Klamath River Fall Chinook Age-Specific Escapement, River Harvest, and Run Size Estimates, 2007 Run

Klamath River Technical Advisory Team
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Executive Summary

The number of Klamath River fall Chinook returning to the Klamath River Basin (Basin) in 2007 was estimated to be:

	Run Size	
Age	Number	Proportion
2	1,661	0.01
3	112,207	0.85
4	16,713	0.13
5	1,587	0.01
Total	132,168	1.00

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

	Adults		
Sector	Preseason Forecast	Postseason Estimate	Pre / Post
Run Size	121,800	130,500	0.93
Fishery Mortality			
Tribal Harvest	40,800	27,400	1.49
Recreational Harvest	10,600	5,900	1.80
Drop-off Mortality	3,800	2,500	1.52
	55,200	35,800	1.54
Escapement			
Hatchery Spawners	31,600	35,000	0.90
Natural Area Spawners	35,000	59,700	0.59
	66,600	94,700	0.70

Introduction

This report describes the data and methods used by the Klamath River Technical Advisory Team (KRTAT) to estimate age-specific numbers of fall Chinook returning to the Basin in 2007. The estimates provided in this report are consistent with the Klamath Basin Megatable (CDFG 2008) and with the 2008 forecast of ocean stock abundance (KRTAT 2008).

Age-specific escapement estimates for 2007 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 (KRTAT 2008, Mohr 2006a, Goldwasser et al. 2001). 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 (KRTAT 2008). 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 the Klamath River fall Chinook stock.

Methods

The KRTAT 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 KRTAT 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 person arbitrated. Statistical methods (Kimura and Chikuni 1987, Cook and Lord 1978, Cook 1983) 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 age-composition is described in Appendix A.

In cases where scales were believed to be non-representative of the age-two component, the KRTAT 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 that immigrated above the 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 of 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 KRTAT 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 12,627 scales from 17 different sectors were aged for this analysis (Table 2). Of these, 1,527 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 undetermined for age-2 fish[1], 99% for age-3 fish, 85% for age-4 fish, and 75% for age-5 fish. For the Klamath

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[1] There were zero known age-2 scale samples (of 15 scales read) recovered for the Trinity River scale validation matrix. The four-by-four scale age validation matrix must have entries for at least one read of a known-age fish within each of four age categories (2, 3, 4, 5) to return a valid bias correction matrix. An entry was artificially applied to the validation matrix signifying that an age-2 fish was validated by a CWT as being read accurately, hence there is no correction of age-2 scale ages.

River the accuracy was 93% for age-2 fish, 97% for age-3 fish, 85% age-4 fish, and 75% 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. Calculations underlying the results summarized in Table 1 are presented in Appendix F.

The final estimates of the 2006 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
M&U   Klamath River below Weitchpec: "middle" section (Hwy 101–Surpur Ck) and "upper" section (Surpur Ck—Trinity River)
SRRC   Salmon River Restoration Council
TRH   Trinity River Hatchery
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 2007 Klamath Basin fall Chinook run

