

Klamath River Fall Chinook Age-Specific Escapement, River Harvest, and Run Size Estimates, 2004 Run¹

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 2004 was estimated to be:

<i>Age</i>	<i>Run Size</i>	
	<i>Number</i>	<i>Proportion</i>
2	9,700	0.11
3	33,200	0.37
4	40,600	0.46
5	5,300	0.06
Total	88,800	1.00

Preseason forecasts of the number of fall chinook 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>Run Size</i>	96,800	79,100
<i>Fishery Mortality</i>		
Tribal Harvest	31,100	25,600
Recreational Harvest	4,700	4,000
Dropoff Mortality	2,800	2,300
<i>Escapement</i>		
Hatchery Spawners	23,200	23,000
Natural Area Spawners	35,000	24,200

Table 1 presents estimates of age-specific returns to Basin hatcheries and spawning grounds, as well as Basin harvest by Tribal and recreational fisheries and the dropoff mortality associated with those fisheries.

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 2004. The estimates provided in this report are consistent with the Klamath River Megatable (CDFG 2005) and with the 2005 forecast of ocean stock abundance (KRTAT 2005).

Age-specific escapement estimates for 2004 and previous years, coupled with the coded-wire tag (CWT) recovery data on the Basin's hatchery stocks, allow for a cohort reconstruction of the hatchery and natural components of Klamath River fall chinook (KRTAT 2005, Goldwasser et al. 2001). Cohort reconstruction results enable forecasts to be developed of the current year's ocean

¹ An earlier version of this report was issued 23 February 2005.

stock abundance, percent of spawners expected in natural areas and ocean fishery contact rates, as described in a companion report (KRTAT 2005). These forecasts are essential inputs to the Klamath Ocean Harvest Model (Mohr et al. 2001); 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 2) to obtain the data from which the Klamath River Megatable totals and estimates of age composition were derived.

Estimates of age composition were based on random samples of scales whenever possible. Generally, each scale is read and aged independently by two persons. In cases of disagreement, a third person arbitrates. However, for the Klamath River scales the KRTAT decided to use the age-assignments provided by a single reader because the second reader did not demonstrate a sufficient level of classification accuracy. In all cases, 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 / read-age validation matrices. A summary of the scale samples is provided in Table 3.

Where the sample of scales was non-representative of the age-two component, the KRTAT relied on length-frequency analysis. 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.

Where the sample of scales was insufficient for estimation of age composition, or was altogether lacking, the KRTAT relied on surrogate data (see Table 4).

An indirect method of subtraction 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 the 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.

For natural spawners in the Trinity River below WCW, total escapement was estimated by redd surveys (Table 2). Age-composition was estimated from scales that were collected in the survey areas.

Results

The specific protocols used to develop estimates of age composition for each sector are provided in Table 4. A summary of the KRTAT minutes specific to each sector is given in Appendix A for the Klamath River and Appendix B for the Trinity River.

A total of 13,619 scales from 15 different sectors were provided for this analysis (Table 3). Of the total, 683 and 1,171 were collected from CWT fish from the Trinity and Klamath Rivers, respectively. The scales from fish with CWT's provide a direct check, or "validation," of accuracy of the scale-based age estimates (Tables 5a, 5b). Overall, the scale-based ages were accurate and

precise. For the Trinity River, accuracy was $\geq 93\%$ for age-2, age-3, and age-4 fish, and was 86% for age-5 fish. For the Klamath River, accuracy was $\geq 91\%$ for age-2, age-3, and age-4 fish, but only 35% for age-5 fish. While the (estimated) accuracy of classifying age-5 fish was particularly low for the Klamath River, this estimate was based on a small sample size (23 fish). The statistical bias-adjustment methods employed are intended to correct for scale-reading bias, but the methods assume that the known-age/read-age validation matrices are themselves well estimated (Kimura and Chikuni 1987).

The resulting sector-specific age composition is given in Table 6 and further summarized in Table 1. Calculations underlying the results for the Klamath and Trinity Rivers are presented in Appendices C and D, respectively.

