

## Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2009 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 2009 was estimated to be:

<i>Age</i>	<i>Run Size</i>	
	<i>Number</i>	<i>Proportion</i>
2	11,938	0.11
3	78,708	0.70
4	16,387	0.15
5	5,653	0.05
<b>Total</b>	<b>112,686</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>	130,200	100,700	1.29
<i>Fishery Mortality</i>			
Tribal Harvest	30,900	28,400	1.09
Recreational Harvest	30,800	5,600	5.50
Drop-off Mortality	3,300	2,600	1.27
	65,000	36,600	1.78
<i>Escapement</i>			
Hatchery Spawners	24,600	19,600	1.26
Natural Area Spawners	40,700	44,600	0.91
	65,300	64,200	1.02

### 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 2009. The estimates provided in this report are consistent with the Klamath Basin Megatable (CDFG 2010) and with the 2010 forecast of ocean stock abundance (KRTT 2010).

Age-specific escapement estimates for 2009 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 2010). Cohort reconstruction results enable 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 2010). 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 obtain the data from which the Klamath Basin Megatable totals and estimates of age composition were derived. The KRTT relied on surrogate data where the sample of scales was insufficient for estimation of age composition, or was altogether lacking, within a particular sector.

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

In cases where scales were believed to be non-representative of the age-two 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-two, 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, known-age (CWT) length-frequencies. As before, scales were used to estimate the age composition of adults (Appendix A).

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

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

## Results

A total of 14,753 scales from 17 different sectors were aged for this analysis (Table 2). Of these, 1,594 were from known-age (CWT) fish. Known-age scales provide a direct check, or "validation," of accuracy of the scale-based age estimates (Tables 4a and 4b, Appendices D and E). Overall, the scale-based ages were generally accurate. For the Trinity River, accuracy was 100% for age-2 fish, 98% for age-3 fish, 93% for age-4 fish, and 100% for age-5 fish. For the Klamath River the accuracy was 97% for age-2 fish, 97% for age-3 fish, 84% age-4 fish, and 89% for age-5 fish. The statistical bias-adjustment methods employed are intended to correct for scale-reading bias, but the methods assume that the known-age vs. 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 2008 Klamath Basin age composition were slightly modified from the preliminary age composition. Final estimates are presented in Appendix G.

### List of Acronyms and Abbreviations

ad-clipped	adipose fin removed
CDFG	California Department of Fish and Game
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
M&U	Klamath River below Weitchpec: “middle” section (Hwy 101–Surpur Ck) and “upper” section (Surpur Ck—Trinity River)
SCS	Siskiyou County Schools
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

### Literature Cited

- CDFG (California Department of Fish and Game). 2010. Klamath River basin fall Chinook salmon spawner escapement, in-river harvest and run-size estimates, 1978–2009. Available from W. Sinnen, CDFG, 5341 Ericson Way, Arcata, CA 95521.
- Cook, R.C. and G.E. Lord. 1978. Identification of stocks of Bristol Bay sockeye salmon, *Oncorhynchus nerka*, by evaluating scale patterns with a polynomial discriminant method. *Fishery Bulletin* 76:415–423.
- Cook, R.C. 1983. Simulation and application of stock composition estimators. *Canadian Journal of Fisheries and Aquatic Sciences* 40:2113–2118.
- Goldwasser, L., M.S. Mohr, A.M. Grover, and M.L. Palmer-Zwahlen. 2001. The supporting databases and biological analyses for the revision of the Klamath Ocean Harvest Model. Available from M.S. Mohr, National Marine Fisheries Service, 110 Shaffer Road, Santa Cruz, CA 95060.
- Kimura, D.K. and Chikuni, S. 1987. Mixtures of empirical distributions: an iterative application of the age-length key. *Biometrics* 43:23–35.

KRTT (Klamath River Technical Team). 2010. Ocean abundance projections and prospective harvest levels for Klamath River fall Chinook, 2009 season. Available from the Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, OR 97220-1384. <<http://www.pccouncil.org/salmon/salother.html>>

Mohr, M.S. 2006a. The cohort reconstruction model for Klamath River fall Chinook salmon. Unpublished report. National Marine Fisheries Service, Santa Cruz, CA.

Mohr, M.S. 2006b. The Klamath Ocean Harvest Model (KOHM): model specification. Unpublished report. National Marine Fisheries Service, Santa Cruz, CA.

