

Fisheries Management and Evaluation for 2001 Willamette River Spring Chinook

Introduction

In February 2001, the Oregon Department of Fish and Wildlife (ODFW) submitted a Fisheries Management and Evaluation Plan (FMEP) for upper Willamette spring chinook salmon to the National Marine Fisheries Service (NMFS) under limit number 4 of the 4(d) Rule for the upper Willamette River (ODFW 2001). Upper Willamette River wild spring chinook salmon were listed as a threatened species under the federal Endangered Species Act (ESA) in May 1999.

The NMFS evaluated ODFW's FMEP and determined the FMEP adequately addressed all of the criteria specified in limit number 4 of the Rule. Thus, take prohibitions under Section 9 of the ESA and applicable 4(d) Rule do not apply to fishery harvest activities provided such fisheries are managed in accordance with the FMEP.

The FMEP indicates ODFW will complete an annual report that includes a summary of the previous year's run, fisheries, spawning escapement, fishery mortality estimates, and fishing plans for the coming year. The report is due January 31 each year to NMFS.

2001 Willamette Spring Chinook Run

The 2001 Willamette spring chinook return was 80,400 fish to the mouth of the Columbia River. It was the largest return since 1991 (Table 1 and Figure 1). The return continued a progression of improved returns since the near record-low returns of 35,000 fish in 1996 and 1997.

Table 1. Willamette River spring chinook returns and lower Willamette recreational harvest, 1946-2001.

Year	Run Entering		Falls Count	Mortalities Below Falls ²	Run Entering Clackamas R.	Lower Willamette Sport Fishery					
	Columbia	Willamette ¹				L. Willamette	Days	Catch Per Trip	Harvest Rate	Wild Fish Impact	Trips Per Fish
1946		68,600	53,000		3,000	12,600	61,900	0.20	18%		4.9
1947		59,000	45,000		2,000	12,000	91,900	0.13	20%		7.7
1948		40,100	30,000		1,800	8,300	83,600	0.10	21%		10.1
1949		37,900	27,000		1,800	9,100	85,500	0.11	24%		9.4
1950		24,800	14,500		1,500	8,800	73,400	0.12	35%		8.3
1951		49,600	34,300		2,000	13,300	92,600	0.14	27%		7.0
1952		67,500	52,200		2,800	12,500	91,100	0.14	19%		7.3
1953		96,800	76,400		4,000	16,400	102,800	0.16	17%		6.3
1954		44,400	31,100		1,800	11,500	104,100	0.11	26%		9.1
1955		32,500	22,000		1,500	9,000	77,700	0.12	28%		8.6
1956		77,600	58,600		3,000	16,000	84,100	0.19	21%		5.3
1957		52,800	39,300		2,000	11,500	95,500	0.12	22%		8.3
1958		62,800	45,200		2,100	15,500	137,900	0.11	25%		8.9
1959		53,400	31,900		3,000	18,500	134,100	0.14	35%		7.2
1960		24,200	14,400		1,800	8,000	92,300	0.09	33%		11.5
1961		27,500	18,900		2,200	6,400	75,100	0.09	23%		11.7
1962		38,200	26,000	100	3,000	9,100	74,000	0.12	24%		8.1
1963		48,100	30,300	200	4,000	13,600	84,800	0.16	28%		6.2
1964		58,400	36,300		3,500	18,600	118,700	0.16	32%		6.4
1965		41,100	29,100		3,000	9,000	74,000	0.12	22%		8.2
1966		44,000	28,200		3,000	12,800	85,700	0.15	29%		6.7
1967		74,400	56,200		3,000	15,200	92,500	0.16	20%		6.1
1968		47,500	31,500	500	2,000	13,500	91,800	0.15	28%		6.8
1969		52,600	33,700	100	2,500	16,300	99,000	0.16	31%		6.1
1970	65,500	53,500	34,200		1,500	17,700	118,800	0.15	33%		6.7
1971	80,900	67,400	44,600	600	2,200	20,000	112,800	0.18	30%		5.6
1972	58,400	47,100	26,200	200	2,200	18,500	91,200	0.20	39%		4.9
1973	70,700	54,500	42,000	300	2,200	10,000	90,300	0.11	18%		9.0
1974	82,400	71,800	44,500	100	2,200	25,000	154,000	0.16	35%		6.2
1975	40,800	32,800	19,100	100	1,100	12,500	143,800	0.09	38%		11.5
1976	45,100	40,800	22,100	100	2,200	16,400	149,100	0.11	40%		9.1
1977	64,400	58,100	40,000	100	4,000	14,000	126,400	0.11	24%		9.0
1978	83,330	71,400	47,500	100	4,000	19,800	157,600	0.13	28%		8.0
1979	49,200	44,600	26,600	100	5,000	12,800	132,700	0.10	29%		10.4
1980	43,300	42,400	27,000		8,500	7,000	83,600	0.08	17%		11.9
1981	56,300	48,600	30,100		8,000	10,500	124,300	0.08	22%		11.8
1982	78,000	72,500	46,200	100	7,300	18,900	142,900	0.13	26%		7.6
1983	62,200	55,100	30,600	300	10,400	13,800	136,100	0.10	25%		9.9
1984	84,200	74,500	43,500	400	11,300	19,400	136,900	0.14	26%		7.1
1985	68,100	57,100	34,500	400	6,600	15,500	185,600	0.08	27%		12.0
1986	73,600	62,500	39,200	400	7,900	15,000	171,900	0.09	24%		11.5
1987	93,600	82,900	54,800	500	8,700	18,800	173,500	0.11	23%		9.2
1988	118,100	104,000	70,500	200	8,700	24,600	209,700	0.12	24%		8.5
1989	114,900	102,000	69,200	200	8,400	24,200	186,200	0.13	24%		7.7
1990	130,600	106,300	71,300	600	11,500	23,000	200,400	0.11	22%		8.7
1991	109,900	95,300	52,500	400	11,900	30,500	235,800	0.13	32%		7.7
1992	75,000	68,000	42,000	1,000	11,500	13,500	188,500	0.07	20%		14.0
1993	65,900	63,900	32,000	400	10,800	20,700	174,100	0.12	32%		8.4
1994	49,600	47,200	26,100	1,400	7,500	11,500	155,700	0.07	24%		13.5
1995	42,600	42,500	20,600	600	6,600	14,700	145,300	0.10	35%		9.9
1996	34,800	34,600	21,600	1,100	5,900	6,100	63,800	0.10	18%		10.5
1997	35,300	35,000	26,900	400	5,800	1,900	15,000	0.13	5%		7.9
1998	45,100	45,000	34,500	300	7,400	2,800	34,500	0.08	6%		12.3
1999	54,200	53,900	40,400	600	7,400	5,500 ⁵	45,400	0.12	10%		8.3
2000	57,500	56,100	39,100	300	7,700	11,400 ⁶	76,100	0.15	16%	14.0%	6.7
2001	80,400	73,000	54,000	600	10,800	12,400 ⁶	101,500	0.12	10%	2.1%	8.2