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Literature Cited

CDFG (California Department of Fish and Game). 2005. Klamath River basin fall chinook salmon spawner escapement, in-river harvest and run-size estimates, 1978–2004. 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.
- KRTAT (Klamath River Technical Advisory Team). 2005. Ocean abundance projections and prospective harvest levels for Klamath River fall chinook, 2005 season. Available from U.S. Fish and Wildlife Service, 1829 South Oregon Street, Yreka, CA, 96097.
- Mohr, M.S., A.M. Grover, M.L. Palmer-Zwahlen, and M. Burner. 2001. Klamath Ocean Harvest Model Revision Documentation Outline. Available from M.S. Mohr, National Marine Fisheries Service, 110 Shaffer Road, Santa Cruz, CA 95060.

Table 1. Age composition of the 2004 Klamath River fall chinook run as determined by the Klamath River Technical Advisory Team.

Escapement & Harvest	2	3	AGE 4	5	Total Adults	Total Run
<u>Hatchery Spawners</u>						
Iron Gate Hatchery (IGH)	937	3,810	6,570	202	10,582	11,519
Trinity River (TRH)	1,044	10,695	1,635	69	12,399	13,443
Hatchery Spawner subtotal	1,981	14,505	8,205	271	22,981	24,962
<u>Natural Spawners</u>						
Salmon River basin	96	103	401	26	530	626
Scott River basin	22	42	154	249	445	467
Shasta River Basin	129	184	484	166	833	962
Bogus Creek Basin	295	1,100	2,353	41	3,493	3,788
Klamath River mainstem (IGH to Shasta R)	173	1037	3139	71	4,247	4,420
Klamath River mainstem (Shasta R to Indian Cr)	32	193	584	13	790	822
Klamath Tributaries (above Reservation)	80	99	319	59	477	557
Yurok Reservation Tributaries	<u>64</u>	<u>28</u>	<u>109</u>	<u>7</u>	<u>144</u>	<u>208</u>
Klamath Basin subtotal	891	2,786	7,543	630	10,959	11,850
Trinity River (mainstem above WCW)	3,768	8,604	3,101	182	11,887	15,655
Trinity River (mainstem below WCW)	31	120	753	125	998	1,029
Trinity Tributaries (above Reservation)	75	55	132	71	258	333
Hoopa Reservation Tributaries	<u>42</u>	<u>31</u>	<u>74</u>	<u>39</u>	<u>144</u>	<u>186</u>
Trinity Basin subtotal	3,916	8,810	4,060	417	13,287	17,203
Natural Spawners subtotal	4,807	11,596	11,603	1,047	24,246	29,053
Total Spawner Escapement	6,788	26,101	19,808	1,318	47,227	54,015
<u>Recreational Harvest</u>						
Klamath River (below Hwy 101 bridge)	748	449	226	50	725	1,473
Klamath River (Hwy 101 to Coon Cr. Falls)	1,493	930	446	97	1,472	2,965
Klamath River (Coon Cr. Falls to IGH)	52	309	936	21	1,266	1,318
Trinity River basin (above WCW)	328	199	70	16	285	613
Trinity River basin (below WCW)	69	136	60	15	211	280
Subtotals	2,690	2,023	1,738	199	3,959	6,649
<u>Tribal Harvest</u>						
Klamath River (below Hwy 101)	73	2,626	15,130	3,099	20,856	20,929
Klamath River (Hwy 101 to Trinity mouth)	73	1,134	1,634	314	3,083	3,156
Trinity River (Hoopa Reservation)	19	855	723	57	1,635	1,654
Subtotals	165	4,616	17,487	3,471	25,574	25,739
Total Harvest	2,855	6,639	19,225	3,670	29,533	32,388
<u>Totals</u>						
Harvest and Escapement	9,643	32,740	39,033	4,988	76,760	86,403
Recreational Angling Dropoff Mortality 2.04%	55	41	35	5	81	136
Tribal Net Dropoff Mortality 8.7%	14	401	1,521	302	2,224	2,238
Total In-river Run	9,712	33,182	40,589	5,294	79,065	88,777

Table 2. Documentation of the methods used to sample 2004 Klamath River fall chinook run.