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Table 1. Estimation and sampling methods used for the 2009 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, marks. Systematic random sample ~10% bio-sampled <sup>a</sup> . All ad-clipped fish bio-sampled.	CDFG
Trinity River Hatchery (TRH)	Direct count. All fish bio-sampled. Scales collected from ~20% of all fish by systematic random sampling of aggregated ad- and non-ad-clipped fish.	CDFG, HVT
<b>Natural Spawners</b>		
Salmon River Basin	Redd count twice weekly. Adults = 2 * redd counts+live fish observed on last survey; total run = adults/(1-jack proportion from scale sample). Bio-data collected from carcasses. Total estimate was adjusted downward to account for spatiotemporal overlap of spring/fall Chinook.	CDFG,USFS,YT, KT, SRRC, SCS
Scott River Basin	Video count above weir at river mile 21, and mark-recapture carcass estimate (Schaefer) below weir with reaches surveyed twice weekly. Bio-data collected from all carcasses.	CDFG, SCS
Shasta River Basin	Video count above weir. Bio-data collected from carcasses upstream of video weir/trap site 1-day per week and mortalities stranded on weir. In addition, bio-data were collected from live fish sub-samples three days per week from a trap adjoining the video flume at the weir site.	CDFG, SCS
Bogus Creek Basin	Video count above weir and five days per week direct carcass count below weir. Bio-data taken from a systematic random sample (1:4). All ad-clipped fish were bio-sampled.	CDFG, YT
Klamath River mainstem (IGH to Shasta R)	Petersen mark-recapture carcass estimate. River sections are surveyed weekly. Bio-data collected from fresh carcasses.	USFWS, YT
Klamath River mainstem (Shasta R to Indian Cr)	Redd count based on weekly surveys. Adults = 2 * redd counts; total run = adults/(1-proportion jacks estimated in IGH to Shasta reach). No bio-data collected.	USFWS, KT
Klamath Tributaries (above Trinity, including Pine Creek)	Periodic redd surveys, the majority of which were performed weekly. Adults=2 * redd counts+live fish observed on last day surveyed. Total run = adults/(1-proportion jacks). Bio-data collected from all carcasses recovered.	USFS,CDFG
Blue Creek	Weekly surveys. Jacks and adults estimated as the peak count of successive weekly snorkel surveys. Bio-data collected from all fresh carcasses.	YT
Trinity River (mainstem above WCW)	Petersen mark-recapture run-size estimate; marks applied at WCW, recovered at TRH. All fish bio-sampled. Scales taken at WCW in systematic random sample (1:2). Total natural escapement calculated from WCW run size minus TRH return minus recreational harvest.	CDFG, HVT
Trinity River (mainstem below WCW)	Bi-weekly redd surveys. Adults = 2 * redd counts. Total run = adults/(1-proportion jacks estimated for upper Trinity natural escapement). Bio-samples from all recovered carcasses.	HVT
Trinity Tributaries (above Reservation; below WCW)	Redd surveys. Adults = 2 * redd counts plus live fish observed on the last survey date. Total run = adults/(1-proportion jacks estimated for upper Trinity natural escapement). No bio-data collected.	CDFG
Hoopa Reservation Tributaries	Redd surveys. Adults = 2 * redd counts. Total run = adults/(1-proportion jacks estimated for upper Trinity natural escapement). Bio-data collected.	HVT
<b>Recreational Harvest</b>		
Klamath River (below Hwy 101 bridge)	Jack and adult estimates based on access point creel survey during three randomly selected days per statistical week. Bio-data collected during angler interviews.	CDFG
Klamath River (Hwy 101 to Weitchpec)	Jack and adult estimates based on access point creel survey during three randomly selected days per statistical week. Bio-data collected during angler interviews.	CDFG
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. Upper river adult harvest=total adult harvest minus lower river adult harvest. Upper river total harvest=upper river adult harvest/(1-proportion jacks estimated by IGH and Bogus weighted average).	CDFG
Trinity River Basin (above WCW)	Jack and adult harvest estimates based on estimated harvest rates from recovery of reward tags (applied at WCW) multiplied by WCW jack and adult run sizes.	CDFG
Trinity River Basin (below WCW)	Roving access creel survey during three randomly selected days per statistical week stratified by weekdays and weekend days (1 weekday and 2 weekend). Bio-data collected during angler interviews.	HVT
<b>Tribal Harvest</b>		
Klamath River (below Hwy 101)	Daily harvest estimates based on effort and catch-per-effort surveys. Bio-data collected during net harvest and buying station interviews.	YT
Klamath River (Hwy 101 to Trinity mouth)	Daily harvest estimates based on effort and catch-per-effort surveys. Bio-data collected during net harvest interviews.	YT
Trinity River (Hoopa Reservation)	Effort and catch-per-effort surveys 4 random days per statistical week. Bio-data collected during net harvest interviews.	HVT
<b>Fishery Dropoff Mortality</b>		
Recreational Angling Dropoff Mortality 2.04%	Not directly estimated. Assumed rate relative to fishery impacts = .02; relative to fishery harvest = .02/(1-.02).	KRTAT
Tribal Net Dropoff Mortality 8.7%	Not directly estimated. Assumed rate relative to fishery impacts = .08; relative to fishery harvest = .08/(1-.08).	KRTAT

<sup>a</sup> Biological samples("bio-samples" or "bio-data") of live fish or carcasses generally include: sex, fork length, scales, tags or marks, and CWT recovery from ad-clipped fish.

Table 2. Scale sampling locations and numbers of scales collected for the 2009 Klamath Basin fall Chinook age-composition assessment.

Sampling Location	Scales collected			Total	Agency
	Read		Not read <sup>c/</sup>		
	Unknown-age <sup>a/</sup>	Known-age <sup>b/</sup>			
<b><u>Hatchery Spawners</u></b>					
Iron Gate Hatchery (IGH)	1,135	510	261	1,906	CDFG
Trinity River Hatchery (TRH)	1,163	309	9	1,481	HVT
<b><u>Natural Spawners</u></b>					
Salmon River Carcass Survey	223	1	11	235	CDFG
Scott River Carcass Survey	757	0	13	770	CDFG
Shasta River Carcass	372	0	427 <sup>d/</sup>	799	CDFG
Bogus Creek Weir	1,001	51	58	1,110	CDFG
Klamath River mainstem	1,154	0	6	1,160	USFWS
Upper Klamath River tributaries	215	0	22	237	USFS
Blue Creek Snorkle	70	0	4	74	YT
Willow Creek Weir	543	31	6	580	CDFG, HVT
Lower Trinity River Carcass	45	0	0	45	HVT
Lower Trinity River tributaries	18	0	0	18	HVT
<b><u>Recreational Harvest</u></b>					
Lower Klamath River Creel	1,522	77	44	1,643	CDFG
Lower Trinity River Creel	67	7	2	76	HVT
<b><u>Tribal Harvest</u></b>					
Klamath River (below Hwy 101)	1,278	389	2,504	4,171	YT
Klamath River (Hwy 101 to Trinity R)	2,149	58	96	2,303	YT
Trinity River (Hoopa Reservation)	1,447	161	15	1,623	HVT
<b>TOTAL</b>	<b>13,159</b>	<b>1,594</b>	<b>3,478</b>	<b>18,231</b>	

a/ Scales from non-ad-clipped fish and ad-clipped fish without CWTs, mounted and read. May include scales not used for a validation.

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

c/ Scales mounted and not read or scales not mounted.

d/ Includes weir washback collected scales which were read but not used due to over-representation of age-two fish.

