

Run Size Forecast for Klickitat River Adult Spring Chinook, 2007

Prepared by:
Bill Bosch and Joe Zendt
Yakama Nation Fisheries - Yakima Klickitat Fisheries Project
Klickitat Field Office
1575 Horseshoe Bend Road
Klickitat, Washington 98628

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Summary

In 2006 the forecast was for a return of 1,300 adult (age-4 and age-5) spring Chinook to the Klickitat River. The actual return in 2006 was estimated to be 1,670 age-4 and age-5 spring Chinook, with about 74% of the return estimated to be of Klickitat Hatchery origin.

The 1990-2000 regressions were used to project 2007 returns of age-4 and age-5 spring Chinook from 2006 returns of 150 age-3 and 1,250 age-4 fish, respectively. **This method projects a 2007 return of approximately 1200 adult spring Chinook to the Klickitat River including about 700 age-4 and 500 age-5 fish.** We also reviewed 1984-2002, 1994-2002, and 1990-2002 (excluding 2001) cohort ratio and regression forecast data as possible predictors. Table 1 gives the forecasts from these various methods with the 1990-2000 regression forecast highlighted in **bold**.

Table 1. 2007 Klickitat River Spring Chinook Predictors

	'84-02	R ²	'94-02	R ²	'90-00	R ²	'90-00 & '02	R ²
<u>Age-4</u>								
Ratio	764		645		699		762	
Regression	1202	0.085	1050	0.240	681	0.81	760	0.77
<u>Age-5</u>								
Ratio	824		514		620		620	
Regression	616	0.374	462	0.421	480	0.45	480	--
<u>Total</u>								
Ratio	1588		1159		1319		1382	
Regression	1818		1512		1161		1240	

Review of 2006 Klickitat River spring Chinook return

The estimated spring Chinook return to the Klickitat River mouth in 2006 was just over 1,900 fish including 225 jacks and mini-jacks and 1,680 adult spring Chinook (Table 2). Harvest was estimated at 333 spring Chinook (301 adults) in the recreational fishery (Table 3) and 475 fish (455 adults) in the tribal ceremonial and subsistence fishery at Lyle Falls (Table 4). Observed age composition from adults sampled in the sport fishery was assumed to apply to the tribal fishery as well. Escapement to the Klickitat Hatchery was 76 mini-jack, 94 jack, and 680 adult spring Chinook (Table 5). A total of 82 spring Chinook redds were observed in spawning ground surveys in 2006 and the natural spawning escapement was estimated to be 246 using an estimate of 3 fish per redd (Table 6). The fish per redd estimate was based on a review of 2002-2004 adult plants and redd observations above Castile Falls as well as a review of 1982-2006 fish per redd data for spring Chinook in the Yakima Basin. Observed age composition for unmarked spring Chinook sampled at the Lyle Falls adult trap was assumed to represent the natural spawn escapement. Although there is a some concern for bias in age composition data from the Lyle Falls adult trap due to size selectivity in the trap catch, the resulting adult age proportions did not differ significantly from those of past years' natural spawners.

Finally, Table 7 gives brood year productivity estimates for Klickitat spring Chinook for the years 1984 to present. These are the data used to derive the cohort ratio and regression estimates given in Table 1.

Table 2. Klickitat River spring Chinook run by return year.

Return Year	Age					Total	Adult Total
	2	3	4	5	6		
1977		371				904	533
1978		154				1,682	1,528
1979		2,921				3,772	851
1980		955				2,640	1,685
1981	441	193				3,162	2,528
1982	236	70				3,544	3,238
1983	817	173				3,407	2,417
1984	201	64	489	305		1,588	1,323
1985	152	94				1,094	848
1986	204	262				1,578	1,112
1987	341	111				2,134	1,682
1988	2/ 143	273	1,819	2,108	2	4,345	3,929
1989	3/ 291	508	4,486	762	6	6,053	5,254
1990	4/ 795	399	766	1,797	20	3,777	2,583
1991	1,604	246	973	500	4	3,327	1,477
1992	736	131	1,000	527	13	2,407	1,540
1993	923	44	1,640	1,998	64	4,669	3,702
1994	1,935	78	146	790	22	2,971	958
1995	1,476	271	465	193	38	2,443	696
1996	56	113	1,034	117	5	1,325	1,156
1997	540	52	1,147	704	10	2,453	1,861
1998	3,193	148	316	333	53	4,043	702
1999	165	560	523	204	1	1,453	728
2000	3,730	383	2,450	258	0	6,821	2,708
2001	5,648	420	531	586	9	7,194	1,126
2002	3,071	696	2,098	232	0	6,097	2,330
2003	3,863	615	2,717	1,175	0	8,370	3,892
2004	313	1,077	2,209	1,362	4	4,965	3,575
2005	5/ 231	129	1,112	83	37	1,592	1,232
2006	5/ 76	150	1,249	420	9	1,904	1,678

1/ Adult totals prior to 1988 include some jacks.