¹ Tribal Fishermen harvested 759, 29, and 12 chinook at Willamette Falls in 1994, 1995, and 1996 respectively.

² Number of mortalities below Willamette Falls includes fish estimates for predation by sea lions. For 1997, 1998, 1999, 2000, and 2001, the estimated take was 141, 150, 348, 138, and 70 respectively.

³ Catch totals include estimates for the mainstem Willamette bank fishery in 1947, and 1951-2001. Clackamas catch is included from 1950-70 and Eagle Creek catch is included from 1962-70. Clackamas River catch averaged 100 to 200 fish for these years.

⁴ No estimate for number of days fished was made for the L. Willamette bank fishery of 1946-74.

⁵ Total catch of 11,382 includes, 8,712 kept, and 2,670 released. Hook and release mortality estimate is 299.

⁶ Total catch of 12,362 includes, 6,969 kept, and 5,393 released. Hook and release mortality estimate is 706.

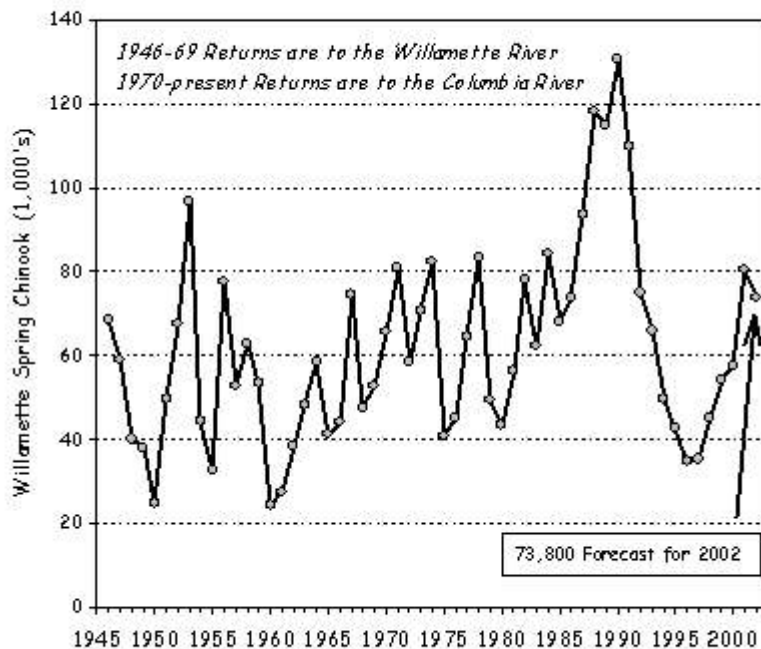


Figure 1. Historic Willamette spring chinook returns and the 2002 forecast.

Notes

1. The total 2001 return of 80,400 fell exactly on the upper error bound. Bounds were 80% statistical confidence intervals based on regression error terms. Last year's run was 24% greater than the forecast. The 2001 return was the largest since 1991.
2. This year's forecast of 73,800 is based on the 2001 methods except the statistical correction for positive autocorrelation of error terms in the five-year old forecast was abandoned in favor of the traditional simple linear regression model.
3. It is currently not possible to forecast the wild component of the 2002 run expectation. For management purposes staff will assume 10% of the 2002 run will be wild fish. This is the same percentage used for 2000 and 2001 management.
4. The uncertainty in run size forecasts is estimated based on confidence limits from the regression models and cohort estimators.
5. The 2002 forecast of 25,900 age 4 fish represents a 12% decrease from the 2001 forecast and is 38% less than the actual 2001 return.
6. The 2002 forecast of 45,600 age 5 fish is 54% higher than the 2001 forecast and 25% greater than the actual 2001 return.
7. The 2002 McKenzie Leaburg Dam forecast is 3,200 (range 2,200-4,200) based on the expected return of 73,800, selective harvest of 26,600 hatchery fish below Willamette Falls (40% harvest rate on hatchery fish and 5% impact on wild fish), 7,800 fish into the Clackamas River, 500 fish lost to mortality below the falls, 38,600 fish to Willamette Falls, and an 8.2% Leaburg count of the falls passage.
8. The 2002 Clackamas North Fork Dam forecast of 2,300 (range 800-3,800) is based on a recent average conversion rate (36.1% of the Clackamas turnoff) and an expected 19% harvest rate on hatchery fish in the Clackamas River and 2% impact on wild fish in the Clackamas River.

The preseason forecast developed by ODFW was for a return of 61,000 fish entering the Columbia River. The wild proportion of the run was estimated preseason at 10% or 6,100 fish (Melcher 2000). Although a complete accounting of the wild run was not possible in 2001 because a large proportion of the hatchery return in 2001 was not adipose fin-clipped, it does appear that the 2001 actual run of 80,400 was indeed about 10% wild or about 8,000 fish to the mouth of the Columbia River. More accurate accounting will be possible in 2002 because nearly all returning hatchery fish will be adipose finclipped. The primary basins that continue to support natural production of spring chinook are the Clackamas, North Santiam, and McKenzie rivers; and the McKenzie is considered to be the most important of these.