Sampling Location	Estimation and Sampling Methods	Agency
Hatchery Spawners		
Iron Gate Hatchery (IGH)	Direct count. Scales collected, and fork length (FL) and sex noted for a systematic random sample (~10%) of returns and all ad-clipped fish.	CDFG
Trinity River Hatchery (TRH)	Direct count. FL, ad-clip, and sex information recorded for all fish. Scales collected from ~20% of all fish by systematic random sampling of both ad- and non-ad-clipped fish.	CDFG
Natural Spawners		
Salmon River Basin	Redd count based on weekly surveys. Adults = 2*redd counts+last survey live count; total run = adults/(1-%jacks estimated from scale sample proportion).	CDFG,USFS,YT, KT, SRRC
Scott River Basin	Mark-recapture carcass estimate. River is surveyed twice weekly. Scales collected and FLs and ad-clips noted from all fresh carcasses.	CDFG
Shasta River Basin	Video count. Scales collected and FLs, sex, and ad-clips noted from carcasses upstream of video weir site and mortalities stranded on weir.	CDFG
Bogus Creek Basin	Video count above weir, direct carcass count below weir. Scales collected, and FLs, sex, and ad-clips noted in both areas by 1:4 systematic sampling and from non-random ad-clipped fish.	CDFG
Klamath River mainstem (IGH to Shasta R)	Petersen mark-recapture carcass estimate based on weekly surveys to estimate adults. Total Run=adults/(1-%jacks estimated from scale sampling proportion). Scales collected and FLs, sex and ad-clips noted 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-%jacks estimated in Klamath River Mainstem).	USFWS
Klamath tributaries (above Reservation)	Periodic redd surveys. Adults = 2*redd counts+live fish observed on last day surveyed. Total run=adults/(1-%jacks estimated from unweighted average of Shasta, Scott, and Salmon scale proportions). Note: Pine Creek moved to Klamath tributaries; in previous years, it was included in Trinity tributaries.	USFS,CDFG, HVT
Yurok Reservation tributaries	Only surveyed stream is Blue Creek. Jacks and adults estimated as the peak count of successive weekly snorkel surveys.	YT
Trinity River Basin (above WCW)	Petersen mark-recapture run-size estimate; marks applied at WCW, recaptured at TRH. FL and ad-clip information recorded for all fish at TRH. Scales taken at WCW by systematic random sample (1:2). Total natural escapement calculated from WCW run size minus TRH return minus upper Trinity River recreational harvest.	CDFG, HVT
Trinity River mainstem (below WCW)	Redd surveys. Adults = 2*redd counts. Total run = adults / % adults based on natural escapement estimated above WCW.	HVT
Trinity tributaries (above Hoopa Reservation to WCW)	Redd surveys. Only stream surveyed in 2007 was Horse Linto Cr. Adults = 2 * redd counts. Total run = adults / % adults based on natural escapement above WCW data.	USFS, CDFG
Hoopa Reservation tributaries	Redd surveys. Adults = 2*redd counts. Total run = adults / % adults of surrogate (natural escapement estimated above WCW).	HVT
Recreational Harvest		
Klamath River (below Hwy 101 bridge)	Total harvest estimate based on weekly stratified, access point creel survey on two randomly selected days per statistical week (one weekday and one weekend). Scales collected and FL and ad-clips noted during angler interviews.	CDFG
Klamath River (Hwy 101 to Weitchpec)	Total harvest estimate based on weekly stratified, access point creel survey, on two randomly selected days per statistical week (one weekday and one weekend). Scales collected and FL and ad-clips noted during angler interviews.	CDFG
Klamath River (Weitchpec to IGH)	No survey; ratio of adult harvest in lower river to adult harvest in the upper river (1999-2002 data) used to project upper river harvest. Total run = adults / (1-% jacks from weighted IGH and Bogus creek age composition combined).	CDFG
Trinity River Basin (above WCW)	Adult harvest: Estimated adult harvest rate from recovery of reward/non-reward tags (applied at WCW) multiplied by estimated adult run size above WCW. Jack harvest: Estimated jack harvest rate from recovery of reward/non-reward tags (applied at WCW) multiplied by estimated jack run size above WCW.	CDFG
Trinity River Basin (below WCW)	Estimate based on a three randomly selected days per statistical week stratified (weekday/weekend day), roving creel survey. Scales collected and FLs and ad-clips noted during angler interviews.	HVT
Tribal Harvest		
Klamath River (below Hwy 101)	Stratified (night/day), hourly effort and catch-per-effort surveys. Scales collected and FLs and ad-clips noted during net harvest interviews.	YT
Klamath River (Hwy 101 to Trinity mouth)	Daily effort and catch-per-effort surveys. Scales collected and FLs and ad-clips noted during net harvest interviews.	YT
Trinity River (Hoopa Reservation)	Two-stage effort and catch-per-effort surveys. Scales collected and FLs and ad-clips noted during net harvest interviews.	HVT
Fishery Dropoff Mortality		
Recreational Angling Dropoff Mortality 2.04%	Not directly estimated. Assumed rate relative to fishery impacts = .02; relative to fishery harvest = .02/(1-.02).	KRTT (1986)
Tribal Net Dropoff Mortality 8.70%	Not directly estimated. Assumed rate relative to fishery impacts = .08; relative to fishery harvest = .08/(1-.08).	KRTT (1986)

Table 2. Scale sampling locations and numbers of scales collected for the 2007 Klamath Basin fall Chinook age-composition assessment.

| Sampling Location | Scales collected | | | | Agency |
| | Read | | Not read [c] | Total | |
	Unknown-age [a]	Known-age [b]			
Hatchery Spawners					
Iron Gate Hatchery (IGH)	1,053	460	1,364	2,877	CDFG
Trinity River Hatchery (TRH)	2,700	772	34	3,506	HVT
Natural Spawners					
Salmon River Carcass Survey	133	0	10	143	CDFG, USFS
Scott River Carcass Survey	1,299	0	154	1,453	CDFG, USFS
Shasta River Weir & Carcass	133	0	227	360	CDFG
Bogus Creek Weir	788	20	43	851	CDFG
Klamath River mainstem	1,094	8	19	1,121	USFWS
Upper Klamath River tributaries	0	0	38	38	USFS
Blue Creek Snorkle	19	0	1	20	YT
Willow Creek Weir	371	25	5	401	CDFG, HVT
Lower Trinity River Carcass	0	0	0	0	HVT
Lower Trinity River tributaries	1	0	0	1	HVT
Recreational Harvest					
Lower Klamath River Creel	735	33	14	782	CDFG
Lower Trinity River Creel	70	17	2	89	HVT
Tribal Harvest					
Klamath River (below Hwy 101)	1,174	60	1,205	2,439	YT
Klamath River (Hwy 101 to Trinity R)	819	34	109	962	YT
Trinity River (Hoopa Reservation)	711	98	12	821	HVT
TOTAL	11,100	1,527	3,237	15,864	

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

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.

Table 3. Age-composition methods used for the 2007 Klamath Basin fall Chinook run assessment.

