Prediction of the 2002 Ocean Abundance of Rogue River Fall Chinook Salmon

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SUMMARY

The ocean population abundance of fall chinook salmon from the Rogue River for 2002 is predicted to be the highest observed since 1988. Relative to the base period used in scaling the Klamath Ocean Harvest Model (1986-2001), the prediction for 2002 is 2.1 times the average of the estimated actual abundance during this sixteen-year period; ranging from 19% of their estimated actual abundance in 1987 to 473% of their estimated actual abundance in 1999 (Table 1).

We continued the second year of a study to convert relative abundance indices to absolute estimates using mark-recapture. Returning fish were captured and tagged near the river mouth and recaptured as carcasses in survey areas. Only 1% of the 923 tagged chinook were recaptured. The validity of the resulting population estimate is questionable because of low precision and a high rate of tag loss.

Table 1. Scaling factors to account for the predicted ocean abundance of Rogue River fall chinook salmon in 2002 relative to their estimated actual ocean abundance in 1986-2001.

Comparison	Scaling Factor
2002 to 1986	0.29
2002 to 1987	0.19
2002 to 1988	0.33
2002 to 1989	1.19
2002 to 1990	2.00
2002 to 1991	3.09
2002 to 1992	3.05
2002 to 1993	1.13
2002 to 1994	1.68
2002 to 1995	2.72
2002 to 1996	4.22
2002 to 1997	3.17
2002 to 1998	2.79
2002 to 1999	4.73
2002 to 2000	2.06
2002 to 2001	1.18

INTRODUCTION

Fall chinook salmon produced in the Rogue River Basin are a major contributor to Oregon and California salmon fisheries. A prediction of ocean abundance of Rogue River chinook salmon is needed to account for their abundance in structuring ocean salmon fisheries that harvest Klamath fall chinook salmon (KRTAT 1988, Prager and Mohr 2001). The version of the Klamath Ocean Harvest Model that will be used to evaluate 2002 ocean season options is calibrated to estimated actual landings and fishery impacts that occurred during 1986-2001, and thus requires predictions of the 2002 ocean abundance of Rogue chinook to be scaled to their estimated actual ocean abundance during each of these 16 base years.

Absolute abundance estimates for Rogue fall chinook are not available. However, key spawning areas have been surveyed in a consistent manner since 1977. Counts from these survey sites form the basis of an index of the run size of Rogue fall chinook. We use this index as a relative measure of Rogue fall chinook abundance and develop predictions of their ocean population abundance based on this relative index. This report describes predictions of the relative ocean population size of Rogue fall chinook for 2002 as indexed from spawning survey counts.

In 2000 we initiated a study to attempted to estimate the absolute run size of Rogue Basin fall chinook salmon by conducting a mark-recapture study. Our intent was to convert relative indices of abundance to absolute estimates by determining the fraction of the run that spawns in our index areas. This study was continued in 2001 and results to date are reported here.

METHODS

Mark-Recapture Study

Fall chinook were captured and tagged by a beach seine fished at Huntley Park (river mile 8). The seining operation consisted of 15 sets per day during three days each week from 3 August through 31 October. Captured chinook were measured (fork length), sexed and tagged with uniquely numbered red or yellow-colored anchor tags. Each fish received two tags (one tag at the base of each side of the dorsal fin). The second capture event occurred as carcasses recovered on spawning surveys. All sampled carcasses were examined for the presence of tags, measured for MEPS length, sexed and scale sampled. Tag loss was estimated by the fraction of recovered tagged fish that possessed only one of the two originally placed tags. Run size was estimated using the Peterson formula (Ricker 1975). Precision was estimating using Bootstrapping techniques (Buckland and Garthwaite 1991).

Abundance Prediction

Predictions of indexes of the ocean abundance of Rogue fall chinook salmon were derived by using linear regression analysis to relate indexes of ocean abundance of age i fish to indexes of inriver run size of age i-1 fish of the same cohort. Rogue fall chinook salmon contribute to ocean fisheries primarily at age 3-5, therefore individual regression models were developed to predict indexes of the ocean abundance of each of these three age classes.

Inriver run size was indexed by counts of spawned-out carcasses in the mainstem Rogue and Applegate Rivers. Two mainstem and four Applegate River survey areas were used (Figure 1, Appendix A). These six survey areas compose the spawning habitat most intensively used by this stock. Counts were not conducted in the two mainstem survey areas in 1986 and 1987. These missing counts were estimated by a linear regression relationship between total counts in all six survey areas and total counts in the Applegate River survey areas for the 18 years available from 1981-98. This time span was chosen because it encompassed years in which Applegate Dam increased fall river flow and potentially influenced spawner distribution. Counts disrupted by high flows during the survey season were adjusted using the methods described in Whisler and Jacobs (2001). Additionally, some of the counts in Appendix A were revised to correct errors in data summaries and therefore may differ slightly from counts listed in pervious versions of this report.