The under-forecast in 2001 continued a trend begun in 1997. Forecasts have generally under-predicted when the run was increasing and over-predicted when the run was decreasing (Figure 2).

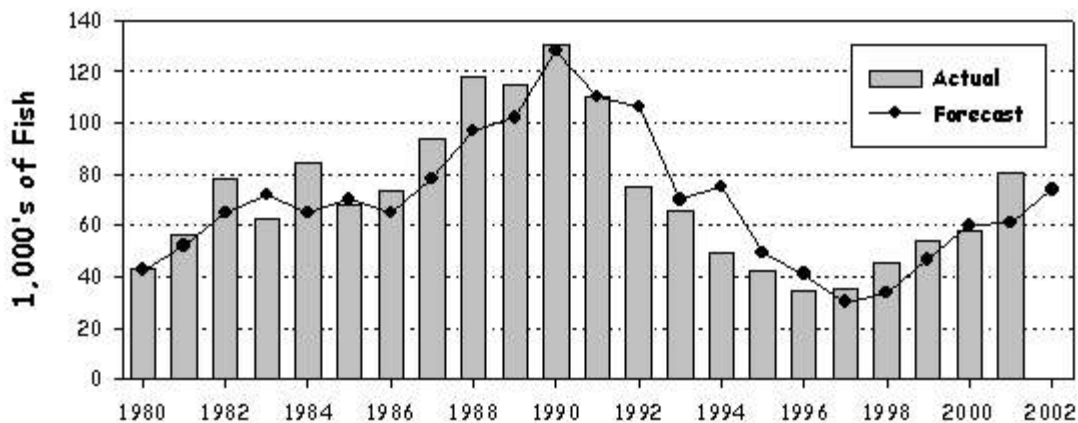


Figure 2. Predicted and observed Willamette spring chinook returns to the Columbia River, 1980-2002.

The 2001 return was comprised of the following age classes (Table 2).

	No.	%
Age 3	1,864	2.3
Age 4	41,243	51.3
Age 5	36,860	45.9
Age 6	399	0.5
Total	80,366	100.0

Clackamas River Return

The return to the Clackamas River in 2001 was 10,800 fish, the largest return since 1993 (Table 3). The return was comprised of the following age classes (Table 2).

	No.	%
Age 3	381	3.5
Age 4	6,708	62.1
Age 5	3,687	34.1
Age 6	34	0.3
Total	10,810	100.0

The preseason forecast was for a return of 8,900 fish to the mouth of the Clackamas River (Melcher 2000) with about 15% of the return being wild or 1,335 wild fish. Even though the majority of age 5 hatchery fish returning in 2001 were nonadipose finclipped, a review of the fish sampling that occurred at the North Fork Dam trap suggests the 15% wild fish estimate was reasonable.

The return to North Fork Dam in 2001 was 3,748 fish, the largest count since 1991 (Table 3 and Figure 3). Sampling by Portland General Electric staff showed the return to be 2,243 nonadipose fin-clipped hatchery and wild fish and 1,505 adipose fin-clipped hatchery fish. The adipose fin-clipped fish were not allowed to pass the dam into the natural spawn area. Adjusting the counts by Clackamas Hatchery juvenile adipose fin-clip mark rates indicates the count of 3,748 included about 1,350 wild fish. When considering natural spawn below the dam and fishery-related mortalities, it appears the wild return entering the Clackamas River in 2001 may have been about 1,600 fish or 15% of the 10,800 run entering the Clackamas River.

Table 2. 2001 Willamette spring chinook return to the Columbia River.

Catch	Age 3	Age 4	Age 5	Age 6	Total
LCR Commercial	0	173	2,617	0	2,790
SAF Commercial	0	236	300	0	536
Tangle Net	0	168	25	0	193
LCR Sport (kept catch)	0	1,768	1,881	0	3,649
LCR Sport (rel. mortality)	0	87	92	0	179
L. Will. Sport Fishery (kept catch)	195	4,052	2,707	15	6,969
L. Will. Sport Fishery (rel. mortality)	0	106	600	0	706
Falls Indian Fishery	0	0	0	0	0
Lower Clackamas Sport (kept catch)	153	549	81	0	783
Lower Clackamas Sport (rel.	0	11	60	0	71
Total	348	7,150	8,363	15	15,876
Escapement					
Willamette Falls Count ^{1/}	1,288	27,702	24,633	350	53,973
Mortality Below Falls	0	206	285	0	491
Clackamas Hatchery Return	145	3,740	2,248	22	6,155
Eagle Creek Hatchery Return	0	2	1	0	3
North Fork Dam, Passed Upstream	59	1,082	1,090	12	2,243
North Fork Dam, Recycled	23	1,292	190	0	1,505
Natural Spawn Bel. N.F. Dam	1	32	17	0	50
Sea Lion Predation	0	37	33	0	70
Total	1,516	34,093	28,497	384	64,490
Run Entering Columbia	1,864	41,243	36,860	399	80,366
Percent	2.3%	51.3%	45.9%	0.5%	
Run Entering Willamette	1,864	38,811	31,945	399	73,019
Percent	2.6%	53.2%	43.7%	0.5%	
Run Entering Clackamas	381	6,708	3,687	34	10,810
Percent	3.5%	62.1%	34.1%	0.3%	

^{1/} *Willamette Falls Count age composition based on age composition and length frequencies of hatchery returns (Preliminary data).*

Table 2 Continued, Next Page

Table 2. 2001 Willamette spring chinook return to the Columbia River. (Continued)