2/ Includes 120 (age 3) Carson stock.

3/ Includes 4,121 (age 4) Carson stock.

4/ Includes 1,088 (age 5) Carson stock.

5/ Preliminary.

Table 3. Klickitat River spring Chinook sport harvest by return year.

Return Year	Age					Total	Adult Total	
	2	3	4	5	6			
1977	0	0				9	9	
1978	0	46				312	266	
1979	0	31				120	89	
1980	0	5				11	6	
1981	0	69				221	152	
1982	0	45				477	432	
1983	0	156	142	141	*	439	283	
1984	0	14	218	109	*	341	327	
1985	0	50	99	82	*	231	181	
1986	0	4	15	9	*	28	24	
1987	0	38	151	9	*	198	160	
1988	1/	0	29	104	144	*	277	248
1989	2/	0	97	788	43	0	928	831
1990	3/	0	36	107	247	2	392	356
1991		0	36	98	41	0	175	139
1992		0	0	92	31	0	123	123
1993		0	28	145	138	0	311	283
1994		0	0	0	48	3	51	51
1995		0	13	0	0	0	13	0
1996		0	39	124	19	0	182	143
1997		2	9	142	123	5	281	270
1998		0	7	5	5	4	21	14
1999		0	56	50	26	0	132	76
2000		0	222	360	35	0	617	395
2001		0	82	62	62	0	206	124
2002	4/	0	36	151	3	0	190	154
2003	4/	0	157	480	203	0	840	683
2004	4/	0	464	765	371	0	1,600	1,136
2005	4/	0	23	196	0	11	230	207
2006	5/	0	32	252	49	0	333	301

1/ Includes 12 (age 3) Carson stock.

2/ Includes 769 (age 4) Carson stock.

3/ Includes 204 (age 5) Carson stock.

4/ Preliminary Catch Record Card estimates.

5/ Preliminary estimate. From J. Hymer email 11/7/06.

* All 6's included in the 5's column

Table 4. Klickitat River spring Chinook tribal harvest by return year.

Return Year	Age					Total	Adult Total	
	2	3	4	5	6			
1977	1/					86	86	
1978			72			712	640	
1979						0	0	
1980	1/					61	61	
1981			78			500	422	
1982	1/					1,343	1,343	
1983	1/					1,462	1,462	
1984	1/					427	427	
1985			35			570	535	
1986			61			522	461	
1987	1/					347	347	
1988	2/	0	85	511	594	0	1,190	1,105
1989	3/	0	85	928	24	0	1,037	952
1990	4/	0	113	436	984	9	1,542	1,429
1991		0	93	396	167	0	657	563
1992		0	25	292	168	4	489	464
1993		0	6	480	692	28	1,206	1,200
1994		0	11	16	159	7	193	182
1995		0	4	94	39	7	144	140
1996		0	24	142	23	0	189	165
1997		0	33	88	76	3	200	167
1998		0	31	53	54	28	166	135
1999		0	55	48	27	0	130	75
2000		0	129	977	74	0	1,180	1,051
2001		0	1	170	170	0	341	340
2002		0	45	407	7	0	459	414
2003		0	12	642	341	0	995	983
2004		0	5	384	187	0	576	571
2005	5/	0	18	381	0	25	424	406
2006	5/	0	20	381	74	0	475	455

1/ Jacks included.

2/ Includes 38 (age 3) Carson stock.

3/ Includes 763 (age 4) Carson stock.

4/ Includes 563 (age 5) Carson stock.

5/ Preliminary.

Table 5. Klickitat Hatchery spring Chinook escapement by return year.

Return Year	2	3	Age 4	5	6	Total	Adult Total	
1977		371				983	312	
1978		36				508	472	
1979		2,890				3,582	692	
1980		950				2,505	1,555	
1981	441	46				2,196	1,709	
1982	236	25				1,611	1,350	
1983	817	17				1,443	609	
1984	201	50	271	196	0	718	467	
1985	152	9				214	53	
1986	204	197				886	485	
1987	341	75				1,279	863	
1988	1,2/	143	109	691	776	1	1,720	1,468
1989	3,4/	291	228	2,686	486	4	3,695	3,176
1990	5/	795	243	184	388	2	1,612	574
1991	1,604	113	421	113	0	2,251	534	
1992	736	102	495	140	0	1,473	635	
1993	923	8	945	834	10	2,720	1,789	
1994	1,935	58	113	506	10	2,622	629	
1995	1,476	221	323	134	27	2,181	484	
1996	56	34	520	51	3	664	574	
1997	538	6	534	294	1	1,373	829	
1998	3,193	62	146	155	12	3,568	313	
1999	165	355	337	120	1	978	458	
2000	3,530	22	671	75	0	4,298	746	
2001	5,648	311	204	146	0	6,309	350	
2002	6/	3,071	432	828	36	0	4,367	864
2003	7/	3,863	268	799	285	0	5,215	1,084
2004	7/	313	473	595	453	3	1,837	1,051
2005	8/	231	88	454	39	1	813	494
2006	8/	76	94	475	205	0	850	680

1/ Includes 65 (age 3) Carson stock.