Sampling Location	Estimation Method	Agency
<u>Hatchery Spawners</u>		
Iron Gate Hatchery (IGH)	Direct count. All fish examined for fin clips, tags, marks. Systematic random sample ~10% bio-sampled for FL, scales, sex, and all ad-clipped fish bio-sampled.	CDFG
Trinity River (TRH)	Direct count. All fish bio sampled for FL, fin-clips, marks, sex. Scales collected from ~10% of all fish by systematic random sampling of ad- and non-ad-clipped fish	CDFG
<u>Natural Spawners</u>		
Salmon River basin	Mark-recapture carcass estimate. River is surveyed twice weekly. bio-data (scales, FLs, marks) collected from all fresh carcasses.	CDFG,USFS
Scott River basin	Mark-recapture carcass estimate. River is surveyed twice weekly. bio-data (scales, FLs, marks) collected from all fresh carcasses.	CDFG
Shasta River Basin	Video count at lower river weir site. bio-data (Scales, FLs, sex, marks) collected from 25 carcasses upstream of site and 265 washback mortalities stranded on weir. Video used to generate total run-size length frequency.	CDFG
Bogus Creek Basin	Video count above weir, direct carcass count below weir. Fish bio--sampled (scales, FLs, sex, fin-clips) in both areas.	CDFG
Klamath River mainstem (IGH to Shasta R)	Petersen mark-recapture carcass estimate. River sections are surveyed once weekly. Peak numbers of carcasses in first survey indicated run began sooner than observed in recent years. bio-data (scales, FLs' marks) collected from fresh carcasses.	USFWS
Klamath River mainstem (Shasta R to Indian Cr)	Redd count based on weekly surveys. Cumulative count based on flagging old redds. Adult estimate is redds times 2.	USFWS
Klamath Tributaries (above Reservation)	Periodic redd surveys. Prior weeks redds flagged, only new redds counted. Estimate is redds times 2 + live fish observed on last survey date.	USFS,CDFG
Yurok Reservation Tributaries	Only surveyed stream is Blue Creek. Jacks and adult count based on the peak weekly snorkle survey. Weekly dives performed Oct - Dec.	YT
Trinity River (mainstem above WCW)	Petersen mark-recapture run-size estimate; mark recapture at T.R.Hatchery. All fish at weir bio-sampled for FL, marks, fin-clips. Scale samples taken randomly from every other fish bio-sampled.	CDFG, HVT
Trinity River (mainstem below WCW)	Adult escapement estimate based on Redd count times 2. Periodic surveys performed. Cumulative redd counts with prior redds flagged to prevent recounting.	HVT
Trinity Tributaries (above Reservation)	Only 1 trib, Horse Linto Cr., situated between HVR and WCW location in 2004. Adult estimate based on weekly redd counts times 2. Previous weeks redds flagged to avoid double counting.	USFS
Hoopa Reservation Tributaries	Adult estimate based on redd surveys. Survey redd totals are cumulative. Final adult estimate is redds times 2.	HVT
<u>Recreational Harvest</u>		
Klamath River (below Hwy 101 bridge)	Estimate is based on a stratified access point creel survey. bio-data (scales, FLs, marks, fin-clips) collected during angler interviews.	CDFG
Klamath River (Hwy 101 to Weitchpec)	Estimate is based on a stratified access point creel survey. bio-data (scales, FLs, marks, fin-clips) collected during angler interviews.	CDFG
Klamath River (Weitchpec to IGH)	No creel census in '04. Adults estimated by a ratio of average upper to lower (Weitchpec To Estuary) creel results from 1999-2002. Jacks estimated from the jack proportion for the Klamath mainstem (IGH to Shasta).	CDFG
Trinity River basin (above WCW)	Estimate is based on the return of reward tags placed on fish at weir. Return rate is applied to run-size estimate to estimate harvest.	CDFG
Trinity River basin (below WCW)	Estimate based on a stratified roving/access creel survey. bio-data (scales, FLs, marks, fin-clips) collected during angler interviews.	HVT
<u>Tribal Harvest</u>		
Klamath River (below Hwy 101)	Stratified effort/catch surveys. bio-data (FLs, scales, fin-clips, marks) collected during net harvest interviews and at buying station.	YT
Klamath River (Hwy 101 to Trinity mouth)	Stratified effort/catch surveys. bio-data (FLs, scales, fin-clips, marks) collected during net harvest interviews.	YT
Trinity River (Hoopa Reservation)	Two stage stratified effort/catch surveys. bio-data (FLs, scales, fin-clips) collected during net harvest interviews.	HVT
<u>Fishery Dropoff Mortality</u>		
Recreational Angling Dropoff Mortality 2.04%	Not directly estimated. Assumed rate relative to fishery impacts = .02; relative to fishery harvest = .02/(1-.0204).	KRTAT
Tribal Net Dropoff Mortality 8.7%	Not directly estimated. Assumed rate relative to fishery impacts = .08; relative to fishery harvest = .08/(1-.087).	KRTAT