	Age 3	Age 4	Age 5	Age 6	Total
Percentages					
LCR Commercial	0.0%	6.2%	93.8%	0.0%	
SAF Commercial	0.0%	44.0%	56.0%	0.0%	
Tangle Net	0.0%	87.0%	13.0%	0.0%	
LCR Sport (kept catch)	0.0%	48.5%	51.5%	0.0%	
L. Will. Sport Fishery (kept catch)	2.8%	58.2%	38.8%	0.2%	
Falls Indian Fishery	0.0%	0.0%	0.0%	0.0%	
Lower Clackamas Sport (kept catch)	19.6%	70.1%	10.3%	0.0%	
Willamette Falls Count	0.0%	52.6%	47.4%	0.0%	
Mortality Below Falls	0.0%	42.0%	58.0%	0.0%	
Clackamas Hatchery	2.4%	60.8%	36.5%	0.4%	
Eagle Creek Hatchery Return	0.0%	66.7%	33.3%	0.0%	
North Fork Dam, Passed Upstream	2.6%	48.2%	48.6%	0.5%	
North Fork Dam, Recycled Downstream	1.5%	85.9%	12.6%	0.0%	
Natural Spawn Bel. N.F. Dam	2.2%	63.3%	34.2%	0.3%	
Sea Lion Predation	0.0%	52.6%	47.4%	0.3%	
LCR Sport (rel. mortality)	0.0%	48.6%	51.4%	0.0%	
L. Will. Sport (rel. mortality)	0.0%	15.0%	85.0%	0.0%	
Lower Clack. Sport (rel. mortality)	0.0%	15.0%	85.0%	0.0%	

SAF Commercial (Select Area Fisheries), includes catch from Youngs Bay (246), Tongue Point (123), and Blind Slough (167).

Clackamas Hatchery and Mortality Below Falls age composition determined by scale analyses from sampling programs.

^{1/} ***Willamette Falls Count age composition based on age composition and length frequencies of hatchery returns (Preliminary data).***

1/15/02

Table 3. Estimated return of spring chinook to the Clackamas River, 1979-2001.

Year	L. Clackamas Sport Catch	North Fork Dam Count	Natural Spawn Bel. N. Fork Dam	Hatchery Return		Total Return
				Eagle Ck. NFH	Clackamas	
1979	1,226	838	159	2,803	0	5,026
1980	3,165	2,172	624	1,480	1,024	8,465
1981	2,334	3,162	654	812	1,065	8,027
1982	2,463	3,119	203	905	573	7,263
1983	4,532	2,685	770	522	1,923	10,432
1984	4,300	2,835	600	1,032	2,521	11,288
1985	2,478	1,834	635	726	944	6,617
1986	3,900	1,960	600	661	776	7,897
1987	3,186	2,425	868	1,338	1,005	8,822
1988	2,720	3,140	201	1,373	1,253	8,687
1989	2,900	2,938	600	1,137	865	8,440
1990	4,710	3,444	600	869	1,847	11,470
1991	3,834	4,659	500	88	2,776	11,857
1992	2,697	3,553	750	0	4,535	11,535
1993	2,963	3,090	200	0	4,635	10,888
1994	1,541	2,174	100	9	3,675	7,499
1995	1,708	1,659	150	19	3,112	6,648
1996	1,869	903	100	2	3,044	5,918
1997	1,732	1,267	150	0	2,670	5,819
1998	1,302	1,431	100	4	4,530	7,367
1999	1,890	878	100	4	4,562	7,444
2000	1,179	2,277	20	9	4,296	7,781
2001	783 ^{1/}	3,748	50	3	6,155	10,800

1/ An additional 544 nonadipose fin-clipped fish were released. The release mortality estimate is 61 fish.

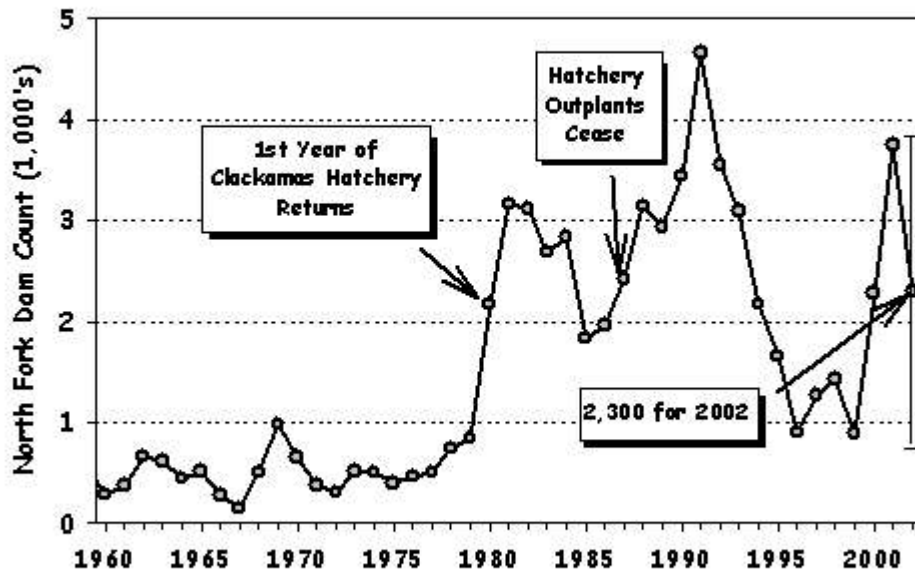


Figure 3. Historic spring chinook returns to North Fork Dam (Clackamas River) and the 2002 forecast.

An escapement of 1,350 wild fish at North Fork Dam is in the range of escapement goals contained in the Clackamas River Basin Fish Management Plan for Spring Chinook (ODFW 1998).

A more accurate estimate of the Clackamas wild fish return will be available beginning in 2002 when nearly all returning hatchery fish will be adipose finclipped.

North Santiam River

The 2001 North Santiam spring chinook return was monitored at Upper and Lower Bennett dams by ODFW District and Research staff. Nearly all hatchery fish returning in 2001 were adipose finclipped. Also all hatchery fish were thermally otolith marked (Schroeder et al., 2001). An estimated 7,003 spring chinook passed Bennett dams. A total of 410 (5.9%) were nonadipose finclipped. Otoliths were collected during natural spawn surveys from nonadipose fin-clipped carcasses. Readings are not complete yet, but likely the number of naturally produced spring chinook will number in the low hundreds.

