (TRH)	Jack/adult structure from scale-age analysis.
<u>Natural Spawners</u>	
Salmon River Basin	Jack/adult structure from scale-age analysis.
Scott River Basin	Jacks (<54cm) from length frequency and adult structure from scale-age analysis.
Shasta River Basin	Jacks (<47cm) from length frequency and adult structure from scale-age analysis.
Bogus Creek Basin	Jacks (<50cm) from length frequency and adult structure from scale-age analysis.
Klamath River mainstem (IGH to Shasta R.)	Jacks (<58cm) from length frequency and adult structure from scale-age analysis.
Klamath R. mainstem (Shasta R. to Wingate Bar)	Surrogate: Klamath mainstem (IGH to Shasta R.) age structure.
Klamath R. mainstem (Persido Bar to Green Riffle)	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 Creek in 2007-2009, 2011-2015, 2017, and 2020.
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: jack/adult structure from Trinity River (above WCW).
Trinity tributaries (above Reservation to WCW)	Surrogate: jack/adult structure from Trinity River (above WCW).
Hoopa Reservation Tributaries	Surrogate: jack/adult structure from Trinity River (above WCW).
<u>Recreational Harvest</u>	
Klamath River (below Hwy 101)	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, Scott River, IGH, Bogus Creek, mainstem Klamath tributaries 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.
<u>Tribal Harvest</u>	
Klamath River (below Hwy 101)	Jack/adult structure from scale-age analysis.
Klamath River (Hwy 101 to Trinity mouth)	Jacks (<55cm) from length frequency and adult structure from scale-age analysis.
Trinity River (net, hook-and-line and tribal creel)	Jack/adult structure from scale-age analysis.
Trinity River (harvest weir)	Jack/adult structure from scale-age analysis.
<u>Ich Disease Monitoring</u>	
Klamath-Trinity Basin	Jack/adult structure from scale-age analysis.

Table 4a. 2022 Klamath River Basin scale validation matrices.

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	28	21	2	0	Total 441
	3	0	217	25	0	
	4	0	39	109	0	
	5	0	0	0	0	
Total	28	277	136	0		
<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	1.00	0.08	0.01	0.00	
	3	0.00	0.78	0.18	0.00	
	4	0.00	0.14	0.80	0.00	
	5	0.00	0.00	0.00	0.00	
Total	1.00	1.00	1.00	0.00		

Table 4b. 2022 Trinity River Basin scale validation matrices.

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	79	2	0	0	Total 295
	3	0	55	18	0	
	4	0	0	140	0	
	5	0	0	0	1	
Total	79	57	158	1		
<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	1.00	0.04	0.00	0.00	
	3	0.00	0.96	0.11	0.00	
	4	0.00	0.00	0.89	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 2022 Klamath Basin fall Chinook run.