Table 3. Scale sampling locations and numbers of scales used for the 2004 Klamath River Basin fall chinook age composition.

Sampling Location	Scales			Total	Agency
	Unknown-age read ^{a/}	Known-age read ^{b/}	Not used ^{c/}		
Hatchery Spawners					
Iron Gate Hatchery (IGH)	1,015	687	141	1,843	CDFG
Trinity River (TRH)	1,959	525	32	2,516	HVT
Natural Spawners					
Salmon River Carcass Survey	61	0	3	64	CDFG, USFS
Scott River Carcass Survey	107	0	3	110	CDFG, USFS
Shasta River Weir & Carcass	284	0	11	295	CDFG
Bogus Creek Weir	827	53	42	922	CDFG
Klamath River mainstem	502	0	20	522	USFWS
Upper Klamath River Tribs	0	0	0	0	CDFG, USFS
Willow Creek Weir	921	119	18	1,058	CDFG, HVT
Lower Trinity River Carcass	67	0	0	67	HVT
Lower Trinity River Tribs	77	1	0	78	USFS, HVT
Recreational Harvest					
Upper Klamath River Creel	0	0	0	0	CDFG
Lower Klamath River Creel	1,217	145	49	1,411	CDFG
Upper Trinity River Creel	0	0	0	0	CDFG
Lower Trinity River Creel	66	1	0	67	HVT
Tribal Harvest					
Klamath River (below Hwy 101)	2,677	239	110	3,026	YT
Klamath River (Hwy 101 to Trinity R)	1,151	47	62	1,260	YT
Trinity River (Hoopa Reservation)	336	37	7	380	HVT
TOTAL	11,267	1,854	498	13,619	

a/ Scales from non-ad-clipped fish, mounted and read.

b/ Scales from ad-clipped, CWT fish, mounted and read; not all Klamath scales used in scale validation matrix.

c/ Scales from non-ad-clipped fish, mounted and not read, or un-readable; scales from non-ad-clipped fish, not mounted; scales from ad-clipped fish with no cwt; scales from ad-clipped, CWT fish, mounted and not read.

Table 4. Documentation of the methods used by the KRTAT to determine the age composition of the 2004 Klamath River fall chinook run.