However, the redd counts of spring chinook salmon in the North Santiam River increased again in 2001 and continue the trend of increasing counts since counting was standardized in 1996 (Table 4).

Table 4. Redd counts of spring chinook salmon in the North Santiam River, 1996-2001.

Area	Redd Counts					
	1996	1997	1998	1999	2000	2001
Mainstem North Santiam: Stayton to Minto	137	134	155	215	272	308
Little North Fork of the Santiam	<u>0</u>	<u>10</u>	<u>39</u>	<u>11</u>	<u>22</u>	<u>18</u>
Total	137	144	194	226	294	326

McKenzie River

The 2001 return to the McKenzie River was 9,548 fish, the largest return since 1991 (Table 5 and Figure 4). Monitoring of the wild return occurs at Leaburg Dam and in natural spawn surveys below Leaburg Dam.

The 2001 Leaburg Dam count was 4,428 fish, the largest count since 1990. The vast majority of McKenzie hatchery spring chinook returning in 2001 were adipose finclipped. The Leaburg count was comprised of 3,433 nonadipose fin-clipped fish and 995 adipose fin-clipped hatchery fish. A total of 126 hatchery fish were removed and not allowed to pass the dam into natural spawn areas.

An analysis of the Leaburg Dam count by ODFW District and Research staff provides estimates of the number of wild and hatchery fish in the 2001 count. This analysis was begun in 1996. The preliminary 2001 estimate of wild fish passing Leaburg Dam is 3,380 fish, the highest count in the database and likely the largest passage of wild fish since 1990 (Table 6). The wild fish escapement of 3,380 is within the escapement goal range of 3,000-5,000 in the McKenzie River Basin Fish Management Plan for Spring Chinook (ODFW 1998).

Table 5. Estimated return of spring chinook to the McKenzie River, 1970-2001.

Run Year	Leaburg Dam Count	McKenzie Hatchery Return	Sport Catch			Est. Natural Spawn Below Leaburg Dam ^{1/}		Total Return
			Above Leaburg Dam	Below Leaburg Dam	Total	Redds	No. Fish	
1970	2,991	20	--		525	278	1,251	4,787
1971	3,602	232	--		621	415	1,868	6,323
1972	1,547	301	--		1,125	177	797	3,770
1973	3,870	56	--		1,510	556	2,502	7,938
1974	3,717	0	--		1,022	689	3,101	7,840
1975	1,374	0	--		461	346	1,557	3,392
1976	1,899	396	--		139	409	1,841	4,275
1977	2,714	1,517	--		1,071	850	3,825	9,127
1978	3,058	1,464	--		924	599	2,696	8,142
1979	1,219	798	--		303	155	698	3,018
1980	1,980	807	--		381	219	986	4,154
1981	1,078	784	--		493	282	1,269	3,624
1982	2,241	1,460	--		627	241	1,085	5,413
1983	1,561	821	15	206	221	172	774	3,377
1984	1,000	1,901	51	567	618	271	1,220	4,739
1985	825	1,923	8	459	467	381	1,715	4,930
1986	2,061	1,705	29	354	383	315	1,418	5,567
1987	3,455	1,593	29	1,339	1,368	212	954	7,370
1988	6,753	2,487	86	1,133	1,219	484	2,178	12,637
1989	3,981	3,154	134	1,730	1,864	228	1,026	10,025
1990	7,226	3,206	315	1,387	1,702	160	720	12,854
1991	4,359	4,483	64	1,922	1,986	161	725	11,553
1992	3,816	3,407	81	1,195	1,276	106	477	8,976
1993	3,629	2,051	80	1,761	1,841	142	639	8,160
1994	1,526	701	13	486	499	59	266	2,992
1995	1,622	1,135	24	84	108 ^{2/}	66	297	3,162
1996	1,445	1,573	58	244	302 ^{2/}	71	320	3,640
1997	1,176	1,524	0	0	0 ^{3/}	90	405	3,105
1998	1,874	1,690	0	0	0 ^{3/}	95	428	3,992
1999	1,909	2,279	0	0	0 ^{3/}	82	369	4,557
2000	2,657	3,553	0	0	0 ^{3/}	132	594	6,804
2001 ^{4/}	4,428	3,920	0	750	750 ^{2/}	100	450	9,548
1970-01 Average	2,706	1,592	52	717	744	267	1,201	6,243
1994-01 Average	2,080	2,047	12	196	207	87	391	4,725

^{1/} Estimated Natural Spawn below Leaburg Dam = No. of Redds below Leaburg Dam X 4.5 Fish/Redd.

^{2/} Adipose fin-clipped hatchery fish only allowed to be retained.

^{3/} Closed season.

^{4/} Preliminary.

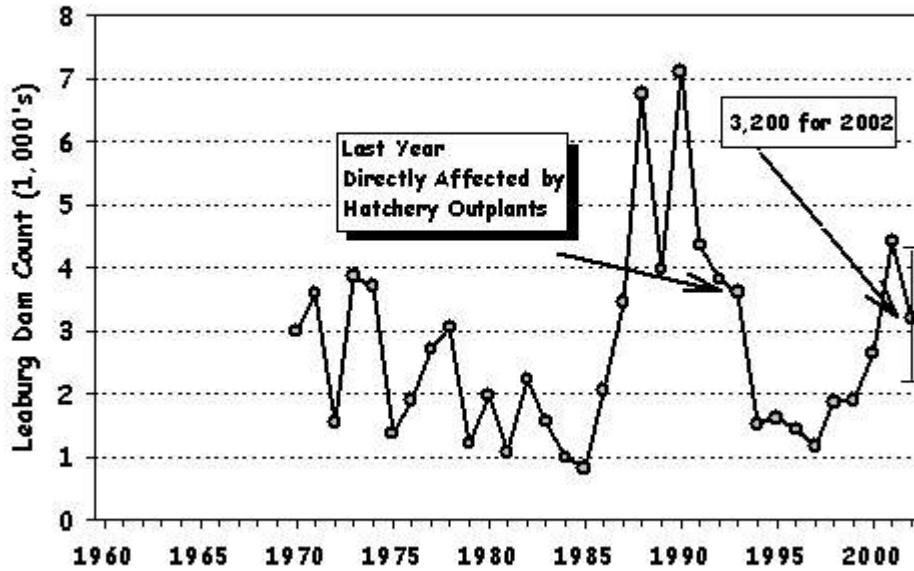


Figure 4. Historic spring chinook returns to Leaburg Dam (McKenzie River) and the 2002 forecast.