1/19/2023

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
Hatchery Spawners						
Iron Gate Hatchery (IGH)	206	7,336	1,931	2	9,269	9,475
Trinity River Hatchery (TRH)	973	2,327	1,632	7	3,966	4,939
Hatchery Spawner subtotal	1,179	9,663	3,563	9	13,235	14,414
Natural Spawners						
Salmon River Basin	291	986	288	0	1,274	1,565
Scott River Basin	67	839	88	0	927	994
Shasta River Basin	106	3,409	981	13	4,403	4,509
Bogus Creek Basin	42	1,376	340	5	1,721	1,763
Klamath River mainstem (IGH to Shasta R.)	71	2,120	1,035	17	3,172	3,243
Klamath River mainstem (Ash Cr. to Wingate Bar)	35	1,032	503	9	1,544	1,579
Klamath River mainstem (Persido Bar to Green Riffle)	5	143	70	1	214	219
Klamath Tributaries (above Trinity River)	224	973	314	0	1,286	1,510
Blue Creek	148	152	74	2	228	376
Klamath Basin subtotal	989	11,030	3,693	47	14,769	15,758
Trinity River (mainstem above WCW)	2,742	4,392	1,901	18	6,311	9,053
Trinity River (mainstem below WCW)	309	495	214	2	712	1,021
Trinity Tributaries (above Reservation; below WCW)	51	82	35	0	117	168
Hoopla Reservation tributaries	60	98	42	1	141	201
Trinity Basin subtotal	3,162	5,067	2,192	21	7,281	10,443
Natural Spawners subtotal	4,151	16,097	5,885	69	22,050	26,201
Total Spawner Escapement	5,330	25,760	9,448	78	35,285	40,615
Recreational Harvest						
Klamath River (below Hwy 101 bridge)	104	297	84	0	381	485
Klamath River (Hwy 101 to Weitchpec)	1,614	916	176	0	1,092	2,706
Klamath River (Weitchpec to IGH)	26	574	168	0	742	768
Trinity River Basin (above WCW)	70	128	39	0	167	237
Trinity River Basin (below WCW)	56	61	18	0	79	135
Subtotals	1,870	1,976	485	0	2,461	4,331
Tribal Harvest						
Klamath River (below Hwy 101)	0	2,165	2,157	71	4,393	4,393
Klamath River (Hwy 101 to Trinity mouth)	41	946	913	5	1,864	1,905
Trinity River (Net, hook-and-line, and Tribal creel)	79	737	812	9	1,558	1,637
Trinity River (Selective harvest weir)	214	99	121	0	220	434
Subtotals	334	3,947	4,003	85	8,035	8,369
Total Harvest	2,204	5,923	4,488	85	10,496	12,700
Totals						
Harvest and Escapement	7,533	31,682	13,937	163	45,782	53,315
Recreational Angling Dropoff Mortality 2.04%	38	40	10	0	50	88
Tribal Net Dropoff Mortality 8.7%	10	344	342	8	694	704
Klamath-Trinity Basin Ich disease testing	0	112	51	1	164	164
Total River Run	7,581	32,178	14,340	172	46,690	54,271

Table 6. Age proportion of the 2022 Klamath Basin fall Chinook run.

Escapement & Harvest	AGE			
	2	3	4	5
Hatchery Spawners				
Iron Gate Hatchery (IGH)	0.02	0.77	0.20	0.00
Trinity River Hatchery (TRH)	0.20	0.47	0.33	0.00
Hatchery Spawner subtotal	0.08	0.67	0.25	0.00
Natural Spawners				
Salmon River Basin	0.19	0.63	0.18	0.00
Scott River Basin	0.07	0.84	0.09	0.00
Shasta River Basin	0.02	0.76	0.22	0.00
Bogus Creek Basin	0.02	0.78	0.19	0.00
Klamath River mainstem (IGH to Shasta R.)	0.02	0.65	0.32	0.01
Klamath River mainstem (Ash Cr. to Wingate Bar)	0.02	0.65	0.32	0.01
Klamath River mainstem (Persido Bar to Green Riffle)	0.02	0.65	0.32	0.00
Klamath tributaries (above Trinity River)	0.15	0.64	0.21	0.00
Yurok Reservation tributaries	<u>0.39</u>	<u>0.40</u>	<u>0.20</u>	<u>0.01</u>
Klamath Basin subtotal	0.06	0.70	0.23	0.00
Trinity River (mainstem above WCW)	0.30	0.49	0.21	0.00
Trinity River (mainstem below WCW)	0.30	0.49	0.21	0.00
Trinity tributaries (above Reservation)	0.30	0.49	0.21	0.00
Hoopa Reservation tributaries	<u>0.30</u>	<u>0.49</u>	<u>0.21</u>	<u>0.01</u>
Trinity Basin subtotal	0.30	0.49	0.21	0.00
Natural Spawners subtotal	0.16	0.61	0.22	0.00
Total Spawner Escapement	0.13	0.63	0.23	0.00
Recreational Harvest				
Klamath River (below Hwy 101 bridge)	0.21	0.61	0.17	0.00
Klamath River (Hwy 101 to Weitchpec)	0.60	0.34	0.07	0.00
Klamath River (Weitchpec to IGH)	0.03	0.75	0.22	0.00
Trinity River Basin (above WCW)	0.30	0.54	0.16	0.00
Trinity River Basin (below WCW)	<u>0.41</u>	<u>0.45</u>	<u>0.13</u>	<u>0.00</u>
Subtotals	0.43	0.46	0.11	0.00
Tribal Harvest				
Klamath River (below Hwy 101)	0.00	0.49	0.49	0.02
Klamath River (Hwy 101 to Trinity mouth)	0.02	0.50	0.48	0.00
Trinity River (Net, hook-and-line, and Tribal creel)	0.05	0.45	0.50	0.01
Trinity River (Selective harvest weir)	<u>0.49</u>	<u>0.23</u>	<u>0.28</u>	<u>0.00</u>
Subtotals	0.04	0.47	0.48	0.01
Total Harvest	0.17	0.47	0.35	0.01
Totals				
Harvest and Escapement	0.14	0.59	0.26	0.00
Recreational Angling Dropoff Mortality 2.04%	0.43	0.45	0.11	0.00
Tribal Net Dropoff Mortality 8.7%	0.01	0.49	0.49	0.01