Table 3. Age-composition methods used for the 2009 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 (Shasta R to Indian Cr)	Surrogate: Klamath mainstem (IGH to Shasta R) age-structure.
Klamath tributaries (above Reservation)	Jack/adult structure from scale-age analysis.
Blue Creek	Jacks estimated by direct observation. Adult structure from scale-age analysis.
Trinity River (above WCW)	Jack/adult structure derived from subtracting age specific TRH counts and recreational harvest estimate above WCW from the age specific total run estimate above WCW derived from scale-age analysis.
Trinity River (mainstem below WCW)	Surrogate: Mainstem natural spawners above WCW age-structure.
Trinity Tributaries (above Reservation to WCW)	Surrogate: Mainstem natural spawners above WCW age-structure.
Hoopa Reservation Tributaries	Surrogate: Mainstem natural spawners above WCW age-structure.
<b><u>Recreational Harvest</u></b>	
Klamath River (below Hwy 101 bridge)	Jack/adult structure from scale-age analysis.
Klamath River (Hwy 101 to Weitchpec)	Jack/adult structure from scale-age analysis.
Klamath River (Weitchpec to IGH)	Surrogate: IGH and Bogus Creek weighted age composition.
Trinity River Basin (above WCW)	Jack component based on estimated jack harvest rate. Surrogate: Adult age composition from Trinity River Basin 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)	Jacks component based on estimated jack harvest. Adult structure from scale-age analysis.
Klamath River (Hwy 101 to Trinity mouth)	Jack/adult structure from scale-age analysis.
Trinity River (Hoopa Reservation)	Jack/adult structure from scale-age analysis.

**Table 4a. 2009 Klamath River Basin scale validation matrices.**

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	145	6	0	0	Total 1088
	3	5	567	47	0	
	4	0	12	274	3	
	5	0	0	4	25	
Total		150	585	325	28	

  

<u>Percentage</u>		Known Age				
		2	3	4	5	
Read Age	2	0.97	0.01	0.00	0.00	Total 1.00
	3	0.03	0.97	0.14	0.00	
	4	0.00	0.02	0.84	0.11	
	5	0.00	0.00	0.01	0.89	
Total		1.00	1.00	1.00	1.00	

**Table 4b. 2009 Trinity River Basin scale validation matrices.**

<u>Number</u>		Known Age				
		2	3	4	5	
Read Age	2	9	0	0	0	Total 508
	3	0	440	3	0	
	4	0	11	42	0	
	5	0	0	0	3	
Total		9	451	45	3	

  

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

Table 5. Age composition of the 2009 Klamath Basin fall Chinook run.

<b>Escapement &amp; Harvest</b>	2	3	AGE 4	5	Total Adults	Total Run
<b><u>Hatchery Spawners</u></b>						
Iron Gate Hatchery (IGH)	1,229	8,982	3,184	97	12,263	13,492
Trinity River Hatchery (TRH)	143	6,867	444	39	7,351	7,494
<b>Hatchery Spawner subtotal</b>	<b>1,372</b>	<b>15,849</b>	<b>3,628</b>	<b>136</b>	<b>19,614</b>	<b>20,986</b>
<b><u>Natural Spawners</u></b>						
Salmon River Basin	516	1,291	511	403	2,204	2,720
Scott River Basin	44	1,794	106	267	2,167	2,211
Shasta River Basin	151	5,587	315	243	6,145	6,296
Bogus Creek Basin	471	4,836	552	66	5,455	5,926
Klamath River mainstem (IGH to Shasta R)	160	3,150	1,010	107	4,267	4,427
Klamath River mainstem (Shasta R to Indian Cr)	135	2,724	863	92	3,678	3,813
Klamath Tributaries (above Trinity, including Pine Creek)	175	2,793	168	134	3,094	3,269
Blue Creek	296	667	33	33	733	1,029
<b>Klamath Basin subtotal</b>	<b>1,948</b>	<b>22,842</b>	<b>3,558</b>	<b>1,345</b>	<b>27,743</b>	<b>29,691</b>
Trinity River (mainstem above WCW)	5,787	12,883	2,022	909	15,814	21,601
Trinity River (mainstem below WCW)	195	435	68	31	534	729
Trinity Tributaries (above Reservation; below WCW)	70	155	24	11	190	260
Hoopla Reservation tributaries	113	251	39	18	308	421
<b>Trinity Basin subtotal</b>	<b>6,165</b>	<b>13,724</b>	<b>2,153</b>	<b>969</b>	<b>16,846</b>	<b>23,011</b>
<b>Natural Spawners subtotal</b>	<b>8,113</b>	<b>36,566</b>	<b>5,711</b>	<b>2,314</b>	<b>44,589</b>	<b>52,702</b>
<b>Total Spawner Escapement</b>	<b>9,485</b>	<b>52,415</b>	<b>9,339</b>	<b>2,450</b>	<b>64,203</b>	<b>73,688</b>
<b><u>Recreational Harvest</u></b>						
Klamath River (below Hwy 101 bridge)	319	966	154	71	1,191	1,510
Klamath River (Hwy 101 to Weitchpec)	1,559	1,825	111	80	2,015	3,574
Klamath River (Weitchpec to IGH)	155	1,259	340	15	1,614	1,769
Trinity River Basin (above WCW)	146	389	57	37	483	629
Trinity River Basin (below WCW)	36	216	34	22	272	308
<b>Subtotals</b>	<b>2,215</b>	<b>4,655</b>	<b>696</b>	<b>225</b>	<b>5,575</b>	<b>7,790</b>
<b><u>Tribal Harvest</u></b>						
Klamath River (below Hwy 101)	43	13,055	4,216	2,194	19,465	19,508
Klamath River (Hwy 101 to Trinity mouth)	39	3,548	926	295	4,769	4,808
Trinity River (Hoopla Reservation)	96	3,217	689	247	4,153	4,249
<b>Subtotals</b>	<b>178</b>	<b>19,820</b>	<b>5,831</b>	<b>2,736</b>	<b>28,387</b>	<b>28,565</b>
<b>Total Harvest</b>	<b>2,393</b>	<b>24,475</b>	<b>6,527</b>	<b>2,961</b>	<b>33,962</b>	<b>36,355</b>
<b><u>Totals</u></b>						
Harvest and Escapement	11,878	76,890	15,866	5,411	98,165	110,043
Recreational Angling Dropoff Mortality 2.04%	45	95	14	5	114	159
Tribal Net Dropoff Mortality 8.7%	15	1,723	507	239	2,469	2,484
<b>Total River Run</b>	<b>11,938</b>	<b>78,708</b>	<b>16,387</b>	<b>5,653</b>	<b>100,748</b>	<b>112,686</b>

Table 6. Age proportion of the 2009 Klamath Basin fall Chinook run.