Sampling Location	Age Composition Method
Hatchery Spawners	
Iron Gate Hatchery (IGH)	Jack/adult structure from scale-age analysis.
Trinity River Hatchery (TRH)	Jacks (<48cm) from length frequency and adult structure from scale-age
Natural Spawners	
Salmon River Basin	Jack/adult structure from scale-age analysis.
Scott River Basin	Jack/adult structure from scale-age analysis.
Shasta River Basin	Jack/adult structure from scale-age analysis of carcass scale samples only.
Bogus Creek Basin	Jack/adult structure from scale-age analysis.
Klamath River mainstem (IGH to Shasta R)	Jacks estimated from subtracting adult estimate from total. 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)	Surrogate: Unweighted average age structure from the Shasta, Scott and Salmon Rivers.
Yurok Reservation tributaries	Jacks estimated by direct observation. Adult structure from scale-age analysis
Trinity River (above WCW)	Indirect estimation: WCW run (age structure from scales) minus age-structured TRH return minus age structured recreational harvest estimate above WCW.
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.
Recreational Harvest	
Klamath River (below Hwy 101 bridge)	Jacks (<51 cm) from length frequency and adult structure from scale-age analysis from Estuary to Weitchpec areas combined.
Klamath River (Hwy 101 to Weitchpec)	Jacks (<51 cm) from length frequency and adult structure from scale-age analysis from estuary to Weitchpec areas combined.
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. Surrogate: Adult age composition from Trinity River Basin Recreational Harvest (below WCW).
Trinity River Basin (below WCW)	Jack/adult structure from scale-age analysis.
Tribal Harvest	
Klamath River (below Hwy 101)	Jacks (<51cm) from length frequency and 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. 2007 Klamath River Basin scale validation matrices.

Number		Known Age				
		2	3	4	5	
	2	39	2	0	0	
Read	3	3	650	5	1	
Age	4	0	15	53	4	
	5	0	0	4	15	Total
	Total	42	667	62	20	791

Percentage		Known Age				
		2	3	4	5	
	2	0.93	0.00	0.00	0.00	
Read	3	0.07	0.97	0.08	0.05	
Age	4	0.00	0.02	0.85	0.20	
	5	0.00	0.00	0.06	0.75	
	Total	1.00	1.00	1.00	1.00	

Table 4b. 2007 Trinity River Basin scale validation matrices.

Number		Known Age				
		2	3	4	5	
	2	1	0	0	0	
Read	3	0	879	3	0	
Age	4	0	9	17	1	
	5	0	0	0	3	Total
	Total	1	888	20	4	913

Percentage		Known Age				
		2	3	4	5	
	2	1.00	0.00	0.00	0.00	
Read	3	0.00	0.99	0.15	0.00	
Age	4	0.00	0.01	0.85	0.25	
	5	0.00	0.00	0.00	0.75	
	Total	1.00	1.00	1.00	0.00	

Table 5. Age composition of the 2007 Klamath Basin fall Chinook run.

Escapement & Harvest	AGE 2	3	4	5	Total Adults	Total Run
Hatchery Spawners						
Iron Gate Hatchery (IGH)	180	16,528	381	59	16,969	17,149
Trinity River Hatchery (TRH)	34	17,489	471	63	18,023	18,057
Hatchery Spawner subtotal	**214**	**34,017**	**852**	**122**	**34,992**	**35,206**
Natural Spawners						
Salmon River Basin	55	1,004	373	0	1,377	1,432
Scott River Basin	11	3,397	1,097	0	4,494	4,505
Shasta River Basin	27	1,855	146	8	2,009	2,036
Bogus Creek Basin	64	4,513	144	20	4,677	4,741
Klamath River mainstem (IGH to Shasta R)	33	4979	464	15	5,457	5,490
Klamath River mainstem (Shasta R to Indian Cr)	8	1299	121	4	1,424	1,432
Klamath tributaries (above Reservation)	26	1,136	276	2	1,414	1,440
Yurok Reservation tributaries	8	114	244	69	428	436
Klamath Basin subtotal	232	18,297	2,865	118	21,280	21,512
Trinity River (mainstem above WCW)	821	35,123	2,786	144	38,053	38,874
Trinity River (mainstem below WCW)	1	54	4	0	58	59
Trinity tributaries (above Reservation)	5	227	18	1	246	251
Hoopa Reservation tributaries	2	87	7	0	94	96
Trinity Basin subtotal	829	35,491	2,815	145	38,451	39,280
Natural Spawners subtotal	**1,061**	**53,788**	**5,680**	**263**	**59,731**	**60,792**
Total Spawner Escapement	**1,275**	**87,805**	**6,532**	**385**	**94,723**	**95,998**
Recreational Harvest						
Klamath River (below Hwy 101 bridge)	20	969	105	23	1,097	1,117
Klamath River (Hwy 101 to Weitchpec)	218	1,953	212	46	2,211	2,429
Klamath River (Weitchpec to IGH)	17	1,463	37	5	1,505	1,522
Trinity River Basin (above WCW)	78	614	73	0	687	765
Trinity River Basin (below WCW)	23	357	44	0	401	424
Subtotals	**356**	**5,356**	**471**	**75**	**5,901**	**6,257**
Tribal Harvest						
Klamath River (below Hwy 101)	16	14,229	8,141	952	23,322	23,338
Klamath River (Hwy 101 to Trinity mouth)	5	1,274	446	41	1,761	1,766
Trinity River (Hoopa Reservation)	0	1,919	337	42	2,298	2,298
Subtotals	**21**	**17,422**	**8,923**	**1,035**	**27,381**	**27,402**
Total Harvest	**377**	**22,778**	**9,394**	**1,110**	**33,282**	**33,659**
Totals						
Harvest and Escapement	1,652	110,583	15,926	1,495	128,005	129,657
Recreational Angling Dropoff Mortality 2.04%	7	109	10	2	120	127
Tribal Net Dropoff Mortality 8.7%	2	1,515	776	90	2,381	2,383
Total River Run	**1,661**	**112,207**	**16,712**	**1,587**	**130,506**	**132,167**

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):

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

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 – 2007 Details.