Table 6. Spring chinook counts at Leaburg Dam on the McKenzie River, 1994-2001.

Year	Wild		Hatchery		Total
	Number	Percent	Number	Percent	
1994	825	54	701	46	1,526
1995	933	58	689	42	1,622
1996	1,105	76	340	24	1,445
1997	991	84	185	16	1,176
1998	1,415	76	459	24	1,874
1999	1,383	72	526	28	1,909
2000	1,985	75	672	25	2,657
2001 ^{1/}	3,380	76	1,048	24	4,428

^{1/} Preliminary.

2001 Fisheries

The year 2001 was the first fisheries were managed under the FMEP. The FMEP calls for full implementation of selective fisheries for hatchery spring chinook. Only spring chinook that are adipose finclipped will be allowed to be retained in all freshwater fisheries beginning in 2002. All unmarked, wild fish will be required to be released unharmed. The goal of Willamette Basin fishery management for spring chinook is to limit fishery impacts to wild fish to levels which ensure the survival and rebuilding of wild populations. An annual average impact rate of 15% or less in combined freshwater fisheries in the Willamette Basin and lower Columbia will achieve this goal.

In the year 2001 during the preseason planning process, the last year prior to all returning hatchery fish being adipose finclipped, managers limited the 2001 fisheries to an impact rate of 15% not to exceed 20%. The actual 2001 impact rate was considerably less than 15%.

Tables 7 and 8 provide 2001 catch estimates by fishery and fishery impact estimates on Willamette wild spring chinook. Spring chinook stock separations were made through visual stock identification and coded-wire-tag analyses (ODFW/WDFW 2002). The mortality rates for released fish in Columbia spring chinook fisheries is estimated to be 10% (personal communication C. LeFleur, Chair, U.S. v Oregon Technical Advisory Committee).

Lower Columbia River Commercial Fishery

The 2001 lower Columbia River winter gill-net season was the last whereby all spring chinook could be retained. Feasibility testing of the live capture tangle net was initiated in the spring of 2001. It is expected the 2002 mainstem Columbia spring chinook fisheries will employ the tangle net, and only adipose fin-clipped spring chinook would be retained.

The 2001 winter season was managed for an expected catch of 6,000 spring chinook including 4,000 Willamette spring chinook. Impact rates were limited to 6-7% on Willamette wild spring chinook and less than 0.5% on upriver wild spring chinook. The fishery occurred for 148 hours over five fishing periods during February 26 to March 9, 2001. The final landings were 5,445 spring chinook including 2,790 Willamette spring chinook. The estimated impact on Willamette wild spring chinook was 279 fish or 3.48% of the return.

Table 7. 2001 Willamette spring chinook freshwater catches and impacts on wild fish returns.

Fishery	Catch		Wild Fish Mortalities	Percentage Impact on Wild Return ^{1/}
	Kept	Released		
Lower Columbia Commercial	2,790	0	279	3.48
Select Area Commercial	536	0	54	.68
Tangle Net Experimental	193	152	4	.01
Lower Columbia Sport	3,649	1,746	54	.68
Lower Willamette Sport	<u>6,969</u>	<u>5,393</u>	<u>170</u>	<u>2.12</u>
Total	14,137	7,291	561	6.97
Clackamas Sport	783	544	26	1.49
Upper Willamette Sport	NA	NA	NA	(.3) ^{2/}
North Santiam Sport	NA	NA	NA	(2.5) ^{2/}
McKenzie Sport	NA	NA	NA	(1.0) ^{2/}
Totals by Population				
Clackamas				8.46
North Santiam				9.77
McKenzie				8.27

1/ Wild return estimated at 8,037 fish at the mouth of the Columbia River (10% of the actual 2001 Willamette spring chinook run size of 80,366).

2/ Estimates from Table 4 of the FMEP.

Table 8. Freshwater fishery impact rates on wild Willamette River spring chinook, 1981-2001.

	1981-97	1998	1999	2000	2001
Spring Chinook Fishery					
Lower Columbia Commercial ^{1/}	6.8%	0.0%	0.0%	0.6%	4.17%
Lower Columbia Sport	2.5%	0.1%	0.0%	0.4%	0.68%
Lower Willamette Sport	21.7%	6.3%	10.2%	14.0%	2.12%
Clackamas Sport	22.9%	26.5%	22.8%	13.6%	1.49%
Upper Willamette Sport	1.2%	0.6%	0.9%	1.2%	(0.3%)
North Santiam Sport	16.5%	22.7%	21.7%	2.0%	(2.5%)
McKenzie Sport	5.1%	0.0%	0.0%	0.0%	(1.0%)
Totals by Population					
Clackamas	54.0%	22.8%	33.0%	28.2%	8.46%
North Santiam	48.8%	29.6%	32.8%	18.0%	9.77%
McKenzie	37.3%	7.0%	11.1%	16.1%	8.27%

1/ Includes mainstem salmon/sturgeon fisheries and Oregon Select Area fisheries.