Total carcass counts for the three years from 1978-80 were adjusted to compensate for pre-spawning mortality (Cramer et al. 1985). These adjustments were made by dividing each count by one minus the corresponding estimated annual mortality rate.

Age composition of the inriver run was estimated from scales collected from carcasses. Scale samples were read to determine proportions of age 2-5 fish (Borgerson and Bowden 2001) and these proportions were applied to the total carcass count to obtain indexes of inriver run size for each age class. Six hundred fourteen scale samples were read to obtain the estimate of age composition in 2002.

Indexes of ocean population size were obtained using cohort reconstruction methods (Appendix B). These methods followed those used for Klamath fall chinook salmon (KRTAT 1990), except for the procedure used to estimate ocean impacts and May starting populations. We used indexes of May starting populations as scalars of ocean population size. Indexes of May starting populations were derived by applying estimates of ocean fishery harvest rates to the remaining portion of each respective cohort as follows:

$$\text{Maystrt}_i = (\text{inriver}_i + \text{fallstart}_{i+1})/(1\text{-harvest rate}_i)$$

where i equals a given age class.

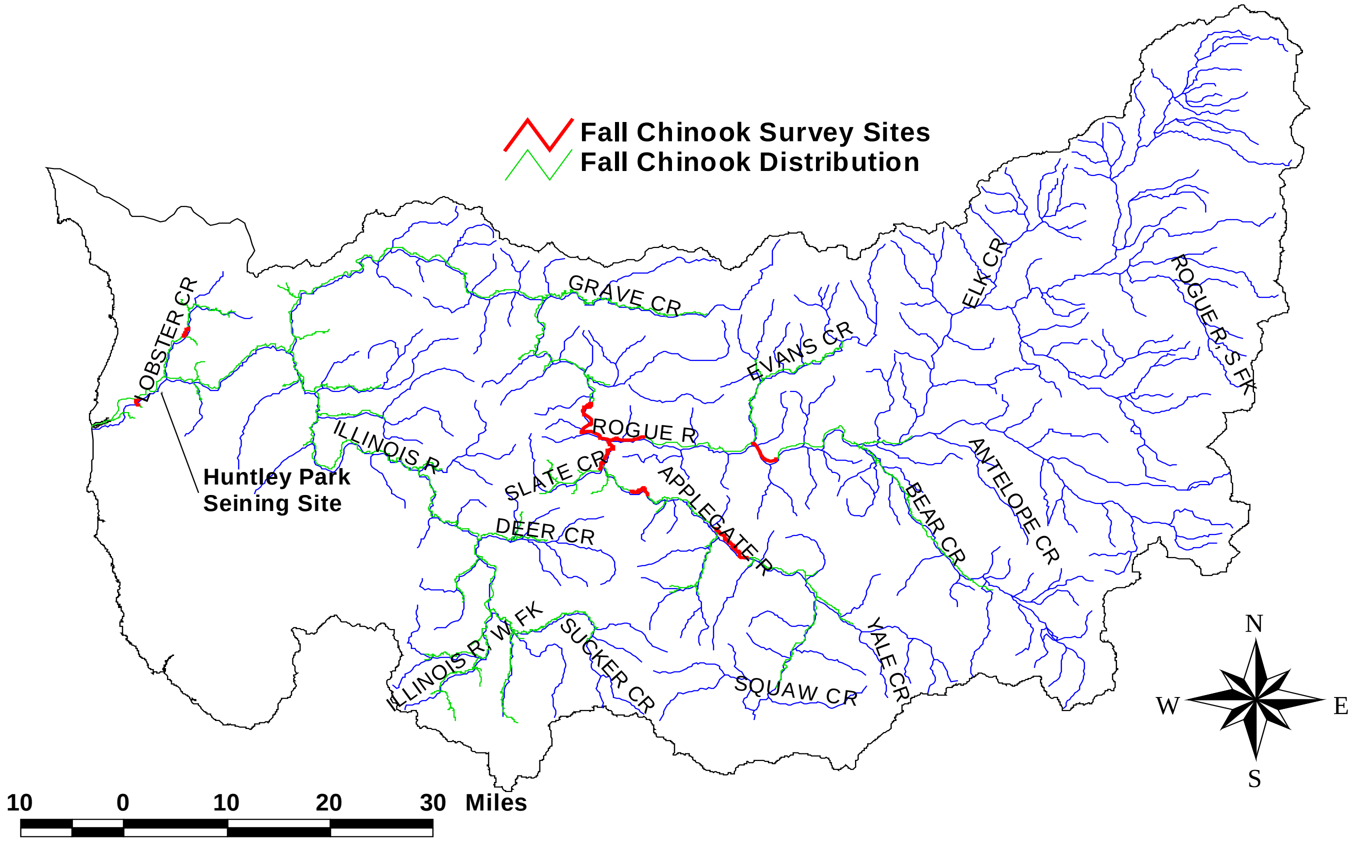

Figure1. Map of Rogue River Basin showing distribution of fall chinook salmon and locations of Huntley Park seining site and spawning surveys.