Iron Gate Hatchery
A systematic random bio-sample[a] was obtained from every tenth Chinook returning to IGH in 2008. Additionally every ad-clip fish not occurring in the random sample was bio-sampled as nonrandom. A representative sub-sample was obtained by systematically discarding every third scale sample packet obtained in the random 1:10 bio sample collected at IGH. Scale-based age compositions were used to apportion all age classes. A total of 1,513 scales were aged and 460 were 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. There were a total of 808 scales aged of which 20 were from known-age, CWT fish. All age classes were apportioned by scale-based analysis.

Shasta River
Total run estimated by videography (as since 1998) while bio samples were collected from carcass surveys and fish that washed back onto the counting weir. There were a total of 133 scales aged (from carcass surveys, excluding "wash-back" samples) of which none were from known-age, CWT fish. Scale-age proportions derived from the carcass survey samples were used for apportioning all age classes.

Scott River
Total escapement was obtained using a Petersen carcass mark-recapture estimator. There were a total of 1,299 scales aged of which none were from known-age fish.   Scale age proportions were used to assign all ages.

Salmon River
In past years, carcass mark-recapture was use to estimate total fall Chinook spawners in Salmon River. However, concern over the low number of marks applied and recoveries made in the carcass survey resulted in using redd counts to estimate escapement. A total of 873 redds were counted in the Basin of which 250 were credited to spring Chinook spawners. Deducting spring Chinook redds and multiplying the resulting 623 redds by two resulted in an estimate of 1,246 adult fall Chinook. A total of 131 live fish observed on the last day were added to the redd-count estimate yielding a total estimate of 1,377 adults. Scale age proportions were used to assign all ages. A total of 133 scales were aged, none of which were from known-age, CWT fish.

Klamath River Tributaries
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. Due to insufficient collection of scales, Chinook from these tributaries were apportioned by age using a surrogate of un-weighted average proportions estimated for the Salmon, Shasta, and Scott rivers combined.

Klamath River Mainstem
For the upper reach (IGH to Shasta River section), 1,102 scales were aged, 8 of which were from known-age CWT fish. Total adults (>50 cm) were estimated by combined Petersen K-sample (multiple mark, multiple recapture). The number of jacks and adult age assignments were estimated by applying the scale-based age proportions obtained from bio-sampled fish from this sector.

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

Redds were multiplied by two to estimate the adult run in the lower reach (Shasta to Indian Creek section). The scale-age proportions from upper reach were used as surrogate to estimate jacks and assign adult age proportions.

Lower Klamath River Creel
The total harvest of 3,546 was estimated by creel census for the combined area (above Highway 101 bridge to Weitchpec, and Highway 101 bridge to mouth). A total of 768 scales were aged, of which 33 were taken from known-age, CWT fish. Jacks were estimated for the estuary area using a <51cm "cut-off", resulting in 20 jacks and 1,097 adults harvested. For the area from the 101 Bridge up to Weitchpec, the <51 cm "cut-off" resulted in 218 jacks and 2,211 adults harvested. Adult age proportions were assigned using the combined scale samples obtained from both sub-areas.

Upper Klamath River Recreational Fishery
There was no creel census in this sub-area in 2007. Harvest data were available from creel census of the lower and upper river fisheries in 1999 through 2002. The ratio of average harvest in the upper area versus average harvest in the lower area for these years was used to estimate adult harvest in the upper area in 2007, given the estimated lower-river 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 Irongate Hatchery 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 adult harvest total was allocated by age using scales obtained in this fishery. Jacks were estimated as the proportion of fish <51cm in the bio-sample in the fishery because of an unexpectedly high age-2 scale-age proportion. A total of 1,234 scales were aged of which 60 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. Yurok harvest in the mid and upper-Klamath area was segregated into jacks and adults based upon scale ageing. A total of 853 scales were aged of which 34 came from known-age, CWT fish.

Blue Creek
Snorkel surveys were used to produce the total escapement estimate. The peak count yielded 436 Chinook, of which 8 were classified as jacks by visual estimation. Scale-based age proportions from 19 scales collected from Blue Creek Chinook carcasses were used for adult age assignments.

Appendix C: Trinity River – 2007 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 3,472 scales were aged of which 772 scales came from CWT fish. The jack component was estimated based on a < 48 cm cut off for age-2 fish. Scale samples were used to apportion the adult hatchery return into age classes.

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 CWT "run-size" analysis allocated proportions of tag codes observed at TRH to natural spawning areas and the recreational fishery occurring in the river reach between TRH and WCW. In 2007, CDFG reported a 1.21% harvest rate on adult Chinook based on return of adult program tags. The jack harvest rate of 8.33% was based on return of only one program tag from the 12 tags applied at WCW yielding an estimated harvest of 78 age-2 Chinook. There were no scales recovered from this fishery as no creel census was implemented in 2007. The adult age-proportions estimated for the Lower Trinity River Creel were used to apportion the Upper Trinity River Recreational Harvest adult component.

Lower Trinity River Creel
Roving creel census implemented in Trinity River below the location of the WCW. A total of 87 scales were aged of which 17 were from known-age fish. Total harvest was apportioned by age using the scale-age proportions.