Escapement & Harvest	AGE			
	2	3	4	5
<b><u>Hatchery Spawners</u></b>				
Iron Gate Hatchery (IGH)	0.091	0.666	0.236	0.007
Trinity River Hatchery (TRH)	0.019	0.916	0.059	0.005
<b>Hatchery Spawner subtotal</b>	<u>0.065</u>	<u>0.755</u>	<u>0.173</u>	<u>0.006</u>
<b><u>Natural Spawners</u></b>				
Salmon River Basin	0.190	0.474	0.188	0.148
Scott River Basin	0.020	0.811	0.048	0.121
Shasta River Basin	0.024	0.887	0.050	0.039
Bogus Creek Basin	0.080	0.816	0.093	0.011
Klamath River mainstem (IGH to Shasta R)	0.036	0.712	0.228	0.024
Klamath River mainstem (Shasta R to Indian Cr)	0.035	0.714	0.226	0.024
Klamath tributaries (above Reservation)	0.053	0.854	0.051	0.041
Yurok Reservation tributaries	<u>0.288</u>	<u>0.648</u>	<u>0.032</u>	<u>0.032</u>
<b>Klamath Basin subtotal</b>	<u>0.066</u>	<u>0.769</u>	<u>0.120</u>	<u>0.045</u>
Trinity River (mainstem above WCW)	0.268	0.596	0.094	0.042
Trinity River (mainstem below WCW)	0.268	0.596	0.094	0.042
Trinity tributaries (above Reservation)	0.268	0.596	0.094	0.042
Hoopa Reservation tributaries	<u>0.268</u>	<u>0.596</u>	<u>0.094</u>	<u>0.042</u>
<b>Trinity Basin subtotal</b>	<u>0.268</u>	<u>0.596</u>	<u>0.094</u>	<u>0.042</u>
<b>Natural Spawners subtotal</b>	<u>0.154</u>	<u>0.694</u>	<u>0.108</u>	<u>0.044</u>
<b>Total Spawner Escapement</b>	0.129	0.711	0.127	0.033
<b><u>Recreational Harvest</u></b>				
Klamath River (below Hwy 101 bridge)	0.211	0.640	0.102	0.047
Klamath River (Hwy 101 to Weitchpec)	0.436	0.511	0.031	0.022
Klamath River (Weitchpec to IGH)	0.088	0.712	0.192	0.008
Trinity River Basin (above WCW)	0.232	0.618	0.091	0.059
Trinity River Basin (below WCW)	<u>0.117</u>	<u>0.700</u>	<u>0.110</u>	<u>0.073</u>
<b>Subtotals</b>	<u>0.284</u>	<u>0.598</u>	<u>0.089</u>	<u>0.029</u>
<b><u>Tribal Harvest</u></b>				
Klamath River (below Hwy 101)	0.002	0.669	0.216	0.112
Klamath River (Hwy 101 to Trinity mouth)	0.008	0.738	0.193	0.061
Trinity River (Hoopa Reservation)	<u>0.023</u>	<u>0.757</u>	<u>0.162</u>	<u>0.058</u>
<b>Subtotals</b>	<u>0.006</u>	<u>0.694</u>	<u>0.204</u>	<u>0.096</u>
<b>Total Harvest</b>	0.066	0.673	0.180	0.081
<b><u>Totals</u></b>				
Harvest and Escapement	0.108	0.699	0.144	0.049
Recreational Angling Dropoff Mortality 2.04%	0.283	0.597	0.088	0.031
Tribal Net Dropoff Mortality 8.7%	0.006	0.694	0.204	0.096
<b>Total River Run</b>	0.11	0.70	0.15	0.05

## 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 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 – 2009 Details.

### Iron Gate Hatchery

A systematic random bio-sample<sup>a</sup> was obtained from every tenth Chinook returning to IGH in 2009. Additionally every ad-clip fish not occurring in the random sample was bio-sampled as non-random. Scale-based age composition was used to apportion all age classes. Age composition was estimated from a total of 1,592<sup>b</sup> scales, of which 510 came from known-age CWT fish.

### Bogus Creek

Total run was estimated by summing carcasses encountered below the video weir and videography (since 2002) counts above the weir. Biological samples were obtained from all areas using a systematic random sample of 1:4. Additionally, biological data were obtained from a non-random collection of every ad-clipped fish encountered. Age composition was estimated from a total of 1,030<sup>b</sup> scales, of which 51 came from known-age CWT fish.

### Shasta River

Total run estimated by videography (since 1998). Bio-samples were collected from fish sampled in a trap located immediately upstream of the video flume, from all recovered carcasses for surveys in the lower seven miles on public and private lands where access is granted, and from an additional six miles on the upper Shasta River and Big Springs Creek. Bio-samples were also obtained from all fish that washed back onto the counting weir. Age composition was estimated from a total of 372 scales collected at the weir trap, of which none came from known-age, CWT fish.

### Scott River

Total escapement was obtained using a Schaefer carcass mark-recapture estimator for reaches below a resistance board weir installed near Jones Beach, river mile 21. Videography was used to estimate the population above the weir augmented with carcass surveys above the weir for biological samples. Bio-samples were obtained from all suitable carcasses encountered. Age composition was estimated based on a total of 757 scales collected, none of which none were from known-age CWT fish.

### Salmon River

In past years, carcass mark-recapture methods were used to estimate total fall Chinook spawners in the Salmon River. However, the 2009 mark-recapture data sheets were lost and the only information available was a summary of redd counts. The adult run estimate was obtained by multiplying total redd counts by two and adding the total of live fish observed during the final survey. Additionally, the number of adult spring Chinook salmon observed during snorkel surveys were subtracted from the total adult run. The total run (jacks and adults) was estimated by dividing the total adult fall Chinook salmon run by (1-proportion of jacks) in the run based on scale-age analysis. Age composition was estimated from a total of 224 scales of which one was from a known-age CWT fish.

### Klamath River Tributaries (above Reservation)

The adult run estimate was obtained by multiplying total redd counts by two and adding the total of live fish observed during the final survey in each tributary. Age composition was estimated from a total of 215 scales of which none were from known-age CWT fish.

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<sup>a</sup> Biological samples ("bio-samples") of live fish or carcasses generally included: sex, fork length, tags or marks, scales, and CWT recovery from ad-clipped fish.

<sup>b</sup> Age composition estimates are made from scales sampled at random. Discrepancies between the number of scales used to estimate age composition reported here, and the sum of known and unknown age scales in Table 2, are due to the omission of nonrandom samples.