Ocean impacts were estimated as:

$$\text{Ocean impact}_i = \text{Maystrt}_i - (\text{inriver}_i + \text{fallstart}_{i+1})$$

Indexes of reconstructed cohorts for the 1972-96 broods appear in Appendix B. Complete reconstruction through inriver age-2 is available for the 1975-96 broods. Methods used to derive May starting populations for age-3 and 4 chinook for the 2001 return year differed from those described above, because only incomplete cohorts are available for these broods. The age-4 May starting population for 2001 was estimated by dividing the inriver run of age-4's by the mean maturity rate at age-4 for the 1975-96 broods (73.1%), and then dividing this value by one minus the 2001 age-4 harvest rate. The Age-3 May starting population for 2001 was estimated by dividing the inriver run of age-3s by the mean maturity rate at age-3 for the 1975-96 broods (15.1%), and then dividing his value by one minus the 2001 age-3 harvest rate.

RESULTS AND DISCUSSION

Mark-Recapture Study

Results of the mark-recapture study are displayed in Table 2. A total of 934 fall chinook were captured and tagged. Of the 12 tagged carcasses recovered, four were missing one of the two original tags. This equates to an estimated rate of 11% of the tagged fish loosing both tags. Applying this rate reduces the tagged population to 923 fish. One of the 12 tag recoveries occurred in a lower river tributary (Jim Hunt Creek). The remaining 11 recoveries occurred in index areas in the mainstem middle river and in the Applegate River. The average duration between tagging and recovery was 72 days and ranged between 60 and 82 days. Interestingly, 13 recoveries of tagged fish were voluntarily reported by anglers. Most voluntary angler recoveries were from fish caught in the mid portion of the river near Grants Pass (river mile 105), although one angler reported recovery was from Agness (river mile 27) and another was from Gold Hill (river mile 120). These recoveries were not used in the analysis because recoveries of unmarked fish were not available.

Table 2. Estimated run size of Rogue River Fall Chinook salmon, 2001. Estimates derived through mark-recapture.

Tagged[a]	Carcasses Sampled	Tags Recovered	Estimate	95% Confidence Interval
923	7,102	12	404,660	192,880 - 616,440

a *Adjusted for tag loss.*

The validity of estimated run size of 405,000 fish is questionable. Because of the low rate of tag recovery, the precision of the estimate was poor. Additionally, the estimate appears to be unreasonably high. Reasons for a positively biased estimate can be attributable to three factors: 1) mortality of tagged fish prior to opportunities for recovery, 2) failure or survey crews to accurately recognize tagged fish, or 3) unaccounted tag loss. The degree to which any of these three factors contributed to a biased estimate is not clear.

Tagging crews reported that the capture and tagging procedure did not appear to be overly stressful. Fish were processed quickly and behaved normally after tagging. No mortalities of tagged fish were observed or reported near the seining location. The fact that most of the tagged recoveries reported by anglers were caught in the middle river also suggests that little tagging mortality occurred. Survey crews did examine all recovered carcasses for the presence of anchor tags, and the use of brightly colored tags should have enhanced their ability to detect tags. Unaccounted tag loss appears to be the most like factor contributing to the biased estimate. Although the rate of tag loss should be adequately estimated by the ratio of the number of single-tagged recoveries to the number of double-tagged recoveries, with only 12 total recoveries this estimate has poor precision. Additionally, tagging crews had difficulty getting the tags to properly seat in the fish. Thus, it appears that unaccounted tag loss is the most likely factor contributing to the bias in the population estimate.

We plan to continue this study in 2002. Modifications that will be considered to improve the accuracy of the population estimate include use heavier duty tags that should anchor more firmly in the fish and clipping the adipose fin as a secondary mark to assess tag loss. Until further study is completed, estimates of run size should not be used for management purposes.

Abundance Prediction

The predicted index of ocean abundance of Rogue fall chinook salmon for 2002, along with actual (post-season) indexes of ocean abundance in 1977-2001 appear in Table 3. The predicted abundance of age-4 chinook is the highest occurring since 1994and the prediction for age-3 fish is the highest since 1993. Predictive relationships based on the data set for age 3-5 fish are presented in Figures 2-4. These relationships were revised beginning in 1999 based on the adjusted data set discussed earlier and by forcing the intercept through zero. For the evaluation of the accuracy of these adjustments, please refer to the 1999 version of this report.