Upper Trinity River Natural Escapement
Total run estimated using a Petersen mark-recapture estimator. The methods used for ageing the Trinity River run above WCW are similar to those used in the estimation of the population, apportioned to three general recovery areas: Trinity River Hatchery, Trinity upper-basin natural spawning escapement, and recreational harvest. At WCW a systematic random sampling (1:2) of all fish examined produces a collection of scales for program marked fish, some of which are Ad-clipped (Trinity River Hatchery origin). Validation of WCW scales is accomplished with known-age fish later recovered at either TRH or natural spawning areas which are also referenced to WCW by a unique "program tag" (spaghetti tag applied at WCW with unique identifying number). A total of 396 scales were aged in estimation of the WCW run including 25 known-age CWT records subsequently recovered at TRH.

The age-structure for fish passing above WCW was estimated using these scales and known-age fish recovered in upper river areas which are linked to the scale samples. Next, specific age structures are estimated for fish returning to TRH and the recreational fishery. These proportions are applied to the total hatchery escapement and estimated fishery harvest respectively providing totals by age within area. These totals are next deducted from the WCW run apportioned by age resulting in an age-structure for the natural escapement in the upper Trinity River.

Lower Trinity River Natural Escapement:
The Lower Trinity natural escapement estimation area included total spawners estimated in both main-stem and tributary sub-areas (redds X 2). No scales were collected from the mainstem, and only one scale was collected from the tributary sub-area. Ages were apportioned using the "Upper Trinity Natural Escapement" proportions as a surrogate.

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 809 scales were aged of which 98 were from known-age fish. The total harvest was apportioned by age using these scale-age proportions.

Appendix D. 2007 Klamath age analysis

Unknown scales age composition as read

	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	12	734	38	4	788
IGH	13	994	42	4	1,053
SALMON	5	94	32	2	133
SCOTT	6	980	296	17	1,299
SHASTA (carcass only)	2	119	11	1	133
MAINSTEM	9	975	102	8	1,094
UR TRIBS	0	0	0	0	0
LRC	55	593	72	15	735
YTFP EST	6	731	375	62	1,174
YTFP M&U	4	591	196	28	819
BLUE CRK	0	6	10	3	19
	112	5817	1174	144	7247

Unknown scales corrected age proportions (Kimura method)

	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	0.0133	0.9521	0.0304	0.0042	1.0
IGH	0.0102	0.9660	0.0205	0.0033	1.0
SALMON	0.0382	0.7010	0.2608	0.0000	1.0
SCOTT	0.0025	0.7541	0.2434	0.0000	1.0
SHASTA (carcass only)	0.0133	0.9110	0.0719	0.0038	1.0
MAINSTEM	0.0059	0.9070	0.0846	0.0025	1.0
UR TRIBS	0.0000	0.0000	0.0000	0.0000	0.0
LRC	0.0780	0.8139	0.0886	0.0196	1.0
YTFP EST	0.0035	0.6078	0.3482	0.0405	1.0
YTFP M&U	0.0029	0.7179	0.2555	0.0236	1.0
BLUE CRK	0.0000	0.2675	0.5711	0.1614	1.0

Known CWT ages [a]

	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	1	21	1	0	23
IGH	13	655	45	5	718
SALMON	0	0	0	0	0
SCOTT	0	0	0	0	0
SHASTA	0	1	0	0	1
MAINSTEM	0	22	1	1	24
UR TRIBS	0	0	0	0	0
LRC	0	32	2	0	34
YTFP EST	0	46	15	8	69
YTFP M&U	0	33	4	0	37
BLUE CRK	0	0	0	0	0
	14	810	68	14	906
Breakout within strata					
Bogus1	0	7	1	0	8
Bogus2	1	14	0	0	15
LRC - lo	0	4	0	0	4
LRC - mid	0	28	2	0	30
YTFP MID	0	2	0	0	2
YTFP UP	0	31	4	0	35

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

Appendix E. 2007 Trinity age analysis

WCW = Willow Ck. Weir — Cwt Age

		no cwt	2	3	4	5	Total
	unreadable	5	0	0	0	0	5
	2	6	0	0	0	0	6
Scale	3	342	0	25	0	0	367
Ages	4	22	0	0	0	0	22
25	5	1	0	0	0	0	1
17							
371		376	0	25	0	0	401

LOWTRINREC = Lower Trinity Recreational — Cwt Age

		no cwt	2	3	4	5	Total
	unreadable	1	0	1	0	0	2
	2	4	0	0	0	0	4
Scale	3	59	0	17	0	0	76
Ages	4	7	0	0	0	0	7
	5	0	0	0	0	0	0
70		71	0	18	0	0	89

HUPAHARV = Hoopa Tribal Net Harvest plus Tribal Hook-and-Line — Cwt Age

		no cwt	2	3	4	5	Total
	unreadable	7	0	3	1	0	11
	2	0	0	0	0	0	0
Scale	3	600	0	92	1	0	693
Ages	4	101	0	2	2	0	105
98	5	10	0	0	0	1	11
711		718	0	97	4	1	820

772

TRH = Trinity River Hatchery — Cwt Age

		no cwt	2	3	4	5	Total
	unreadable	29	0	4	0	1	34
	2	5	0	0	0	0	5
Scale	3	2602	0	745	2	0	3349
Ages	4	87	0	7	15	1	110
	5	6	0	0	0	2	8
2700		2729	0	756	17	4	3506

LOWTRINTRIBS = Lower Trinity Tribs — Cwt Age

		no cwt	2	3	4	5	Total
	unreadable	0	0	0	0	0	0
	2	0	0	0	0	0	0
Scale	3	0	0	0	0	0	0
Ages	4	1	0	0	0	0	0
0	5	0	0	0	0	0	0
1		1	0	0	0	0	1