Sampling Location	Age Composition Method
<u>Hatchery Spawners</u>	
Iron Gate Hatchery (IGH)	Actual count; jack/adult structure from scale age analysis. CWT distribution applied to ad-non-cwt fish.
Trinity River (TRH)	Actual count; jack/adult structure from scale age analysis. Scale-age distribution applied to ad-non-CWT fish.
<u>Natural Spawners</u>	
Salmon River basin	Jack/adult structure from scale age analysis.
Scott River basin	Jack/adult structure from scale age analysis.
Shasta River Basin	Adults apportioned by scale age analysis. Jacks ≤ 57 cm.
Bogus Creek Basin	Adults apportioned by scale age analysis. Jacks ≤ 56 cm.
Klamath River mainstem (IGH to Shasta R)	Jack/adult structure from scale age analysis applied to USFWS Total Run estimate. Total Run=[Adult Estimate*(Jacks examined/Adults examined)]+Adult Estimate.
Klamath River mainstem (Shasta R to Indian Cr)	Used scale age% from Klamath main stem (IGH to Shasta R) as surrogate to calculate jack and adult structure; adults = $2 * \text{redd counts}$; total run = $\text{adults} / (1 - \% \text{jacks estimated in IGH to Shasta reach})$.
Klamath Tributaries (above Reservation)	Adults = $2 * \text{redd counts} + \text{live adults observed on last day surveyed}$; jacks/adult structure based on unweighted average age structure from the Shasta and Salmon Rivers (surrogate).
Yurok Reservation Tributaries	Number of jacks and adults observed during Blue Creek dive surveys; Salmon River scales age analysis used as surrogate for adult age structure.
Trinity River (mainstem above WCW)	Calculated from total Willow Creek Weir (age structure from scales) population minus TRH (age structure from scales) minus recreational harvest (jacks from harvest rate used in CDFG Megatable; adults from scales).
Trinity River (mainstem below WCW)	Age % from 67 scales collected in redd surveys for this area ; adults = $2 * \text{redd counts}$; total run = $\text{adults} / (1 - \% \text{jacks})$.
Trinity Tributaries (above Reservation)	Used scale data from 40 scales collected in Horse Linto, Willow Creek, and 38 scales from Hoopa tribs to calculate jack and adult structure; adults = $2 * \text{redd counts}$; total run = $\text{adults} / (1 - \% \text{jacks})$.
Hoopa Reservation Tributaries	Used scale data from 40 scales collected in Horse Linto, Willow Creek, and 38 scales from Hoopa tribs to calculate jack and adult structure; adults = $2 * \text{redd counts}$; total run = $\text{adults} / (1 - \% \text{jacks})$.
<u>Recreational Harvest</u>	
Klamath River (below Hwy 101 bridge)	Lower Klamath R. creel census, jack/adult structure from scale age analysis.
Klamath River (Hwy 101 to Weitchpec)	Lower Klamath R. creel census, jack/adult structure from scale age analysis.
Klamath River (Weitchpec to IGH)	Total adults as proportion of Upper vs. Lower Klamath creel based on 1999 through 2002 record, jack/adult structure from scale age analysis of lower Klamath creel census.
Trinity River basin (above WCW)	Jacks based on harvest rate; adult structure from scale age analysis.
Trinity River basin (below WCW)	Lower Trinity R. creel census; jack/adult structure from scale age analysis.
<u>Tribal Harvest</u>	
Klamath River (below Hwy 101)	Total count; jack/adult structure from scale age analysis. Age composition calculated separately for the Estuary Fishery and the Buying Station (where jacks were absent).
Klamath River (Hwy 101 to Trinity mouth)	Total count; jack/adult structure from scale age analysis.
Trinity River (Hoopa Reservation)	Total count; jack/adult structure from scale age analysis.

Table 5a. 2004 Klamath River scale validation matrices.

<u>Number</u>		Known Age (from CWT)				
		2	3	4	5	
Read Age	2	102	6	0	0	Total 1280
	3	4	510	52	0	
	4	1	40	540	15	
	5	0	0	2	8	
Total	107	556	594	23		

<u>Percentage</u>		Known Age (from CWT)				
		2	3	4	5	
Read Age	2	0.953	0.011	0.000	0.000	Total 1.00
	3	0.037	0.917	0.088	0.000	
	4	0.009	0.072	0.909	0.652	
	5	0.000	0.000	0.003	0.348	
Total	1.00	1.00	1.00	1.00		

Table 5b. 2004 Trinity River scale validation matrices.

<u>Number</u>		Known Age (from CWT)				
		2	3	4	5	
Read Age	2	45	0	0	0	Total 683
	3	1	548	5	0	
	4	0	7	70	1	
	5	0	0	0	6	
Total	46	555	75	7		

<u>Percentage</u>		Known Age (from CWT)				
		2	3	4	5	
Read Age	2	0.9783	0.0000	0.0000	0.0000	Total 1.00
	3	0.0217	0.9874	0.0667	0.0000	
	4	0.0000	0.0126	0.9333	0.1429	
	5	0.0000	0.0000	0.0000	0.8571	
Total	1.00	1.00	1.00	0.00		

Appendix A. Klamath River – 2004 Details.

Iron Gate Hatchery (IGH)

After the following discussion, the KRTAT decided to use scale-age-based determination of the jack proportion at IGH. A total of 1,702 scales were used of which 687 were from known-age cwt fish.