Table 3. Rogue fall chinook salmon recovered as carcasses, 1977-2001.

RETURN YEAR	TOTAL CARCASSES[c]	AGE COMPOSITION (%)				OCEAN HARVEST RATE (%)[a]		INRIVER RUN INDEX				OCEAN POPULATION INDEX[b]			
		2	3	4	5	AGE 3	AGE 4-5	AGE 2	AGE 3	AGE 4	AGE 5	AGE 3	AGE 4	AGE 5	TOTAL
1977	3,745	63.8	25.6	9.0	1.0	23	55	2,389	959	337	37	9,753	1,378	83	11,215
1978	10,193	10.0	60.1	22.1	1.0	23	55	1,019	6,126	2,253	102	38,657	5,215	227	44,099
1979	8,467	2.3	11.8	79.5	0.4	23	55	195	999	6,731	34	7,805	18,809	75	26,689
1980	2,632	15.6	9.3	35.2	23.7	23	55	411	245	927	624	5,225	3,988	1,386	10,599
1981	6,399	18.3	57.0	16.8	5.1	21	53	1,171	3,647	1,075	326	9,154	3,009	694	12,858
1982	3,520	20.1	37.9	35.9	3.7	30	52	708	1,334	1,264	130	9,811	2,868	271	12,950
1983	3,008	9.0	35.8	51.5	1.2	19	60	271	1,077	1,549	36	8,575	4,427	90	13,092
1984	3,663	10.8	34.1	50.4	3.0	8	38	396	1,249	1,846	110	9,875	4,695	177	14,747
1985	7,986	31.3	15.7	43.5	8.0	11	25	2,500	1,254	3,474	639	9,723	6,269	852	16,844
1986	20,400	15.8	63.8	12.0	2.6	18	46	3,223	13,015	2,448	530	71,279	5,920	982	78,181
1987	28,450	8.9	26.6	61.9	1.2	16	43	2,532	7,568	17,611	341	80,340	36,347	599	117,286
1988	32,965	4.1	14.7	76.5	4.6	20	39	1,352	4,846	25,218	1,516	17,334	47,934	2,486	67,754
1989	7,889	6.1	16.4	51.0	26.1	15	36	481	1,294	4,023	2,059	8,447	7,217	3,217	18,882
1990	1,914	2.4	14.5	71.4	11.2	30	55	46	278	1,367	214	6,043	4,709	476	11,229
1991	2,956	5.3	12.1	64.3	16.7	3	18	157	358	1,901	494	3,506	3,162	602	7,270
1992	2,830	16.4	12.1	53.0	18.2	2	7	464	342	1,500	515	4,371	2,434	554	7,359
1993	5,704	4.5	60.7	25.9	9.0	5	16	257	3,462	1,477	513	16,043	3,153	611	19,807
1994	7,895	6.7	9.6	72.9	10.8	3	9	529	758	5,755	853	2,982	9,423	937	13,342
1995	4,131	4.2	15.6	33.0	47.5	4	13	173	644	1,363	1,962	4,301	1,708	2,255	8,264
1996	2,569	4.7	16.8	75.3	3.2	5	16	121	432	1,934	82	2,436	2,788	98	5,321
1997	1,711	4.0	16.8	61.1	17.9	1	6	68	287	1,045	306	5,245	1,506	326	7,077
1998	3,641	1.1	13.8	77.5	7.4	0	9	40	502	2,822	269	3,833	3,924	296	8,054
1999	2,650	5.9	12.4	61.0	20.6	1	9	157	329	1,617	545	1,477	2,665	599	4,741
2000	3,592	6.3	55.0	21.9	16.2	6	10	226	1,976	787	582	9,337	907	647	10,890
2001	7,102	10.8	32.6	58.3	0.3	3[e]	9	767	2,315	4,140	21	13,485[d]	5,441[d]	23	18,950
2002												14,044	7,692	710	22,447

a HARVEST RATES FROM KLAMATH CHF COHORT ANALYSIS. VAUES FOR 1977-80 BASED ON 1981-83 AVERAGE.
b BASED ON COHORT RECONSTRUCTION METHODS. VALUES FOR 2002 PREDICTED FROM REGRESSION EQUATIONS.
c CARCASS COUNTS IN 1978, 1979 AND 1980 ADJUSTED FOR PRE-SPAWNING MORTALITY.
d PRELIMINARY, COMPLETE COHORT NOT AVAILABLE. USED MEAN MATURITY RATE TO DERIVE ESTIMATE.
e HARVEST RATE NOT AVAILABLE USED AVERAGE 3:4 HARVEST RATE RATIOS 1996-2000.
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Figure 2. Prediction of age-3 Rogue fall chinook.