### Klamath River Mainstem

For the upper reach (IGH to Shasta River section), the total population was estimated by combined Petersen carcass mark-recapture estimate. Age composition was estimated from a total of 1,154 scales of which none were from known-age CWT fish. For the lower reach (Shasta to Indian Creek section), the total number of observed redds from weekly surveys was multiplied by two to estimate the adult run. The total run (jacks and adults) was estimated by dividing the total adult estimate by (1-proportion of jacks) observed in the upper mainstem scale-age analysis. Age composition was estimated by using the upper mainstem scale-age analysis as a surrogate.

### Lower Klamath River Creel

The total harvest was estimated by creel census for the area from the Highway 101 bridge to the mouth and above the Highway 101 bridge to Weitchpec. Age composition for each area was estimated from a total of 421<sup>b</sup> scales of which 77 were from known-age CWT fish.

### Upper Klamath River Recreational Fishery

There was no creel census in this sub-area in 2009. Harvest data were available from creel census for the lower and upper river fisheries in 1999 through 2002. The ratio of average total adult harvest (upper river recreational harvest plus lower river recreational harvest) versus average adult harvest in the lower area for these years (ratio = 1.504) was used to estimate total Klamath river recreational harvest in 2009, given the estimated lower river harvest. The upper river harvest was then calculated indirectly by subtracting the lower river harvest from the total harvest. The number of jacks and adult age assignments were estimated by applying the scale-based age proportions obtained from the weighted average age composition of Bogus Creek and IGH combined.

### Yurok Tribal Estuary Fishery (Klamath mouth to Hwy 101)

Yurok harvest in the estuary area was estimated by hourly stratified effort and catch per effort methods. The fishery was closed on Wednesdays and Thursdays and between the hours of 10 PM and 8 AM on fishing days. Age composition was estimated from a total of 1,654<sup>b</sup> scales, of which 389 were from known-age, CWT fish.

### Yurok Tribal Above 101

Yurok harvest in this sub area was estimated by daily effort and catch per effort estimation. The fishery was closed on Wednesdays and Thursdays. Age composition was estimated from a total of 2,200<sup>b</sup> scales, of which 58 were from known-age CWT fish.

### Blue Creek

Peak count for jacks and adults from snorkel surveys and adult age-structure derived from scale samples. A total of 70 scales were used of which none were from known-age CWT fish.

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<sup>b</sup> Age composition estimates are made from scales sampled at random. Discrepancies between the number of scales used to estimate age composition reported here, and the sum of known and unknown age scales in Table 2, are due to the omission of nonrandom samples.

## **Appendix C. Trinity River – 2009 Details.**

### Trinity River Hatchery (TRH)

Sampling for scales was conducted in a systematic (1:5) random manner. Ad-clipped and non-ad-clipped fish were selected with equal probability. A total of 1,472 scales were aged, of which 309 scales came from known-age CWT fish. Scale samples were used to apportion all ages of the hatchery return.

### Upper Trinity River Recreational Harvest

The general method for estimating the upper Trinity recreational harvest depends on the application of reward/non-reward program tags at the Willow Creek Weir (WCW) and subsequently returned by anglers. The harvest of jacks and adults was estimated using harvest rate estimates based on returns of WCW program tags and the total run estimated above WCW. The adult age-proportions estimated for the Lower Trinity River Creel were used as a surrogate for the adult component.

### Lower Trinity River Creel

Roving creel census implemented in Trinity River below the WCW. A total of 74 scales were aged, of which 7 were from known-age CWT fish. Total harvest was apportioned by age using the scale-age proportions.

### Upper Trinity River Natural Escapement

Natural escapement in the upper Trinity River above WCW was estimated by subtracting the age-specific returns to TRH and age-specific recreational harvest above WCW from the total estimated run above WCW. The total run above WCW was estimated using Petersen mark-recapture methods. The age structure of the run (including jacks) was estimated using age-composition determined from scales collected at WCW applied to the total run. A total of 574 scales were aged, of which 31 were from known-age CWT fish.

### Lower Trinity River Natural Escapement:

The Lower Trinity natural escapement estimation area included total spawners estimated in both mainstem and tributary sub-areas (redds X 2). 45 scales were aged from the mainstem, and 18 scales were aged from the tributary sub-area. Ages were apportioned using the "Upper Trinity Natural Escapement" proportions as a surrogate due to the relatively low scale sample size for this sector.

### Hoopa Valley Tribal Harvest

Hoopa Valley Tribal harvest is a composite of the gillnet and hook-and-line fisheries prosecuted by Tribal members. A total of 1,608 scales were aged of which 161 were from known-age, CWT fish. The total harvest was apportioned by age using these scale-age proportions.

## Appendix D. 2009 Klamath age analysis

<b>Unknown scales age composition as read</b>					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	82	793	93	11	979
IGH	105	739	228	10	1,082
SALMON	42	110	41	30	223
SCOTT	21	601	53	82	757
SHASTA (trap)	12	323	24	13	372
MAINSTEM	48	838	240	28	1,154
UR TRIBS	13	180	14	8	215
LRC EST	73	220	36	15	344
LRC UP	503	595	45	24	1,167
YTFP EST	5	867	261	132	1,265
YTFP M&U	33	1,591	395	123	2,142
BLUE CRK	21	44	3	2	70
	958	6901	1433	478	9770

  

<b>Unknown scales corrected age proportions (Kimura method)</b>					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	0.0780	0.8194	0.0913	0.0113	1.0
IGH	0.0933	0.6667	0.2328	0.0071	1.0
SALMON	0.1898	0.4744	0.1877	0.1481	1.0
SCOTT	0.0201	0.8113	0.0480	0.1207	1.0
SHASTA (trap)	0.0240	0.8876	0.0500	0.0384	1.0
MAINSTEM	0.0355	0.7142	0.2262	0.0241	1.0
UR TRIBS	0.0535	0.8543	0.0512	0.0410	1.0
LRC EST	0.2128	0.6372	0.1026	0.0474	1.0
LRC UP	0.4405	0.5063	0.0305	0.0226	1.0
YTFP EST	0.0000	0.6720	0.2141	0.1139	1.0
YTFP M&U	0.0081	0.7373	0.1930	0.0617	1.0
BLUE CRK	0.3036	0.6334	0.0314	0.0316	1.0

  