Select Area Fisheries

Fisheries for net pen-reared spring chinook occurred in 2001 in Youngs Bay, Tongue Point/South Channel, and Blind Slough/Knappa Slough. A total of 9,253 spring chinook were caught with an incidental catch of 536 Willamette spring chinook. The estimated impact on Willamette wild spring chinook was 54 fish or 0.68% of the return. Releases of net pen-reared spring chinook are now of adipose fin-clipped fish. It is expected Select Area fisheries in 2003 will be restricted to retention of marked hatchery fish only.

Tangle Net Experimental Fishery

A permit fishery to test the feasibility of the tangle net for live capture of spring chinook occurred in the spring of 2001 in the mainstem Columbia River. Fishermen were allowed to retain and sell adipose fin-clipped spring chinook. A total of 193 adipose fin-clipped Willamette hatchery spring chinook were retained and 152 nonadipose fin-clipped Willamette fish were released. The estimated impact on Willamette wild spring chinook was four fish or 0.01% of the return.

Lower Columbia Sport Fishery

For the first time since 1977, the lower Columbia River sport fishery was open the majority of April to adipose fin-clipped hatchery spring chinook targeting a record-high upriver spring chinook return of 416,500 fish. The fishing area was expanded to include the area between the I-5 Bridge and Bonneville Dam. For many years the fishery was restricted to below the I-5 Bridge and closed April 1 or earlier to focus the fishery on lower river stocks of spring chinook.

The 2001 fishery was managed for a 1.7% impact on Willamette wild spring chinook and, preliminarily, an impact of 0.7% on upriver wild spring chinook. The season was open seven days per week but effective March 12 only adipose fin-clipped spring chinook could be retained. The fishery closed effective April 18 after 37 days of selective fishing when the upriver impact was reached. Because of an in-season update increase for the upriver run size and available upriver impacts from prior fisheries, the sport fishery was reopened for five more days of selective fishing April 25-29.

The sport fishery was the largest on record for mainstem Columbia spring chinook sport fisheries. A total of 172,300 angler trips caught 41,200 spring chinook of which 25,700 adipose fin-clipped fish were retained and 15,500 nonadipose fin-clipped fish were released.

An estimated 3,575 adipose fin-clipped Willamette hatchery fish and 74 Willamette fish, taken prior to the March 12 hatchery fish retention rule, were kept. A total of 1,746 nonadipose fin-clipped Willamette fish were released. The estimated impact on Willamette wild spring chinook was 54 fish or 0.68% of the return.

Lower Willamette Sport Fishery

The 2001 lower Willamette sport fishery was open seven days per week January 1 through July 31 with retention of adipose fin-clipped spring chinook only allowed effective March 12. Ideal water conditions were conducive to angling every day during the spring chinook migration through the lower Willamette; however, the outstanding spring chinook fishery underway on the lower Columbia in April drew much angler effort away from the lower Willamette. All 2001 returning age 3 and 4 hatchery fish were mass marked with an adipose finclip; however, only a portion of the age 5 and 6 fish were clipped.

ODFW Research and District staff recently completed a study of the hooking mortality in the lower Willamette sport fishery during 1998-2000 (Schroeder et al., 2001). Estimates of hooking mortality by anatomical hook locations were made from catch and release of sport caught fish immediately below Willamette Falls and compared to uncaught fish in a control situation from a trap in Willamette Falls fishway. Meanwhile ODFW fish checkers in the lower Willamette sport fishery were noting anatomical locations of hooking in landed catch. Applying the estimates of hooking mortality rates made at Willamette Falls to the distribution of hook locations in the sport fishery provides an estimated 12.3% catch and release hooking mortality in the lower Willamette River sport fishery. When considering repeat capture of released nonadipose fin-clipped spring chinook, the hooking mortality estimate increases to 13.1%. The 13.1% rate will be used beginning with 2001 Willamette spring chinook fishery management to estimate the fishery impact on released fish in the lower Willamette and Clackamas river sport fisheries.

A total 101,500 angler trips were made to catch 483 spring chinook prior to March 12 and 11,879 spring chinook March 12 through July 31 for a total catch of 12,362 fish. Of the 11,879 catch during the selective fishery, 6,486 (54.6%) were kept adipose finclipped fish and 5,393 (45.4%) were released nonadipose finclipped fish. The estimated impact on Willamette wild spring chinook was 170 fish or 2.12% of the return.

Clackamas River Sport Fishery

The 2001 Clackamas River spring chinook sport fishery was open seven days per week but was restricted to adipose fin-clipped spring chinook effective March 12. Age 5 spring chinook returning in 2001 were not mass marked with adipose finclips.

A total of 10,500 angler trips caught 1,327 spring chinook of which 783 (59%) were retained adipose fin-clipped fish and 544 (41%) were released nonadipose fin-clipped fish. The estimated impact on Clackamas wild spring chinook was 26 fish or 1.49% of the return to the mouth of the Columbia River or 1.61% of the return to the mouth of the Clackamas River.

Upper Willamette Mainstem Sport Fishery

The 2001 upper Willamette mainstem sport fishery was restricted to adipose fin-clipped spring chinook effective March 12 through July 31 coincidental with implementation of the rule for the sport fisheries below Willamette Falls. The reach between the Falls and the Highway 20 Bridge at Albany did not open until April 1 to protect upper Willamette wild steelhead. The reach above Albany to the mouth of the McKenzie River opened January 1.

The sport fishery in the upper Willamette is much smaller than the fishery in the lower Willamette. Even though 54,000 spring chinook passed Willamette Falls, angler effort was low and success was poor in 2001. ODFW District staff spot-checked the upper Willamette and interviewed 6 anglers with 0 spring chinook. The impact on Willamette wild spring chinook in the upper Willamette was negligible and likely less than the 0.3% projected in Table 4 (p. 28) of the FMEP.

Upper Willamette Tributary Sport Fisheries

The 2001 sport fisheries in the North Santiam and McKenzie rivers, where all hatchery spring chinook returning in 2001 were adipose finclipped, were restricted by permanent rule to marked fish only.