Desma Williams described a concern wherein the scale reading process was potentially compromised due to inexperienced scale readers who participated in the second and third read of scales. Typically, two independent reads are conducted and discrepancies resolved by a third reader. However, when comparing validation matrices for all recovery areas, it became apparent that the first reader was much more accurate than the second reader. Moreover, when discrepancies arose, the third reader tended to agree with the second reader's age. The Team decided it would be preferable to rely upon the first reads only adjusted for bias using the known-aged fish and the Kimura method. Second and third reads by arbiter were discarded.

Bogus Creek

There were a total of 880 scales used of which 53 were from known-age cwt fish. The KRTAT determined that scale samples used from Bogus Creek were non-representative of the jack component of the run because samples were collected disproportionately throughout the sampling period. The Team decided to assign jacks by length frequency analysis using a ≤ 56 cm cut off as derived from IGH. The adult age classes were apportioned by scale-based analysis.

Shasta River

The KRTAT determined that scale samples collected in Shasta River were representative of the adult run component only. Scale sampling appeared to over-represent the male component of the run when compared to the video-based sex ratios. Hence, the KRTAT decided to use a ≤ 57 cm cut off to identify the jack proportion from video analyses of run length frequency. Adult ages were apportioned by scale analysis. There were a total of 284 scales used of which none were from known-age cwt fish.

Scott River

There were a total of 107 scales used of which none were from known fish. Whereas there appeared an anomalously high proportion of five-year-olds in the scale aged fish, the KRTAT chose to use the scale age proportions to assign all ages to Scott River. The Team verified that the aged scales were a representative sub-sample of the total number of carcasses seen during the spawner surveys.

Salmon River

The KRTAT determined that scale based age proportions were representative of the 2004 Salmon River run. A total of 61 scales were examined with none from known-age cwt fish.

Blue Creek

Snorkel surveys were used to produce a total escapement estimate. Visual counts revealed 64 jacks and 144 adults. Adult age composition was approximated using the age structure of Salmon River as a surrogate.

Miscellaneous Klamath River Tributaries

Due to insufficient collection of scales, these tributaries were to be proportioned by age according to the un-weighted average proportions resulting from analysis of the Salmon and Shasta rivers. Scott River was not used in the surrogate pool given its anomalous proportion of age-five fish.

Klamath River Main stem

For the IGH to Shasta River section, 502 scales were used which resulted in a jack proportion of 0.039. Isaac Sanders had reported an adult total of 4223 fish using Petersen mark-recapture methods. Mr. Sanders expressed concern that a high number of carcasses were found in the first survey week indicating the potential of the adult estimate being biased low. Jacks were estimated as the number of jacks captured divided by the adults captured times the adult estimate. The Team concluded to re-assign

age proportions to the total estimate based on the scale ages. For the Shasta River to Indian Creek section, a similar approach for age composition was applied to total spawners which were estimated by redd counts multiplied by two.

Lower Klamath River Creel (below Hwy 101; Hwy 101 to Coon Cr.)

For both sub-areas scale age proportions were used to apportion all ages for the estimated harvest totals. A total of 1,362 scales were examined of which 145 were taken from known-age cwt fish.

Upper Klamath River creel (Coon Cr. To IGH)

This area was not directly sampled as was done in 1999 through 2002. Instead, the total harvest was estimated for adults by using a ratio estimator of the upper to lower creel results from 1999-2002. The KRTAT decided to apportion all ages based on the proportions used in the lower Klamath River creel census.

Yurok Tribal Estuary Fishery (mouth to Hwy 101)

Two fisheries were sampled in the estuary area. Sampling was conducted at individual fishing sites and at a commercial buying station. Fish sampled at the fishing sites were marked to prevent double sampling in the event these fish were brought to the buying station. A total of 2,916 scales were used of which 239 were from known-age cwt fish. The KRTAT agreed that scale age proportions should be applied to the total estimated harvest for this fishery.

Yurok Tribal Fishery (Hwy 101 to Weitchpec)

Harvest in the mid and upper-Klamath area was segregated into jacks and adults based upon scale ageing. A total of 1,198 scales were used of which 47 came from known-age cwt fish.