<b>Known CWT ages <sup>/a</sup></b>					
	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	16	49	19	0	84
IGH	45	524	231	6	806
SALMON	0	0	0	0	0
SCOTT	0	0	0	0	0
SHASTA	0	0	0	1	1
MAINSTEM	4	5	14	1	24
UR TRIBS	0	0	0	0	0
LRC	5	53	4	0	62
YTFP EST	0	155	106	7	268
YTFP M&U	0	19	3	0	22
BLUE CRK	0	0	0	0	0
	70	805	377	15	1267

  

<b>Breakout within strata</b>					
Bogus1	3	17	8	0	28
Bogus2	13	32	11	0	56
LRC - lo	1	15	1	0	17
LRC - mid	4	38	3	0	45
YTFP MID	0	12	2	0	14
YTFP UP	0	7	1	0	8

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

Appendix E. 2009 Trinity age analysis

WCW = Willow Ck. Weir

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable	6	0	0	0	0	6
	2	111	0	0	0	0	111
	3	362	0	30	0	0	392
	4	52	0	0	1	0	53
	5	1	0	0	0	0	18
	543	0	30	1	0	580	

LOWTRINREC = Lower Trinity Recreational

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable	2	0	0	0	0	2
	2	8	0	0	0	0	8
	3	46	0	6	0	0	52
	4	8	0	0	1	0	9
	5	5	0	0	0	0	5
	67	0	6	1	0	76	

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

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable	14	0	1	0	0	15
	2	34	0	0	0	0	34
	3	1078	0	137	2	0	1217
	4	248	0	4	17	0	269
	5	87	0	0	0	1	88
	1461	0	142	19	1	1623	

TRH = Trinity River Hatchery

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable	8	0	1	0	0	9
	2	21	9	0	0	0	30
	3	1047	0	267	1	0	1315
	4	89	0	7	23	0	119
	5	6	0	0	0	2	8
	1163	9	275	24	2	1481	

LOWTRINTRIBS = Lower Trinity Tribs

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable	0	0	0	0	0	0
	2	5	0	0	0	0	5
	3	9	0	0	0	0	9
	4	1	0	0	0	0	1
	5	3	0	0	0	0	3
	18	0	0	0	0	18	

UPKLAMREC Upper Klamath Recreational

NO DATA

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

LOWTRINMAINSTEM = Lower Trinity Mainstem

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable	0	0	0	0	0	0
	2	3	0	0	0	0	3
	3	18	0	0	0	0	18
	4	8	0	0	0	0	8
	5	16	0	0	0	0	16
	45	0	0	0	0	45	

TribesAboveHoopa

NO DATA

		Cwt Age					
		no cwt	2	3	4	5	Total
Scale Ages	unreadable						
	2						
	3						
	4						
	5						
	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	
4x4	2	9	0	0	0	0
	3	0	440	3	0	0
	4	0	11	42	0	0
	5	0	0	0	3	0.972440945

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

		2	3	4	5
2	1.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.9756	0.0667	0.0000	0.0000
4	0.0000	0.0244	0.9333	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	1.0000

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

known scales	31	161	7	309	0	508
unknown scales	543	1447	67	1163	18	3283

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

		2	3	4	5
2	1.0233	0.0000	0.0000	0.0000	0.0000
3	-0.0233	1.0000	-0.0126	0.0000	0.0000
4	0.0000	0.0000	1.0126	0.0000	0.0000
5	0.0000	0.0000	0.0000	1.0000	0.0000

UNKNOWN CWTS

		26	3	133	(Estimated)		(Estimated)	
		Willow Creek Weir	Hoopa Tribal	Lower Trinity	TRH	Lower Trinity	Upper Trinity	Hoopa
Age		WCW	NET HARVEST	REC HARVEST	HATCHERY	CARCASS	REC HARVEST	Hook&Line
2	0	0	0	0	37	0	2	31
3	0	142	6	1463	0	0	45	727
4	0	19	1	103	0	0	3	51
5	0	1	0	9	0	0	0	4
	0	162	7	1612	0	0	51	814

WCW scales

		known age	Total age	WCW age
		age	all scales	proportions
Age	WCW nocwts	known age	Total age	WCW age
2	111	0	111	0.2044
3	368	0	368	0.6775
4	46	0	46	0.0849
5	18	0	18	0.0331
	543	0	543	1.0000

Total Adults only

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

		ADULTS ONLY		TRH + Rec above WCW+Natural		Add each season if needed		Apportioned Natural Escapement minus TRH #s minus above WCW creel #s	
		Age	proportions	Escapement	Fudge	Escapement	Props		
Rec above WCW	629 CDFG	2	0.2044	6076	0	5787	0.2679		
TRH	7494 Megatable	3	0.6775	20139	0	12883	0.5964		
Naturals	21601 Megatable	4	0.0849	2524	0	2022	0.0936		
Total	29724	5	0.0331	985	0	909	0.0421		
				29724					

Appendix F. 2009 Klamath Basin fall Chinook age-composition calculation worksheet.