2/ Includes 73 adults and 2 jacks of Klickitat stock and 3 jacks of Carson stock distributed to YIN.

3/ Includes 2,559 (age 4) Carson stock.

4/ Includes 39 adult males and 44 jacks of Klickitat stock and 1,001 (age 4) of Carson stock distributed to YIN.

5/ Includes 321 (age 5) Carson stock.

6/ Excludes 165 males, 275 females, and 170 jacks released above Castille Falls.

7/ Excludes 122 males, 440 females, and 98 jacks released above Castille Falls.

8/ Mini jacks assumed to be two year olds.

Table 6. Klickitat River spring chinook natural spawn escapement by return year.

Return Year	Age					Total	Adult Total	
	2	3	4	5	6			
1977						126	126	
1978						150	150	
1979						70	70	
1980						63	63	
1981						245	245	
1982						113	113	
1983						63	63	
1984						102	102	
1985						79	79	
1986						142	142	
1987						312	312	
1988	1/	0	50	513	594	1	1,158	1,108
1989	2/	0	98	84	209	2	393	295
1990	3/	0	7	39	178	7	231	224
1991		0	4	58	179	4	245	241
1992		0	4	121	188	9	322	318
1993		0	2	70	334	26	432	430
1994		0	9	17	77	2	105	96
1995		0	33	48	20	4	105	72
1996		0	16	248	24	2	290	274
1997		0	4	383	211	1	599	595
1998		0	48	112	119	9	288	240
1999		0	94	88	31	0	213	119
2000		200	10	442	74	0	726	516
2001		0	26	95	208	9	338	312
2002	4/	0	183	712	186	0	1,081	898
2003	5/	0	178	796	346	0	1,320	1,142
2004	6/	0	135	465	351	1	952	817
2005	7/	0	0	81	44	0	125	125
2006	8/	0	4	141	92	9	246	242

1/ Includes 5 (age 3) Carson Stock. Estimate includes 1,000 fish that spawned below the hatchery.

2/ Includes 30 (age 4) Carson stock.

3/ Includes 0 (age 5) Carson stock.

4/ Includes 165 males, 275 females, and 170 jacks released above Castille Falls.

5/ Includes 122 males, 440 females, and 98 jacks released above Castille Falls.

6/ Includes 195 males, 320 females, and 85 jacks released above Castille Falls.

7/ No biological sampling available. Used Klickitat Hatchery unmarked age comp (only unmarked morts

8/ Used WDFW Lyle adult trap age sample information and assumed all unmarked fish were wild/natural

Table 7. Productivity (Returns per Age 4/5/6 Spawner) of Klickitat spring Chinook by brood year.

Brood Year	Est. Adult Spawners			Estimated Total Returns					R:S
	Hat.	Wild	Total	Age-3	Age-4	Age-5	Age-6	Total	
1984	467	102	569	111	1819	762	20	2712	4.77
1985	53	79	132	273	4486	1797	4	6560	49.70
1986	485	142	627	508	766	500	13	1787	2.85
1987	863	312	1175	399	973	527	64	1963	1.67
1988	1468	1108	2576	246	1000	1998	22	3266	1.27
1989	3176	295	3471	131	1640	790	38	2599	0.75
1990	574	224	798	44	146	193	5	388	0.49
1991	534	241	775	78	465	117	10	670	0.86
1992	635	318	953	271	1034	704	53	2062	2.16
1993	1789	430	2219	113	1147	333	1	1594	0.72
1994	629	96	725	52	316	204	0	572	0.79
1995	484	72	556	148	523	258	9	938	1.69
1996	574	274	848	560	2450	586	0	3596	4.24
1997	829	595	1424	383	531	232	0	1146	0.80
1998	313	240	553	420	2098	1175	4	3697	6.69
1999	458	119	577	696	2717	1362	37	4812	8.34
2000	746	516	1262	615	2209	83	9	2916	2.31
2001	350	312	662	1077	1112	420		2609	3.94
2002	864	898	1762	129	1249				
2003	1084	1142	2226	150					
2004	1051	817	1868						
2005	494	125	619						
2006	680	242	922						