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 – 2022 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. Jacks (<48 cm FL) estimated from length-frequency analysis. Scale-based age compositions were used to apportion all adult 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. Bio-samples were obtained from every other carcass recovered above and below the weir. Jacks (<50 cm FL) estimated from length-frequency analysis. Scale-based age compositions were used to apportion all adult 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 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 65.5 hours of effort between September 20 and October 13. Every fish was bio-sampled from the video flume trap. Nine ad-clipped fish were recovered as washbacks and all nine were decoded. Spawning ground surveys were also conducted to document spawning and collect biosamples. Jacks (<47 cm FL) estimated from length-frequency analysis. Scale-based age compositions were used to apportion all adult 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. Escapement below the weir was calculated using the CJS 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. Jacks (<54 cm FL) estimated from length-frequency analysis. Scale-based age compositions were used to apportion all adult 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. Jacks (<58 cm FL) estimated from length-frequency analysis. Scale-based age compositions were used to apportion all adult 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 Green Riffle)

Adult escapement was estimated by expanding total redd counts (redds X 2) from a single pass survey. Total escapement was then estimated by expanding adult escapement by the scale-based age-2 proportion from mainstem (IGH to Shasta). Age assignments were based on age proportions from scales collected in the IGH to 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 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 2022. 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 2022 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, Scott River, Bogus Creek, Klamath tributaries 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. Jacks (<55 cm FL) estimated from length-frequency analysis. Scale-based age compositions were used to apportion all adult age classes.

Blue Creek

Total escapement was estimated using the maximum single-day count from dive surveys conducted between November 1 and November 30. Bio-samples were collected from eight 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, 2017 and 2020).

Appendix C. Trinity River – 2022 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 other 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 (1:5), 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 2022 CDFW estimated a 1.60% harvest rate on adult Chinook Salmon based on the return of program reward tags (7 of 437) applied at WCW. An estimated 1.85% (3 of 162 tag returns) jacks were estimated to have been harvested in 2022. No scales were recovered from this fishery since no creel survey was implemented in 2022. 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 stratified by weekend days (Friday-Sunday) and weekdays (Monday-Thursday), 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 jack proportion from the upper Trinity River natural escapement. The upper Trinity River natural escapement age structure was used as a surrogate to apportion all ages.

Hoopa Reservation Tributaries

Total escapement was estimated by expanding total redd counts (redds X 2) for adult escapement then adding jacks from the upper Trinity River natural escapement age-2 proportion. The upper Trinity River natural escapement age structure was used as a surrogate to apportion all ages.

Hoopa Valley Tribal Harvest (Net, hook-and-line, and Tribal creel)

Hoopa Valley Tribal member gill net and hook-and-line harvest is monitored by estimating effort and catch from three (hook-and-line and tribal creel) and/or four (gill net) randomly selected days per sample week.

Total harvest was estimated by expanding randomly selected days and effort to weekly totals. Scale-age proportions were used to apportion all ages.

Hoopa Valley Tribal Harvest (selective harvest weir)

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

Appendix D. 2022 Klamath age analysis.