UPKLAMREC Upper Klamath Recreational — not sampled in 07 — Cwt Age

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

LOWTRINMAINSTEM = Lower Trinity Mainstem — Cwt Age

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

TribsAboveHoopa — NO DATA — Cwt Age

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

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

VALIDATION MATRIX

	2	3	4	5
2	1	0	0	0
3	0	879	3	0
4	0	9	17	1
5	0	0	0	3

4x4 — 913

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

	2	3	4	5
2	1.0000	0.0000	0.0000	0.0000
3	0.0000	0.9899	0.1500	0.0000
4	0.0000	0.0101	0.8500	0.2500
5	0.0000	0.0000	0.0000	0.7500

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

known scales	25	98	17	772			0	912
# unknown scales	371	711	70	2700			1	3853

Age	Willow Creek Weir WCW	Hoopa Tribal NET HARVEST	Lower Trinity REC HARVEST	TRH HATCHERY	Lower Trinity CARCASS	Upper Trinity REC HARVEST	Upper Trin Nat Escape	Lower Trin Tribs
2	0.0162	0.0000	0.0571	0.0019			0.0211	0.0000
3	0.9225	0.8295	0.8352	0.9697		0.8858	0.9035	0.0000
4	0.0577	0.1517	0.1077	0.0255		0.1142	0.0717	1.0000
5	0.0036	0.0188	0.0000	0.0030		0.0000	0.0037	0.0000
	1	1	1	1		1	1	1 kimura used

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

	2	3	4	5
2	1.0057	-0.0185	0.0005	-0.0005
3	-0.0058	1.0468	-0.0283	0.0283
4	0.0002	-0.0288	1.0458	-1.0458
5	0.0000	0.0005	-0.0180	2.0180

UNKNOWN CWTS — 21 — 0 — 39

CWTS Age	Willow Creek Weir WCW	Hoopa Tribal NET HARVEST	Lower Trinity REC HARVEST	TRH HATCHERY	Lower Trinity CARCASS	Upper Trinity REC HARVEST (Estimated)	Upper Trinity Natural (Estimated)	Hoopa Hook&Line
2	0	0	0	4		2	12	
3	0	98	17	3784		67	1678	
4	0	4	0	111		2	49	
5	0	1	0	21		0	9	
	0	103	17	3920		71	1748	

WCW scales

Age	Corrected proportions applied to 371 unknown WCW nocwts	known cwts scales	Total age all scales	WCW age proportions
2	6	0	6	0.0162
3	342	0	342	0.9225
4	21	0	21	0.0577
5	1	0	1	0.0036
	371	0	371	

Total Adult + Jacks
Natural Escapement, Trinity basin above WCW: Apportioned to age structure.

Rec above WCW	765	CDFG
TRH	18057	Megatable
Naturals	38874	Megatable
Total	57696	

Age	proportions	TRH + Rec above WCW+Natural Escapement	Add each season if needed Fudge	Apportioned Natural Escapement minus TRH #s minus above WCW creel #s Escapement	Props
2	0.0162	933	0	821	0.0211
3	0.9225	53226	0	35123	0.9035
4	0.0577	3329	0	2786	0.0717
5	0.0036	207	0	144	0.0037
		57696			

Appendix F. 2007 Klamath Basin fall Chinook age-composition calculation worksheet.