Age 2 on 3
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.848
R Square	0.719
Adjusted R Square	0.671
Standard Error	11277.280
Observations	22

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	6823054353	6.82E+09	53.65004	4.42867E-07
Residual	21	2670718057	1.27E+08		
Total	22	9493772411			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	18.31024112	1.911654695	9.578216	4.1E-09	14.33473686	22.28574538

2002 estimate		
age 3 =	14,044	
based on	767	age 2

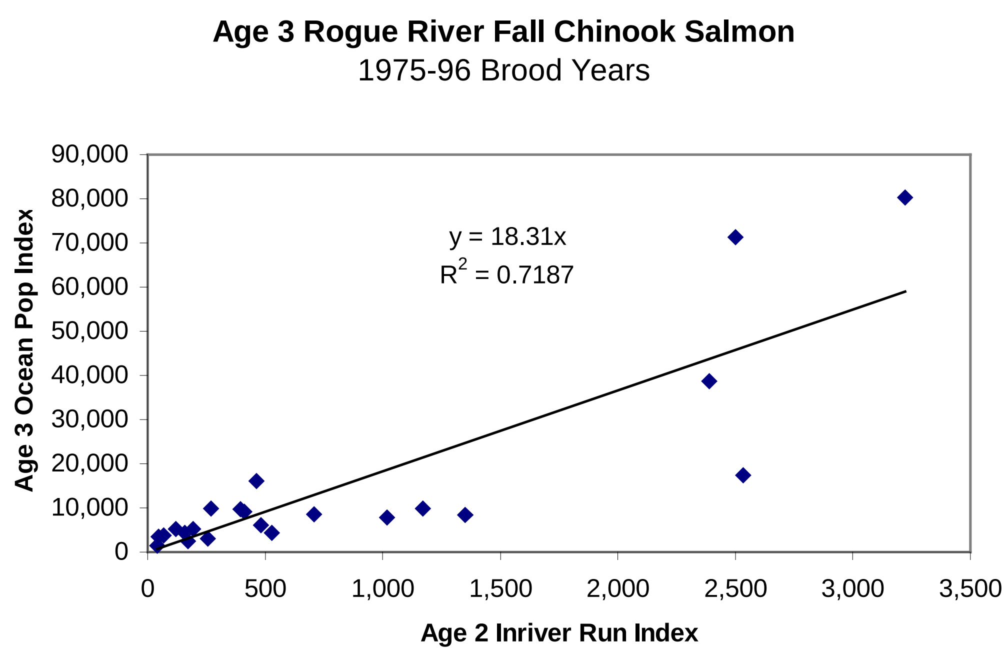


Figure 3. Prediction of age-4 Rogue fall chinook.

Age 3 on 4
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.856704541
R Square	0.73394267
Adjusted R Square	0.686323623
Standard Error	6070.852878
Observations	22

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2135038059	2.14E+09	57.93036	2.49484E-07
Residual	21	773960348	36855255		
Total	22	2908998407			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	3.322283972	0.337421597	9.846092	2.54E-09	2.620577227	4.023990717