Unknown scales age composition as read					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	11	268	105	1	385
IGH	22	361	165	0	548
SALMON	26	58	26	0	110
SCOTT	12	133	37	0	182
SHASTA	3	235	96	1	335
MAINSTEM	12	333	191	3	539
UR TRIBS	7	19	9	0	35
LRC EST	35	68	30	0	133
LRC UP	351	152	55	0	558
YTFP EST	4	413	367	13	797
YTFP M&U	22	370	340	2	734
BLUE CRK	6	5	0	0	11
	513	2,508	1,470	21	4,512
Unknown scales corrected age proportions (Kimura method)					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	0.0000	0.7962	0.2012	0.0026	1.0
IGH	0.0000	0.7567	0.2433	0.0000	1.0
SALMON	0.1859	0.6298	0.1843	0.0000	1.0
SCOTT	0.0000	0.9053	0.0947	0.0000	1.0
SHASTA	0.0000	0.7742	0.2228	0.0030	1.0
MAINSTEM	0.0000	0.6687	0.3257	0.0056	1.0
UR TRIBS	0.1481	0.6442	0.2077	0.0000	1.0
LRC EST	0.2142	0.6118	0.1740	0.0000	1.0
LRC UP	0.6029	0.3326	0.0646	0.0000	1.0
YTFP EST	0.0000	0.4938	0.4898	0.0163	1.0
YTFP M&U	0.0000	0.5077	0.4896	0.0027	1.0
BLUE CRK	0.2313	0.2067	0.5107	0.0512	1.0
Known CWT ages ^{a/}					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	1	69	10	0	80
IGH	105	2,793	470	2	3,370
SALMON	0	0	0	0	0
SCOTT	0	0	0	0	0
SHASTA	0	7	2	0	9
MAINSTEM	0	18	11	0	29
UR TRIBS	0	0	0	0	0
LRC	24	40	6	0	70
YTFP EST	0	16	26	0	42
YTFP M&U	0	8	9	0	17
BLUE CRK	0	0	0	0	0
	130	2,951	534	2	3,617
Breakout within strata					
Bogus1	1	45	9	0	55
Bogus2	0	24	1	0	25
LRC - lo	1	2	0	0	3
LRC - mid	23	38	6	0	67
YTFP MID	0	0	2	0	2
YTFP UP	0	8	7	0	15

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

Appendix E. 2022 Trinity age analysis.

WCW = Willow Ck. Weir						LOWTRINREC = Lower Trinity Recreational					
no cwt age						no cwt age					
Scale unreadable	2	3	4	5	Total	no cwt age	2	3	4	5	Total
2	28	1	0	0	30	0	0	0	0	0	0
3	159	0	0	0	171	14	1	0	0	0	16
4	277	6	3	0	286	3	0	0	0	0	15
5	125	0	7	0	132	4	0	0	0	0	4
Scale	30	1	0	0	33	33	1	1	0	0	35
Ages	562	13	7	10	620	0	0	0	0	0	0

HUPAHARV = Hoopa Tribal Net Harvest plus Tribal Hook-and-Line						TRH = Trinity River Hatchery					
no cwt age						no cwt age					
Scale unreadable	2	3	4	5	Total	Scale unreadable	2	3	4	5	Total
2	21	1	0	0	23	34	1	0	2	0	37
3	56	0	0	0	56	162	45	1	0	0	208
4	426	18	4	0	448	456	0	19	10	0	485
5	349	0	74	0	423	220	0	0	50	0	270
Scale	99	5	0	0	104	128	0	0	0	0	128
Ages	835	2	19	78	955	873	46	20	62	0	1001

LOWTRINTRIBS = Lower Trinity Tribes - Includes samples taken by Cwt Age						NO DATA					
no cwt age						no cwt age					
Scale unreadable	2	3	4	5	Total	Scale unreadable	2	3	4	5	Total
2	0	0	0	0	0	0	0	0	0	0	0
3	3	0	0	0	3	0	0	0	0	0	0
4	2	0	0	0	2	0	0	0	0	0	0
5	1	0	0	0	1	0	0	0	0	0	0
Scale	6	0	0	0	6	0	0	0	0	0	0
Ages	0	0	0	0	0	0	0	0	0	0	0