Appendix B. Trinity River – 2004 Details.

Trinity River Hatchery (TRH)

Sampling for scales was conducted in a systematic (1:10) random manner. Ad-clipped and non ad-clipped fish were selected with equal probability. A total of 2,484 scales were aged of which 525 scales came from CWT fish. This was the largest validation component for the entire Trinity River ageing project. Jacks were identified by scales, as were the age proportions for adult classes.

Upper Trinity River Recreational Harvest (above Willow Ck. Weir)

There were no scales recovered from this fishery as no creel census was implemented in 2004. Total harvest was estimated at 613 fish using the mark-recapture method for reward tag returns of WCW marked fish. The KRTAT decided that the best method to apportion ages to this total was to first utilize specific cwt information on age as summarized by Wade Sinnen (CDFG). The approach depended upon the recovery of reward/non-reward program tags applied at the Willow Creek Weir (WCW) and subsequently recovered by the program. 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 2004, Wade Sinnen assigned ages to 103 of the 613 fish in the harvest estimate based upon specific tag codes. The balance, 510 fish, were apportioned by age (2, 3, 4, and 5) using the corrected scale age proportions from the lower Trinity creel census.

Lower Trinity River Creel (below Willow Ck. Weir)

A total of 67 scales were aged of which one was from a known-age fish. The Team concluded that sufficient scale samples were drawn to enable direct ageing by scales for all ages.

Upper Trinity Natural Escapement (above Willow Ck. Weir)

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 (every other fish) 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 read scales is accomplished with known-aged fish later recovered at either TRH, recreational creel, or spawning grounds which are also referenced to WCW by a unique “program tag” (spaghetti tag applied at WCW with unique identifying number). A total of 1,058 scales were collected at WCW. Of these, 1,040 were used including 119 cwt records subsequently recovered at TRH.

An age-structure for fish passing above WCW is estimated using these scales and known-age fish recovered in upper river areas. 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 leaving an age-structure for the natural escapement in the upper Trinity River.

Lower Trinity River Natural Escapement (below Willow Ck. Weir)

The lower Trinity Natural Escapement estimation area included total spawners estimated in both mainstem and tributary sub areas. These surveys also collected a total 67 and 78 scales from carcasses for the mainstem and tributary sub areas, respectively. One of the 78 scales sampled in the tributary sub-area was associated with a CWT recovery. The tributary sub-area scales were pooled samples from Willow Creek and Horse Linto Creek (1 CWT plus 39 unknown scales), and Hoopa tributaries (38 scales). The Team concluded that scale collections were adequate to provide age distributions for both sub-areas for all ages.

Hoopa Valley Tribal Harvest

Hoopa Valley Tribal harvest is a composite of the gill net and hook and line fisheries prosecuted by Tribal members. Scientists allocate age structures to each of these two fisheries independently and then pool the result for the aggregate “Hoopa Valley Tribal Harvest” age-structure. A total of 373 scales were aged

of which 37 were from known-age fish across both fisheries. Harvest sub-totals were apportioned by age using the scale age proportions for the respective fisheries. The age structured harvest total was then the sum of the two fishery sub-totals apportioned by age.

Appendix C. 2004 Klamath scale age analysis.

Unknown scales age composition as read

	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	51	270	501	5	827
LRC	597	377	228	15	1217
IGH	84	355	568	8	1015
SALMON	9	13	38	1	61
SCOTT	5	12	70	20	107
SHASTA	133	57	90	4	284
YTFP EST	11	248	693	58	1010
YTFP BS	3	238	1337	89	1667
YTFP M&U	30	427	651	43	1151
MAINSTEM	20	140	338	4	502
UR TRIBS	0	0	0	0	0
	943	2137	4514	247	7841

Unknown scales corrected age proportions (Kimura method)

		AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
BOGUS	p	0.0614	0.2929	0.6345	0.0112	1.0
LRC	p	0.5112	0.3023	0.1525	0.0340	1.0
IGH	p	0.0832	0.3229	0.5769	0.0171	1.0
SALMON	p	0.1529	0.1649	0.6413	0.0409	1.0
SCOTT	p	0.0480	0.0889	0.3289	0.5342	1.0
SHASTA	p	0.5941	0.0896	0.2357	0.0807	1.0
YTFP EST	p	0.0091	0.2078	0.6241	0.1591	1.0
YTFP BS	p	0.0010	0.0820	0.7710	0.1460	1.0
YTFP M&U	p	0.0233	0.3538	0.5205	0.1024	1.0
MAINSTEM	p	0.0391	0.2347	0.7102	0.0160	1.0

Known CWT ages

	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL	#CWTS UNKNOWN
BOGUS	2	25	31	0	58	17
LRC	61	85	21	2	169	17
IGH	40	312	343	17	712	81
SALMON	0	0	1	0	1	0
SCOTT	0	0	0	0	0	0
SHASTA	0	0	0	0	0	0
YTFP EST	0	25	42	1	68	25
YTFP BS	0	64	142	6	212	45
YTFP M&U	1	30	22	0	53	31
MAINSTEM	0	0	0	0	0	0
UR TRIBS	0	0	0	0	0	0
Bogus1	1	6	16	0	23	3
Bogus2	1	19	15	0	35	14
LRC - lo	12	13	6	1	32	5
LRC - mid	49	72	15	1	137	12
YTFP MID	0	4	1	0	5	0
YTFP UP	1	26	21	0	48	31

Validation Matrix

		Known Age				
		2	3	4	5	
Read Age	2	102	6	0	0	
	3	4	510	52	0	
	4	1	40	540	15	
	5	0	0	2	8	
Total		107	556	594	23	1280 Total

Percentages from validation matrix

		Known Age			
		2	3	4	5
Read Age	2	0.953	0.011	0.000	0.000
	3	0.037	0.917	0.088	0.000
	4	0.009	0.072	0.909	0.652
	5	0.000	0.000	0.003	0.348
Total		1	1	1	1

Appendix D. 2004 Trinity scale age analysis.

WCW 03 = Willow Ck. Weir <table border="1"> <thead> <tr> <th></th> <th>no cwt</th> <th colspan="4">Cwt Age</th> <th>Total</th> </tr> <tr> <th></th> <th></th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th></th> </tr> </thead> <tbody> <tr> <td>unreadable</td> <td>18</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>18</td> </tr> <tr> <td>Scale</td> <td>166</td> <td>10</td> <td>0</td> <td>0</td> <td>0</td> <td>176</td> </tr> <tr> <td>Ages</td> <td>591</td> <td>1</td> <td>96</td> <td>1</td> <td>0</td> <td>689</td> </tr> <tr> <td></td> <td>157</td> <td>0</td> <td>0</td> <td>10</td> <td>0</td> <td>167</td> </tr> <tr> <td></td> <td>7</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>8</td> </tr> <tr> <td></td> <td>939</td> <td>11</td> <td>96</td> <td>11</td> <td>1</td> <td>1058</td> </tr> </tbody> </table>							no cwt	Cwt Age				Total			2	3	4	5		unreadable	18	0	0	0	0	18	Scale	166	10	0	0	0	176	Ages	591	1	96	1	0	689		157	0	0	10	0	167		7	0	0	0	1	8		939	11	96	11	1	1058	LOWTRINREC = Lower Trinity Recreational <table border="1"> <thead> <tr> <th></th> <th>no cwt</th> <th colspan="4">Cwt Age</th> <th>Total</th> </tr> <tr> <th></th> <th></th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th></th> </tr> </thead> <tbody> <tr> <td>unreadable</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Scale</td> <td>16</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>16</td> </tr> <tr> <td>Ages</td> <td>33</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>34</td> </tr> <tr> <td></td> <td>14</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>14</td> </tr> <tr> <td></td> <td>3</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>3</td> </tr> <tr> <td></td> <td>66</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>67</td> </tr> </tbody> </table>							no cwt	Cwt Age				Total			2	3	4	5		unreadable	0	0	0	0	0	0	Scale	16	0	0	0	0	16	Ages	33	0	1	0	0	34		14	0	0	0	0	14		3	0	0	0	0	3		66	0	1	0	0	67
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