2002 estimate		
age 4 =	7,692	
based on	2,315	age 3

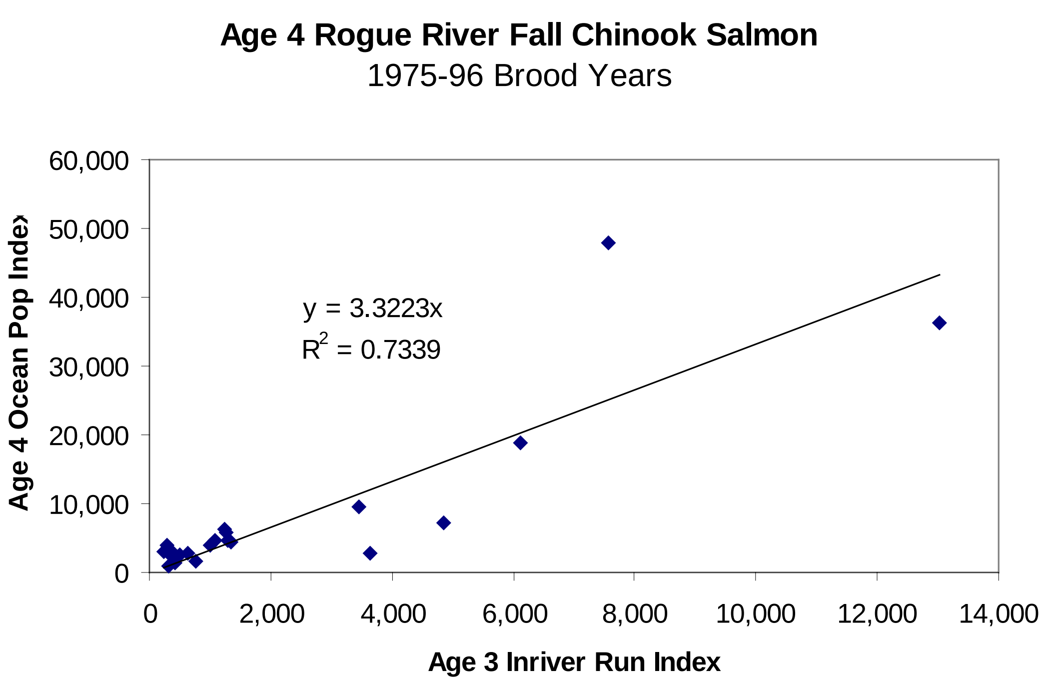


Figure 4. Prediction of age-5 Rogue fall chinook.

Age 4 on 5
SUMMARY OUTPUT

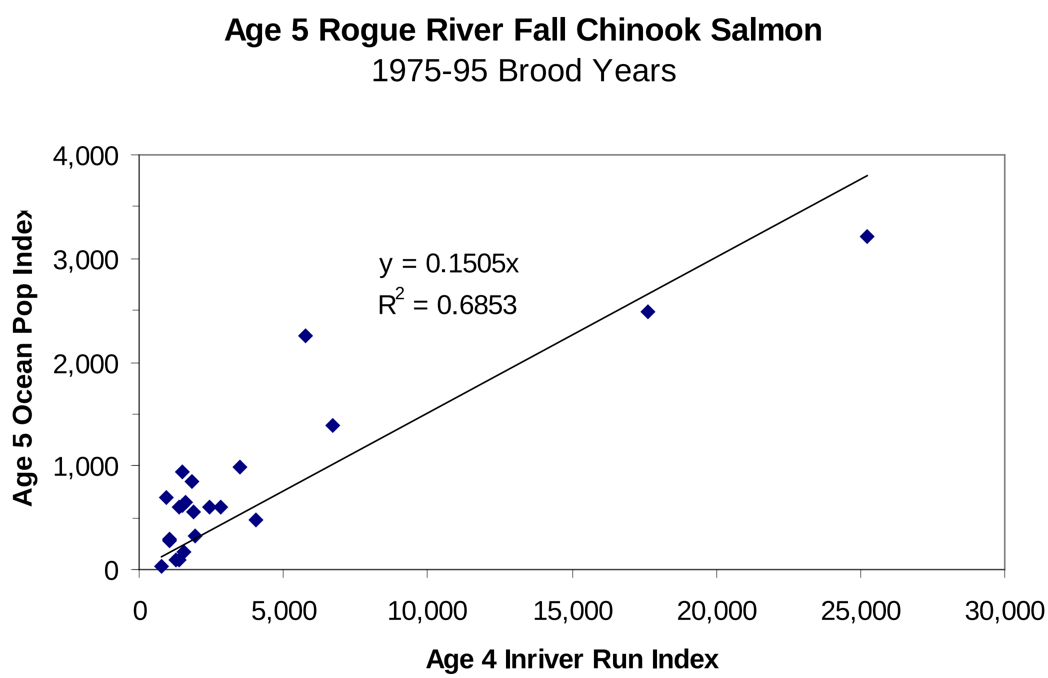
Regression Statistics	
Multiple R	0.807
R Square	0.652
Adjusted R Square	0.606
Standard Error	567
Observations	23

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	13244892.62	13244893	41.19846	2.31497E-06
Residual	22	7072779.833	321490		
Total	23	20317672.45			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	0.171590887	0.016990014	10.09951	1.01E-09	0.136355718	0.206826057

2002 estimate		
age 5 =	710	
based on	4,140	age 4



A means of assessing the aptness of predictive regression models is to compare predictions to actual estimates of abundance. Table 4 compares the predictive accuracy of models based on the adjusted data set. Comparisons are made for each available year back to 1992. We assessed accuracy of models based on the data set by hind-casting abundance predictions for each year and comparing these values to post season abundance estimates for the data set.

Table 4. Assessment of the accuracy of pre-season predictions of ocean abundance for Rogue fall chinook salmon, 1992-2001. Index values in thousands of fish.