Hatchery spawners	# Grilse	# Adults	Total Run	CALCULATED AGE					Total	SCALE AGE PROPORTIONS (unknowns)					Unk. Age Scales Read	Length Freq or Redds Live
				2	3	4	5	Total		2	3	4	5	Total		
Iron Gate Hatchery (IGH)	1229	12263	13492	1229	8982	3184	97	13492	scales 0.0933	0.6667	0.2328	0.0071	1.0	1,082	<=58cm	
Trinity River Hatchery (TRH)	143	7351	7494	143	6867	444	39	7494	IGH cwt 45	524	231	6	806			
<i>Hatchery spawner subtotal:</i>	<i>1372</i>	<i>19614</i>	<i>20986</i>	<i>1372</i>	<i>15849</i>	<i>3628</i>	<i>136</i>	<i>20986</i>	scales 0.01806	0.9188	0.0580	0.0052	1.0	1163	<=57cm	
		prop. hatchery grilse 0.065							TRH cwt 37	1463	103	9	1612			
<b>Natural Spawners</b>									proportion hatchery 0.186							
Trinity River mainstem above WCW	5787	15814	21601	5787	12883	2022	909	21601	scales 0.26790	0.59640	0.09362	0.04208	1.0	543		
Trinity River mainstem below WCW	195	534	729	195	435	68	31	729	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		267	
Salmon River Basin (includes Wooley Cr)	516	2204	2720	516	1291	511	403	2720	scales 0.18980	0.47440	0.18772	0.14809	1.0	223	1183 108	
Scott River	44	2167	2211	44	1794	106	267	2211	scales 0.02009	0.81128	0.04797	0.12066	1.0	757	<=58cm	
Shasta River	151	6145	6296	151	5587	315	243	6296	scales 0.02395	0.88755	0.05004	0.03845	1.0	372	<=59cm	
									Shasta CWT 0	0	0	1	1			
Bogus Creek	471	5455	5926	471	4836	552	66	5926	scales 0.07795	0.81942	0.09130	0.01133	1.0	979	<=58cm	
									Bogus CWT 16	49	19	0	84			
Mainstem Klamath (IGH to Shasta R)	160	4267	4427	160	3150	1010	107	4427	scales 0.03545	0.71425	0.22625	0.02406	1.0	1,154	<=58cm	
									KR main CWT 4	5	14	1	24			
Mainstem Klamath (Shasta R to Indian Cr)	135	3678	3813	135	2724	863	92	3813	Upper Main 0.03545	0.71425	0.22625	0.02406	1.0	IGH to Shasta	1839	
<i>Main basin subtotals:</i>	<i>7,459</i>	<i>40,264</i>	<i>47,723</i>	<i>7,459</i>	<i>32,700</i>	<i>5,447</i>	<i>2,118</i>	<i>47,723</i>								
<b>Klamath Tributaries</b>																
Aiken Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Beaver Cr	32	565	597	32	510	31	24	597	scales 0.05349	0.85430	0.05124	0.04097	1.0		278 9	
Bluff Cr	1	21	22	1	19	1	1	22	scales 0.05349	0.85430	0.05124	0.04097	1.0		10 1	
Boise Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Camp Cr	26	462	488	26	417	25	20	488	scales 0.05349	0.85430	0.05124	0.04097	1.0		224 14	
Clear Cr	17	297	314	17	268	16	13	314	scales 0.05349	0.85430	0.05124	0.04097	1.0		145 7	
Dillon Cr	8	137	145	8	124	7	6	145	scales 0.05349	0.85430	0.05124	0.04097	1.0		62 13	
Elk Cr	16	285	301	16	257	15	12	301	scales 0.05349	0.85430	0.05124	0.04097	1.0		138 9	
Grider Cr	19	338	357	19	305	18	15	357	scales 0.05349	0.85430	0.05124	0.04097	1.0		167 4	
Horse Cr	5	80	85	5	72	4	3	85	scales 0.05349	0.85430	0.05124	0.04097	1.0		40 0	
Independence Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Indian Cr	30	523	553	30	472	28	23	553	scales 0.05349	0.85430	0.05124	0.04097	1.0		258 7	
Irving Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Perch Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Red Cap Cr	12	209	221	12	189	11	9	221	scales 0.05349	0.85430	0.05124	0.04097	1.0		101 7	
Rock Cr	1	23	24	1	21	1	1	24	scales 0.05349	0.85430	0.05124	0.04097	1.0		11 1	
Slate Cr	0	4	4	0	4	0	0	4	scales 0.05349	0.85430	0.05124	0.04097	1.0		2 0	
Seiad Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Thompson Cr	8	150	158	8	135	8	6	158	scales 0.05349	0.85430	0.05124	0.04097	1.0		72 6	
TI Cr	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
Pine Cr (previously in Trin Tribs)	0	0	0	0	0	0	0	0	scales 0.05349	0.85430	0.05124	0.04097	1.0		0 0	
<i>Klamath trib subtotal:</i>	<i>175</i>	<i>3094</i>	<i>3269</i>	<i>175</i>	<i>2793</i>	<i>168</i>	<i>134</i>	<i>3269</i>							1508 78	
<b>Trinity Tributaries</b>									SURROGATE - Trinity River Mainstem above WCW							
Horse Linto Cr	59	160	219	59	130	20	9	219	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		80 9	
Cedar Cr (trib to Horse Linto)	11	30	41	11	24	4	2	41	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		15 1	
<i>Trinity trib subtotal:</i>	<i>70</i>	<i>190</i>	<i>260</i>	<i>70</i>	<i>155</i>	<i>24</i>	<i>11</i>	<i>260</i>								
<i>Non-reservation trib subtotal:</i>	<i>245</i>	<i>3284</i>	<i>3529</i>	<i>245</i>	<i>2948</i>	<i>192</i>	<i>145</i>	<i>3529</i>								
<b>Reservation Tributaries-Hoopa Valley</b>																
Campbell Cr	0	0	0	0	0	0	0	0	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		0	
Hostler Cr	0	0	0	0	0	0	0	0	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		0	
Mill Cr	86	236	322	86	192	30	14	322	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		118	
Pine Cr. (moved in 2007 to Klam trib)																
Soctish Cr	0	0	0	0	0	0	0	0	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		0	
Supply Cr	2	6	8	2	5	1	0	8	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		3	
Tish Tang Cr	24	66	90	24	54	8	4	90	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		33	
Other	0	0	0	0	0	0	0	0	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		0	
<i>HVT reservation trib subtotal:</i>	<i>113</i>	<i>308</i>	<i>421</i>	<i>113</i>	<i>251</i>	<i>39</i>	<i>18</i>	<i>421</i>	Above WCW 0.26790	0.59640	0.09362	0.04208	1.0		154	
<b>Reservation Tributaries-Yurok</b>																
Blue Cr	296	733	1029	296	667	33	33	1029	scales count	0.90956	0.04511	0.04533	1.0	70		
<i>Reservation tributaries subtotal:</i>	<i>409</i>	<i>1041</i>	<i>1450</i>	<i>409</i>	<i>918</i>	<i>72</i>	<i>51</i>	<i>1450</i>								
<i>Natural spawner subtotal:</i>	<i>8113</i>	<i>44589</i>	<i>52702</i>	<i>8113</i>	<i>36566</i>	<i>5711</i>	<i>2314</i>	<i>52702</i>								
<b>Total spawners:</b>	<b>9485</b>	<b>64203</b>	<b>73688</b>	<b>9485</b>	<b>52415</b>	<b>9339</b>	<b>2450</b>	<b>73688</b>								
<b>Angler Harvest</b>																
Klamath River (below Hwy 101)	319	1191	1510	319	966	154	71	1510	scales 0.21277	0.63721	0.10260	0.04742	1.0	344	<=55	
									est-LRC CWT 1	15	1	0	17			
Klamath River (Hwy 101 to Weitchpec)	1559	2015	3574	1559	1825	111	80	3574	scales 0.44051	0.50633	0.03054	0.02261	1.0	1,167	<=55	
									mid-LRC CWT 4	38	3	0	45			
									SURROGATE - Iron Gate+Bogus Weighted Totals							
									1700	13818	3737	163	19418			
Klamath River (Weitchpec to IGH)	155	1614	1769	155	1259	340	15	1769	IGH+Bogus 0.08756	0.71162	0.19244	0.00838	1.0		<=55	
									SURROGATE - Trinity Rec. Harvest below WCW - adults only							
Trinity River (above Willow Cr. Weir)	146	483	629	146	389	57	37	629	TR LRC count	0.79064	0.12462	0.08475	1.0	grilse harvest rat	<=54	
									TR-up CWT 2	45	3	0	49	Paper CWTs		
Trinity River (below Willow Cr. Weir)	36	272	308	36	216	34	22	308	scales 0.11940	0.69623	0.10974	0.07463	1.0	67		
									TR-low CWT 0	6	1	0	7			
<i>Angler harvest subtotal:</i>	<i>2,215</i>	<i>5,575</i>	<i>7,790</i>	<i>2,215</i>	<i>4,655</i>	<i>696</i>	<i>225</i>	<i>7,790</i>								
<b>Tribal Harvest</b>																
Klamath River (Estuary)	43	19465	19508	43	13055	4216	2194	19508	scales count	0.6720	0.2141	0.1139	1.0	1,265	<=58cm	
									YTFP EST CWT 0	155	106	7	268			
Klamath River (101 to Trinity R)	39	4769	4808	39	3548	926	295	4808	scales 0.0081	0.7373	0.1930	0.0617	1.0	2,142	<=58cm	
									YTFP MU CWT 0	19	3	0	22			
Trinity River	96	4153	4249	96	3217	689	247	4249	scales 0.02350	0.75241	0.16397	0.06012	1.0	1447		
									HVT CWT 0	142	19	1	162			