HVTSELECTHARV = Hoopa Tribal Weir Harvest						NO DATA					
no cwt age						no cwt age					
Scale unreadable	2	3	4	5	Total	Scale unreadable	2	3	4	5	Total
2	1	0	0	0	1	0	0	0	0	0	0
3	197	0	0	0	217	0	0	0	0	0	0
4	108	12	1	0	121	0	0	0	0	0	0
5	98	0	9	0	107	0	0	0	0	0	0
Scale	42	0	0	0	42	0	0	0	0	0	0
Ages	403	20	12	10	446	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	79	2	0
3	0	55	18
4	0	0	140
5	0	0	0

4x4

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

2	1.0000	0.0351	0.0000	0.0000
3	0.0000	0.9649	0.1139	0.0000
4	0.0000	0.0000	0.8861	0.0000
5	0.0000	0.0000	0.0000	1.0000

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

Age	Willow Creek Weir WCV	Hoopa Tribal NET HARV	Lower Trinity REC HARV	HATCHERY	TRH	Lower Trinity Mainstem	Upper Trinity REC HARV	Upper Trinity NATURAL	Hoopa Trin Tribs	Lower Hoop&Line
2	0.2660	0.0493	0.4083	0.1745	0.0000	0.0000	0.0000	0.3029	0.4867	0
3	0.4812	0.4730	0.4549	0.5283	0.0000	0.7688	0.4651	0.3232	0.1881	0
4	0.2510	0.4717	0.1368	0.2959	0.0000	0.2312	0.2100	0.1881	0.1881	0
5	0.0018	0.0060	0.0000	0.0012	0.0000	0.0000	0.0020	0.0000	0.0000	0
Total	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0

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

2	1.0000	-0.0364	0.0047	0.0000
3	0.0000	1.0364	-0.1332	0.0000
4	0.0000	0.0000	1.1286	0.0000
5	0.0000	0.0000	0.0000	1.0000

WCW scales

Age	WCW no cwt's	known age cwt's scales	Total age all scales	WCW age proportions
2	150	0	150	0.2660
3	270	0	270	0.4812
4	141	0	141	0.2510
5	1	0	1	0.0018
Total	562	0	562	1.0000

WCW scales

Age	WCW	TRH	Lower Trinity	Upper Trinity	Hoopa
2	0.2660	0.4812	0.2510	0.0018	0.0020
3	0.4812	0.4392	0.2100	0.1881	0.1881
4	0.2510	0.1901	0.2100	0.1881	0.1881
5	0.0018	0.0020	0.0020	0.0020	0.0020
Total	14229	14229	14229	14229	14229

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

Age	WCW	TRH + Rec above WCW + Natural	Escapement	Escapement	Proportions
2	0.2660	3785	2741	0.3029	0.4851
3	0.4812	6847	4392	0.2100	0.1881
4	0.2510	1901	1901	0.2100	0.1881
5	0.0018	25	18	0.0020	0.0020
Total	14229	14229	14229	14229	14229

Age	WCW	TRH + Rec above WCW + Natural	Escapement	Escapement	Proportions
2	0.2660	3785	2741	0.3029	0.4851
3	0.4812	6847	4392	0.2100	0.1881
4	0.2510	1901	1901	0.2100	0.1881
5	0.0018	25	18	0.0020	0.0020
Total	14229	14229	14229	14229	14229

Appendix G: Inclusion of known-age-3 CWT fish in scale validation matrices in 2022

Due to complications associated with Covid-19, no TRH Chinook Salmon and a reduced number of IGH Chinook Salmon were coded-wire-tagged in 2020. As a result, no CWT known age-3 fish were sampled for the purpose of scale ageing in the Trinity River Basin in 2022. To account for this lack of CWT known-age-3 samples, the HVT, following the methods described in Satterthwaite et al. (2013), inserted CWT known-age-3 scale samples from collection year 2021 into the 2022 scale set to provide sufficient samples to validate age-3 reads. Satterthwaite et al. (2013) suggested that at least 20 known-age archived scales should be incorporated into validation matrices for each age class lacking an adequate sample size of known-age scales from the current year. HVT incorporated a total of 59 archived CWT known-age-3 samples into the 2022 collection. Archived samples from TRH (20), Willow Creek Weir (7), Hoopa Selective Harvest Weir (12), Hoopa Valley Tribal Harvest (net, hook-and-line, and Tribal creel) (19), and Lower Trinity Creel (1) were randomly incorporated into their respective sectors in the 2022 collection. Once reader validation was completed, these CWT known-age-3 were removed from the dataset prior to further calculations. For ageing scales from the Klamath River, the Yurok Tribe did not utilize this method but instead relied on a sufficient number of known-age IGH fish for scale reader validation.