Year	Age	Pre-season Prediction	Post-season Estimate	Pre-season/ Post-season
1992	3	4.4	4.1	1.06
1993		12.9	17.3	0.75
1994		7.2	3.3	2.21
1995		14.8	4.5	3.33
1996		4.8	2.6	1.83
1997		3.2	5.9	0.54
1998		1.6	3.7	0.43
1999		1.1	2.0	0.55
2000		4.3	9.3	0.46
2001		6.3	13.5	0.47
Mean				**1.16**
1992	4	1.5	2.3	0.65
1993		1.5	2.9	0.51
1994		14.9	9.5	1.56
1995		3.2	1.9	1.71
1996		2.7	2.7	1.01
1997		1.7	1.6	1.11
1998		1.2	4.0	0.28
1999		2.1	2.7	0.78
2000		1.4	0.9	1.54
2001		8.4	5.4	1.54
Mean				**1.07**
1992	5	0.3	0.5	0.57
1993		0.2	0.6	0.42
1994		0.2	0.9	0.26
1995		0.9	2.5	0.37
1996		0.2	0.1	2.36
1997		0.3	0.3	0.89
1998		0.2	0.3	0.57
1999		0.5	0.6	0.83
2000		0.3	0.6	0.46
2001		0.1	0.0	4.27
Mean				**1.10**

In general, predictive models for age-3 and age-4 fish have not exhibited any net bias over the 10 years they have been used. Whereas, the predictive model fore age-5 fish has tended to under-predict actual abundance.

Starting in 1999, ocean abundance was predicted using zero-intercept regression models derived from this data set. However, despite these potential improvements, abundance predictions for this stock should be viewed as approximate when used in management applications. Furthermore, given the declining abundance this stock is presently exhibiting (Figure 5), abundance predictions should be used conservatively.

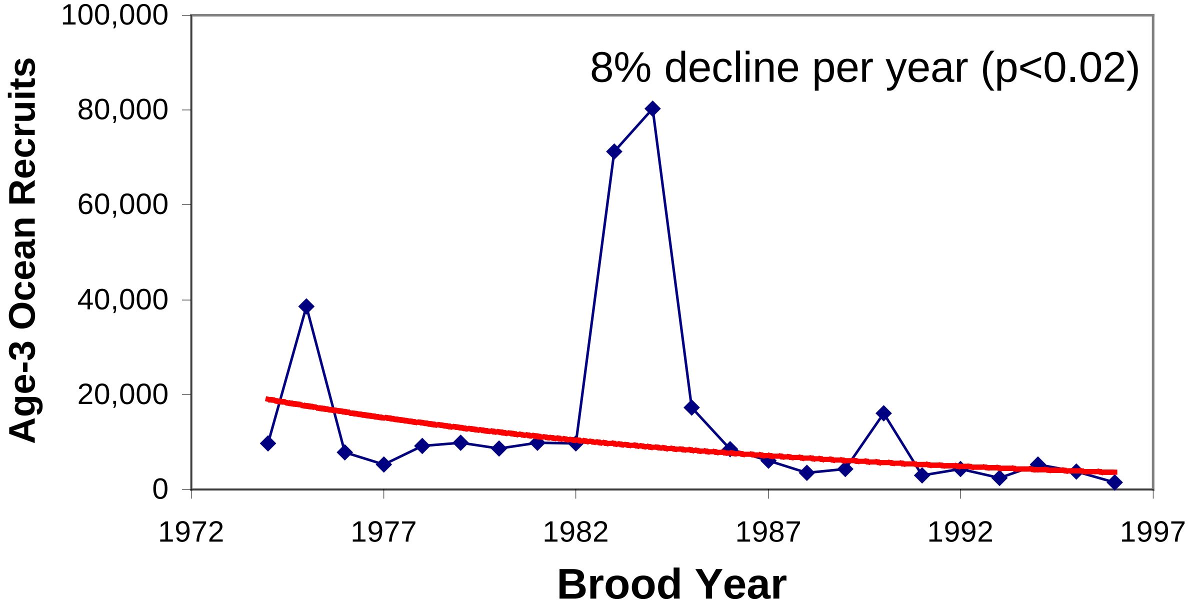


Figure 5. Trends in indexes of age-3 ocean recruits of Rogue River fall chinook salmon of the 1974-96 brood years. Abundance Indexes derived through cohort reconstruction.

ACKNOWLEDGMENTS

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Appendix A. Data set of Rogue basin carcasses counts of fall chinook, 1977-2001. ***Bold Italicized*** values have been adjusted.