Feb 8,2008 Noon   2007

Hatchery spawners	# Grilse	# Adults	Total Run	CALCULATED AGE 2	3	4	5 Total		SCALE AGE PROPORTIONS (unknowns) 2	3	4	5 Total		Scales read or	Length Freq & Redd counts
Iron Gate Hatchery (IGH)	180	16969	17149	180	16528	381	59	17149	scales	0.0102	0.9660	0.0205	0.0033	1.0	1,053	<=50cm
									IGH cwts	13	655	45	5	718		
Trinity River Hatchery (TRH)	34	18023	18057	34	17489	471	63	18057	scales	count	0.9715	0.0255	0.0030	1.000	2700	<48cm act count
									TRH cwts	4	3784	111	21	3916		
Hatchery spawner subtotal:	214	34992	35206	214	34017	852	122	35206								
					proportion hatchery		0.266									
Natural Spawners															Redds	Live adults
Trinity River mainstem above WCW	821	38053	38874	821	35123	2786	144	38874	scales	0.02112	0.90350	0.07166	0.00372	1.0		
Trinity River mainstem below WCW	1	58	59	1	54	4	0	59		0.02112	0.90350	0.07166	0.00372	1.0 TR above WCW	29	
Salmon River Basin (includes Wooley Cr)	55	1377	1432	55	1004	373	0	1432	scales	0.03822	0.70100	0.26077	0.00000	1.0	133	623 131
Scott River	11	4494	4505	11	3397	1097	0	4505	scales	0.00254	0.75405	0.24341	0.00000	1.0	1,299	<=50cm
Shasta River	27	2009	2036	27	1855	146	8	2036	scales	0.01325	0.91102	0.07189	0.00384	1.0	133	<=48cm
									Shasta CWT	0	1	0	0	1		
Bogus Creek	64	4677	4741	64	4513	144	20	4741	scales	0.01333	0.95213	0.03039	0.00415	1.0	788	<=51cm
									Bogus CWT	1	21	1	0	23		
Main stem Klamath (IGH to Shasta R)	33	5457	5490	33	4979	464	15	5490	scales	0.00593	0.90697	0.08463	0.00247	1.0	1,094	<=50cm
										0	22	1	1	24		
Main stem Klamath (Shasta R to Indian Cr)	8	1424	1432	8	1299	121	4	1432	Upper main	0.00593	0.90697	0.08463	0.00247	1.0 Upper Klam main		712 redds
subtotal:	1,020	57,549	58,569	1,020	52,224	5,135	191	58,569								
				Iron Gate+Bogus Weighted Totals (up Klam creel surrogate					Unweighted Salmon Scott Shasta (SSS) - SURROGATE							
		Surrogate		244	21041	526	79	21890	SSS	0.01800	0.78869	0.19202	0.00128	1.0		Redds Live adults
Klamath Tributaries																
Aiken Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128		0	0
Beaver Cr.	6	353	359	6	284	69	0	359	SSS	0.01800	0.78869	0.19202	0.00128		128	97
Bluff Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128		0	0
Boise Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128		0	0
Camp Cr.	4	229	233	4	184	45	0	233	SSS	0.01800	0.78869	0.19202	0.00128		100	29
Clear Cr.	3	158	161	3	127	31	0	161	SSS	0.01800	0.78869	0.19202	0.00128		52	54
Dillon Cr.	0	27	27	0	22	5	0	27	SSS	0.01800	0.78869	0.19202	0.00128		10	7
Elk Cr.	2	109	111	2	88	21	0	111	SSS	0.01800	0.78869	0.19202	0.00128		51	7
Grider Cr.	3	148	151	3	119	29	0	151	SSS	0.01800	0.78869	0.19202	0.00128		73	2
Horse Cr.	1	59	60	1	47	12	0	60	SSS	0.01800	0.78869	0.19202	0.00128		23	13
Independence Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128		0	0
Indian Cr.	3	174	177	3	140	34	0	177	SSS	0.01800	0.78869	0.19202	0.00128		85	4
Irving Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128		0	0
Perch Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128		0	0
Red Cap Cr.	2	99	101	2	80	19	0	101	SSS	0.01800	0.78869	0.19202	0.00128		48	3
Slate Cr	0	3	3	0	2	1	0	3	SSS	0.01800	0.78869	0.19202	0.00128		1	1
Seiad	0	11	11	0	9	2	0	11	SSS	0.01800	0.78869	0.19202	0.00128		5	1
Thompson Cr.	1	34	35	1	27	7	0	35	SSS	0.01800	0.78869	0.19202	0.00128		16	2
Ti Cr.	0	0	0	0	0	0	0	0	SSS	0.01800	0.78869	0.19202	0.00128	0.98	0	0
Pine Cr (previously in Trin Tribs)	0	10	10	0	8	2	0	10	SSS	0.01800	0.78869	0.19202	0.00128		5	0
Klamath Tribs subtotal	26	1414	1440	26	1136	276	2	1440			0.80315	0.19554	0.00130		597	220
Trinity Tributaries										SURROGATE Trinity River Mainstem						
Horse Linto Cr.	4	188	192	4	174	14	1	192	scales	0.02112	0.90350	0.07166	0.00372	1.0		94 redds
Cedar Cr (trib to Horse Linto)	1	58	59	1	54	4	0	59	scales	0.02112	0.90350	0.07166	0.00372	1.0		29 redds
subtotal	5	246	251	5	227	18	1	251								
Non-Reservation Misc. tribs sub total	31	1660	1691	31	1363	294	3	1691								
Reservation Tributaries-Hoopa Valley															Redds	Live adults
Campbell Cr.	0	0	0	0	0	0	0	0	scales	0.02112	0.90350	0.07166	0.00372		0	
Hostler	0	6	6	0	6	0	0	6	scales	0.02112	0.90350	0.07166	0.00372		3	
Mill	1	32	33	1	30	2	0	33	scales	0.02112	0.90350	0.07166	0.00372		16	
Pine Cr. (moved in 2007 to Klam tribs)															5	
Soctish	0	0	0	0	0	0	0	0	scales	0.02112	0.90350	0.07166	0.00372		0	
Supply Cr.	1	24	25	1	22	2	0	25	scales	0.02112	0.90350	0.07166	0.00372		12	
Tish Tang Cr.	1	32	33	1	30	2	0	33	scales	0.02112	0.90350	0.07166	0.00372		16	
Others	0	0	0	0	0	0	0	0	scales	0.02112	0.90350	0.07166	0.00372		0	
subtotal	2	94	96	2	87	7	0	96	scales	0.02112	0.90350	0.07166	0.00372		52	
Reservation Tributaries-Yurok				0	0	0										
Blue Cr.	8	428	436	8	114	244	69	436	scales	count	0.26751	0.57106	0.16143	1.00	19	
reservation tributaries subtotal	10	522	532	10	201	251	69	532								
Natural spawner subtotal:	1061	59731	60792	1061	53788	5680	263	60792								
Total spawner subtotal:	1275	94723	95998	1275	87805	6532	385	95998								
Angler Harvest																
Klamath River (below Hwy 101)	20	1097	1117	20	969	105	23	1117	LRC scales	count	0.88266	0.09609	0.02125	1.00	735	<=50cm
				0.018					LRC cwts	0	4	0	0	4		
Klamath River (Hwy 101 to Weichpec)	218	2211	2429	218	1953	212	46	2429	LRC scales	count	0.88266	0.09609	0.02125	1.00		<=50cm
				0.090					LRC cwts	0	28	2	0	30		
Klamath River (Weitchpec to IGH)	17	1505	1522	17	1463	37	5	1522		0.01115	0.96123	0.02402	0.00360	1.00 Surrogate IGH+Bogus weighted		
												0.971				
Trinity River (above Willow Cr. Weir)	78	687	765	78	614	73	0	765	h rate		0.88578	0.11422	0.00000	1.00 Surrogate adults -lowr creel		
									upper cwts	2	67	0	0	69		
Trinity River (below Willow Cr. Weir)	23	401	424	23	357	44	0	424	scales	0.05714	0.83517	0.10769	0.00000	1.00	70	
									lower cwts	0	17	0	0	17		
Angler harvest subtotal:	356	5,901	6,257	356	5,356	471	74	6,257								
Tribal Harvest										fixed prop based on LF						
Klamath River (Estuary)	16	23322	23338	16	14229	8141	952	23338	scales	0.0007	0.60995	0.34944	0.04061	1	1,174	<=50cm
									YTFP EST cwt	0	46	15	8	69		
Klamath River (101 to Trinity R)	5	1761	1766	5	1274	446	41	1766	scales	0.00294	0.71791	0.25555	0.02360	1	819	
									YTFP MU cwt	0	33	4	0	37	0	
Trinity River	0	2298	2298	0	1919	337	42	2298	scales	0.00000	0.82953	0.15172	0.01875	1	711	
									Hoopa cwts	0	98	4	1	103		
Tribal harvest subtotal:	21	27381	27402	21	17422	8924	1035	27402								
Total harvest	377	33282	33659	377	22778	9395	1109	33659								
Totals																
In-river run and escapement	1652	128005	129657	1652	110583	15927	1494	129657								
Angling dropoff mortality (2.04%)	7	120	127	7	109	10	2	128	0.02041 angler dropoff mort rate on harvest							
Net dropoff mortality (8.7%)	2	2381	2383	2	1515	776	90	2383	0.08696 net dropoff mort rate on harvest							
Total in-river run	1661	130506	132167	1661	112207	16713	1587	132168	age comp of adults in total run							
				1%	85%	13%	1%				84.9%	12.6%	1.2% 98.7%			