Reference

Satterthwaite, W.H., M.R. O'Farrell, and M.S. Mohr. 2013. Klamath-Trinity Basin fall run Chinook Salmon scale age analysis evaluation. U. S. Department of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-522.

Appendix H. Final age composition of the 2021 Klamath Basin fall Chinook run.

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
<u>Hatchery Spawners</u>						
Iron Gate Hatchery (IGH)	494	4,862	2,096	54	7,012	7,506
Trinity River Hatchery (TRH)	129	5,523	315	0	5,838	5,967
Hatchery Spawner subtotal	623	10,385	2,411	54	12,850	13,473
<u>Natural Spawners</u>						
Salmon River Basin	263	738	1,152	0	1,890	2,153
Scott River Basin	655	344	962	0	1,306	1,961
Shasta River Basin	927	1,676	4,273	23	5,972	6,899
Bogus Creek Basin	423	961	1,281	11	2,253	2,676
Klamath River mainstem (IGH to Shasta R.)	343	946	809	7	1,762	2,105
Klamath River mainstem (Ash Cr. to Wingate Bar)	468	1,280	1,095	9	2,384	2,852
Klamath Tributaries (above Trinity River)	179	620	383	0	1,003	1,182
Mainstem Klamath (Persido Bar to Big Bar)	49	141	99	14	254	303
Blue Creek	<u>25</u>	<u>32</u>	<u>79</u>	<u>8</u>	<u>119</u>	<u>144</u>
Klamath Basin subtotal	3,332	6,738	10,133	72	16,943	20,275
Trinity River (mainstem above WCW)	3,220	11,928	861	0	12,789	16,009
Trinity River (mainstem below WCW)	18	66	5	0	70	88
Trinity Tributaries (above Reservation; below WCW)	33	121	9	0	130	163
Hoopla Reservation tributaries	<u>32</u>	<u>116</u>	<u>8</u>	<u>0</u>	<u>124</u>	<u>156</u>
Trinity Basin subtotal	3,303	12,231	883	0	13,113	16,416
Natural Spawners subtotal	6,635	18,969	11,015	72	30,056	36,691
Total Spawner Escapement	7,258	29,354	13,426	126	42,906	50,164
<u>Recreational Harvest</u>						
Klamath River (below Hwy 101 bridge)	138	100	147	2	249	387
Klamath River (Hwy 101 to Weitchpec)	2,161	728	166	6	900	3,061
Klamath River (Weitchpec to IGH)	74	287	288	4	579	653
Trinity River Basin (above WCW)	10	633	4	0	637	647
Trinity River Basin (below WCW)	16	55	0	0	55	71
Subtotals	2,399	1,803	605	12	2,420	4,819
<u>Tribal Harvest</u>						
Klamath River (below Hwy 101)	17	1,089	1,496	13	2,598	2,615
Klamath River (Hwy 101 to Trinity mouth)	144	1,540	1,249	53	2,842	2,986
Trinity River (net and hook-and-line)	136	1,591	566	0	2,156	2,292
Trinity River (harvest weir)	315	428	42	0	470	785
Subtotals	612	4,648	3,353	66	8,066	8,678
Total Harvest	3,011	6,451	3,958	78	10,486	13,497
<u>Totals</u>						
Harvest and Escapement	10,269	35,804	17,384	204	53,392	63,661
Recreational Angling Dropoff Mortality 2.04%	49	37	12	0	49	98
Tribal Net Dropoff Mortality 8.7%	26	372	292	7	671	697
Klamath-Trinity Basin Ich disease testing	6	61	50	2	113	119
Total River Run	10,350	36,274	17,738	213	54,225	64,575