RETURN	ADJUSTED CARCASS COUNTS IN SURVEY AREAS								
	ROGUE		APPLEGATE				TOTAL	TOTAL	GRAND
YEAR	MAIN79	MAIN39	APP110	APP117	APP132	SLATE	ROGUE	APPLEGATE	TOTAL
1977	***480***	***719***	***1,041***	***1,202***	141	162	***1,199***	***2,546***	***3,745***
1978	756	1,174	4,807	1,007	180	1,148	1,930	7,142	9,072
1979	***233***	***252***	586	309	102	550	***485***	***1,547***	***2,032***
1980	170	242	826	280	36	236	412	1,378	1,790
1981	370	***1,414***	***2,605***	***744***	824	442	***1,784***	***4,615***	***6,399***
1982	634	1,130	877	300	329	250	1,764	1,756	3,520
1983	***217***	***916***	***859***	***424***	***339***	253	***1,133***	***1,875***	***3,008***
1984	***423***	***838***	***931***	***818***	***300***	352	***1,262***	***2,401***	***3,663***
1985	557	1,254	2,073	2,099	1,197	806	1,811	6,175	7,986
1986	--	--	3,558	***3,202***	***3,848***	1,065	--	***11,673***	--
1987	--	--	6,794	5,116	4,062	141	--	16,113	--
1988	***2,170***	***13,274***	***7,489***	***5,389***	***4,521***	122	***15,444***	***17,521***	***32,965***
1989	761	2,833	1,897	1,202	1,117	79	3,594	4,295	7,889
1990	273	381	329	477	442	12	654	1,260	1,914
1991	289	731	707	694	515	20	1,020	1,936	2,956
1992	332	772	434	775	472	45	1,104	1,726	2,830
1993	423	1,733	1,011	1,571	933	33	2,156	3,548	5,704
1994	839	1,952	949	1,480	2,629	46	2,791	5,104	7,895
1995	522	1,359	582	810	844	14	1,881	2,250	4,131
1996	276	499	***737***	***665***	***379***	13	***775***	***1,794***	***2,569***
1997	246	543	217	418	245	42	789	922	1,711
1998	366	***995***	***528***	***845***	***871***	36	***1,361***	***2,280***	***3,641***
1999	207	506	396	795	654	92	713	1,937	2,650
2000	295	897	612	1029	671	88	1,192	2,400	3,592
2001	691	2,111	793	1,230	2,229	48	2,802	4,300	7,102

Appendix B. Reconstructed cohorts of 1975-96 broods of Rogue fall chinook as indexed by adjusted carcass counts.

	AGE 2	AGE 3				AGE 4				AGE 5			
BROOD YEAR	INRIVER	FALL START	MAY START	OCEAN IMPACT	INRIVER	FALL START	MAY START	OCEAN IMPACT	INRIVER	FALL START	MAY START	OCEAN IMPACT	INRIVER
1972										104	83	46	37
1973						1,723	1,378	758	337	283	227	125	102
1974		19,507	9,753	2,276	959	6,519	5,215	2,868	2,253	94	75	41	34
1975	2,389	77,314	38,657	9,020	6,126	23,511	18,809	10,345	6,731	1,733	1,386	763	624
976	1,019	15,610	7,805	1,821	999	4,985	3,988	2,193	927	868	694	368	326
1977	195	10,450	5,225	1,219	245	3,761	3,009	1,595	1,075	339	271	141	130
1978	411	18,309	9,154	1,922	3,647	3,585	2,868	1,491	1,264	113	90	54	36
1979	1,171	19,621	9,811	2,943	1,334	5,533	4,427	2,656	1,549	222	177	67	110
1980	708	17,150	8,575	1,629	1,077	5,869	4,695	1,784	1,846	1,065	852	213	639
1981	271	19,750	9,875	790	1,249	7,836	6,269	1,567	3,474	1,228	982	452	530
1982	396	19,446	9,723	1,070	1,254	7,400	5,920	2,723	2,448	749	599	258	341
1983	2,500	142,558	71,279	12,830	13,015	45,434	36,347	15,629	17,611	3,107	2,486	969	1,516
1984	3,223	160,679	80,340	12,854	7,568	59,918	47,934	18,694	25,218	4,022	3,217	1,158	2,059
1985	2,532	34,668	17,334	3,467	4,846	9,021	7,217	2,598	4,023	595	476	262	214
1986	1,352	16,895	8,447	1,267	1,294	5,886	4,709	2,590	1,367	753	602	108	494
1987	481	12,086	6,043	1,813	278	3,953	3,162	569	1,901	692	554	39	515
1988	46	7,011	3,506	105	358	3,043	2,434	170	1,500	764	611	98	513
1989	157	8,742	4,371	87	342	3,941	3,153	504	1,477	1,171	937	84	853
1990	464	32,086	16,043	802	3,462	11,778	9,423	848	5,755	2,819	2,255	293	1,962
1991	257	5,964	2,982	89	758	2,134	1,708	222	1,363	122	98	16	82
1992	529	8,602	4,301	172	644	3,485	2,788	446	1,934	407	326	20	306
1993	173	4,871	2,436	122	432	1,882	1,506	90	1,045	370	296	27	269
1994	121	10,490	5,245	52	287	4,905	3,924	353	2,822	749	599	54	545
1995	68	7,667	3,833	0	502	3,331	2,665	240	1,617	808	647	65	582
1996	40	2,954	1,477	15	329	1,133	907	91	787	29	23	2	21
1997	157	18,674	9,337	560	1,976	6,801	5,441	490	4,140				
1998	226	26,970	13,485	361	2,315								
1999	767												