Appendix G. Age composition of the 2006 Klamath River fall Chinook run (finalized Feb 6, 2008).

Escapement & Harvest	2	3	AGE 4	5	Total Adults	Total Run
Hatchery Spawners						
Iron Gate Hatchery (IGH)	2,386	4,215	7,251	138	11,604	13,990
Trinity River Hatchery (TRH)	4,076	2,576	5,244	97	7,918	11,994
Hatchery Spawner subtotal	**6,462**	**6,791**	**12,495**	**235**	**19,522**	**25,984**
Natural Spawners						
Salmon River Basin	791	698	580	0	1,278	2,069
Scott River Basin	1,953	1,759	1,247	1	3,007	4,960
Shasta River Basin	1,395	151	625	13	789	2,184
Bogus Creek Basin	765	1,398	1,930	41	3,368	4,133
Klamath River mainstem (IGH to Shasta R)	577	1048	1904	120	3,072	3,649
Klamath River mainstem (Shasta R to Indian Cr)	276	500	908	58	1,466	1,742
Klamath Tributaries (above Reservation)	739	659	506	0	1,165	1,904
Yurok Reservation Tributaries	20	67	52	0	119	139
Klamath Basin subtotal	6,516	6,280	7,752	232	14,264	20,780
Trinity River (mainstem above WCW)	7,545	2,579	12,254	415	15,249	22,794
Trinity River (mainstem below WCW)	62	21	101	3	126	188
Trinity Tributaries (above Reservation)	70	24	114	4	142	212
Hoopa Reservation Tributaries	189	65	307	10	382	571
Trinity Basin subtotal	7,866	2,689	12,776	432	15,899	23,765
Natural Spawners subtotal	**14,382**	**8,969**	**20,528**	**664**	**30,163**	**44,545**
Total Spawner Escapement	**20,844**	**15,760**	**33,023**	**899**	**49,685**	**70,529**
Recreational Harvest						
Klamath River (below Hwy 101 bridge)	60	0	1	0	1	61
Klamath River (Hwy 101 to Weitchpec)	4,421	1	30	7	38	4,459
Klamath River (Weitchpec to IGH)	721	7	11	0	18	739
Trinity River Basin (above WCW)	124	0	0	0	0	124
Trinity River Basin (below WCW)	201	5	0	0	5	206
Subtotals	**5,527**	**13**	**42**	**7**	**62**	**5,589**
Tribal Harvest						
Klamath River (below Hwy 101)	30	688	1,944	94	2,726	2,756
Klamath River (Hwy 101 to Trinity mouth)	240	965	2,300	132	3,396	3,636
Trinity River (Hoopa Reservation)	145	736	3,325	100	4,161	4,306
Subtotals	**415**	**2,388**	**7,569**	**326**	**10,283**	**10,698**
Total Harvest	**5,942**	**2,401**	**7,611**	**333**	**10,345**	**16,287**
Totals						
Harvest and Escapement	26,786	18,161	40,634	1,232	60,030	86,816
Recreational Angling Dropoff Mortality 2.04%	113	23	52	2	77	190
Tribal Net Dropoff Mortality 8.7%	36	208	658	28	894	930
Recreational fishery hook-and-release adult mortality	0	112	253	8	373	373
Total River Run	**26,935**	**18,505**	**41,597**	**1,272**	**61,374**	**88,309**