**Appendix G. Age composition of the 2008 Klamath River fall Chinook run (finalized Feb 03, 2010).**

Escapement & Harvest	AGE				Total Adults	Total Run
	2	3	4	5		
<b>Hatchery Spawners</b>						
Iron Gate Hatchery (IGH)	2,130	5,530	3,551	21	9,101	11,231
Trinity River Hatchery (TRH)	801	1,485	2,961	5	4,451	5,252
<b>Hatchery Spawner subtotal</b>	<b>2,931</b>	<b>7,015</b>	<b>6,512</b>	<b>26</b>	<b>13,552</b>	<b>16,483</b>
<b>Natural Spawners</b>						
Salmon River Basin	650	431	1,286	32	1,749	2,399
Scott River Basin	1,228	167	3,227	51	3,445	4,673
Shasta River Basin	3,621	1,222	1,456	63	2,741	6,362
Bogus Creek Basin	1,565	1,076	1,911	14	3,001	4,566
Klamath River mainstem (IGH to Shasta R)	834	960	3068	33	4,060	4,894
Klamath River mainstem (Shasta R to Indian Cr)	365	415	1341	14	1,770	2,135
Klamath Tributaries (above Trinity, including Pine Creek)	1,073	396	1,416	33	1,845	2,918
Blue Creek	89	76	242	91	409	498
<b>Klamath Basin subtotal</b>	<b>9,425</b>	<b>4,743</b>	<b>13,947</b>	<b>330</b>	<b>19,020</b>	<b>28,445</b>
Trinity River (mainstem above WCW)	6,861	2,429	7,902	77	10,408	17,269
Trinity River (mainstem below WCW)	394	140	454	4	598	992
Trinity tributaries (above Reservation)	158	56	182	2	240	398
Hoopa Reservation tributaries	385	136	443	4	584	969
<b>Trinity Basin subtotal</b>	<b>7,798</b>	<b>2,761</b>	<b>8,981</b>	<b>87</b>	<b>11,830</b>	<b>19,628</b>
<b>Natural Spawners subtotal</b>	<b>17,223</b>	<b>7,504</b>	<b>22,928</b>	<b>417</b>	<b>30,850</b>	<b>48,073</b>
<b>Total Spawner Escapement</b>	<b>20,154</b>	<b>14,519</b>	<b>29,440</b>	<b>443</b>	<b>44,402</b>	<b>64,556</b>
<b>Recreational Harvest</b>						
Klamath River (below Hwy 101 bridge)	521	36	99	7	141	662
Klamath River (Hwy 101 to Weitchpec)	3,358	219	633	44	896	4,254
Klamath River (Weitchpec to IGH)	160	285	236	1	523	683
Trinity River Basin (above WCW)	194	54	227	0	281	475
Trinity River Basin (below WCW)	75	14	65	0	78	153
<b>Subtotals</b>	<b>4,308</b>	<b>608</b>	<b>1,260</b>	<b>52</b>	<b>1,919</b>	<b>6,227</b>
<b>Tribal Harvest</b>						
Klamath River (below Hwy 101)	302	2,546	14,102	1,062	17,710	18,012
Klamath River (Hwy 101 to Trinity mouth)	187	445	2,122	70	2,636	2,823
Trinity River (Hoopa Reservation)	152	234	1,667	12	1,913	2,065
<b>Subtotals</b>	<b>641</b>	<b>3,225</b>	<b>17,891</b>	<b>1,144</b>	<b>22,259</b>	<b>22,900</b>
<b>Total Harvest</b>	<b>4,949</b>	<b>3,833</b>	<b>19,151</b>	<b>1,196</b>	<b>24,178</b>	<b>29,127</b>
<b>Totals</b>						
Harvest and Escapement	25,103	18,352	48,591	1,639	68,580	93,683
Recreational Angling Dropoff Mortality 2.04%	88	12	26	1	39	127
Tribal Net Dropoff Mortality 8.7%	56	280	1,556	99	1,935	1,991
<b>Total River Run</b>	<b>25,247</b>	<b>18,644</b>	<b>50,173</b>	<b>1,737</b>	<b>70,554</b>	<b>95,801</b>