The 2001 sport fisheries in the Molalla, main Santiam, South Santiam, and Middle Fork Willamette rivers, streams which afford minimal natural production, were open to retention of any spring chinook. Age 5 and 6 fish returning to these streams in 2001 were not mass marked. All sport fisheries throughout the Willamette Basin are restricted to retention of adipose fin-clipped spring chinook only in 2002.

The upper Willamette tributary sport fisheries were not monitored in-season by ODFW staff. Catch estimates are forthcoming from angler-returned harvest tags.

Notwithstanding tributary catch estimates and wild fish impact analyses, it is likely the wild fish impacts in the sport fisheries of the North Santiam and McKenzie are similar to those projected in Table 4 (p. 28) of the FMEP. The projections for the North Santiam and McKenzie rivers were 2.5% and 1.0% of the forecasted wild returns to the mouth of the Columbia River.

2001 Wild Fish Impacts

The estimated wild fish impact totals by population from the 2001 freshwater fisheries are 8.46%, 9.77%, and 8.27% for the Clackamas, North Santiam, and McKenzie populations, respectively (Table 7). These estimates are less than one-half of the 20% limit instituted by managers in the 2001 preseason fishery planning process. The 2001 rates are a small fraction of the average rates of 37-54% during fisheries of 1981-1997 (Table 8).

2001 Angler Compliance With Regulations

Oregon State Police (OSP) Fish and Wildlife Division officers and their volunteers, with assistance from ODFW fish checkers, enforced the 2001 Willamette spring chinook angling regulations. A priority task was enforcement of the regulation requiring release of nonadipose fin-clipped spring chinook. Compliance with this regulation was nearly 100% (personal communication Sr. Tpr. Mike Hanson, OSP, Portland).

Sixteen OSP personnel and 10 OSP volunteers patrolled the 2001 salmon fisheries in the lower Columbia above Portland and the lower Willamette up to Oregon City for 656 hours. A total of 1,025 salmon angler contacts were made. Only one citation was issued to a Willamette River angler for possession of a nonadipose fin-clipped spring chinook. Other citations were issued to Willamette anglers, mostly for licensing and failure to validate salmon tag violations.

Based on the results of the 2001 enforcement effort combined with the enforcement effort in the May 2000 Willamette experimental selective fishery where no observations of illegal possession were made, ODFW staff has dropped

the 2% noncompliance factor from wild fish impact analyses. ODFW and OSP staff congratulate the spring chinook angling public for their high regard for rules protecting Willamette wild spring chinook.

Outlook for 2002 Willamette Spring Chinook Management

The 2002 Willamette spring chinook run size forecast is 73,800 including 7,380 (10%) wild fish (Melcher 2001) (Figure 2). In December 2001, the Oregon Fish and Wildlife Commission established a long-term allocation plan between the commercial and sport fishery below Willamette Falls for sharing of the harvestable surplus of Willamette River hatchery spring chinook. The shares for 2002 based on the forecast of 66,400 hatchery fish are 26,200 hatchery fish to the sport fishery below Willamette Falls and 9,700 hatchery fish to the Columbia River commercial fishery (Table 9).

All freshwater Willamette spring chinook fisheries will be selective to adipose fin-clipped fish in 2002. All Willamette Basin sport fisheries are under permanent rule to be restricted to adipose fin-clipped fish and regulations are printed as such in the *2002 Oregon Sport Fishing Regulations* pamphlet.

The lower Columbia spring chinook sport fishery is currently open only through March 31 below the I-5 Bridge. It is likely the fishery will be extended through at least April and up to at least Bonneville Dam. ODFW and WDFW fishery managers will meet in the Joint State Sport Fishery Forum immediately following the Columbia River Compact hearing January 31, 2002, at the Water Resources Education Center in Vancouver, Washington, to establish the fishery.

The Columbia River commercial fishery will be set at the January 31 and later Columbia River Compact hearings. The commercial fishery will be required to use the live capture tangle net with short drift times. All lethargic or bleeding nonadipose fin-clipped spring chinook will be placed in an on-board recovery box to be rehabilitated prior to release. ODFW and WDFW are planning on-board monitoring of the fishery (provided funding is available) to estimate the effectiveness of the new gear and survival of nonadipose fin-clipped fish released. It is currently believed the long-term mortality of released fish from the tangle net is 10% or less.

The cumulative freshwater fishery impact on Willamette wild spring chinook is expected to be several percentage points lower than the average annual impact rate of 15% provided in the FMEP.

Table 9. Willamette spring chinook allocation schedule.

Predicted Willamette Hatchery Run Size	Hatchery Fish Escapement Targets			Number of Hatchery Fish Available	Harvest Shares Below the Falls			
	Willamette Falls Escapement Target	Clackamas Escapement Target	Combined Escapement Target		Sport			
					Sport		Commercial	
					Share	Catch	Share	Catch
23,000	20,000	3,000	23,000	0	<1%	<230	<1%	<230
24,000	20,000	3,000	23,000	1,000	100%	1,000	<1%	<240
25,000	20,000	3,000	23,000	2,000	100%	2,000	<1%	<250
26,000	20,000	3,000	23,000	3,000	100%	3,000	<1%	<260
27,000	20,000	3,000	23,000	4,000	100%	4,000	<1%	<270
28,000	20,000	3,000	23,000	5,000	100%	5,000	<1%	<280
29,000	20,000	3,000	23,000	6,000	100%	6,000	<1%	<290
30,000	20,000	3,000	23,000	7,000	100%	7,000	<1%	<300
31,000	20,000	3,000	23,000	8,000	100%	8,000	<1%	<310
32,000	20,000	3,000	23,000	9,000	100%	9,000	<1%	<320
33,000	20,000	3,000	23,000	10,000	100%	10,000	<1%	<330
34,000	20,000	3,000	23,000	11,000	100%	11,000	<1%	<340
35,000	20,000	3,000	23,000	12,000	100%	12,000	<1%	<350
36,000	20,000	3,000	23,000	13,000	100%	13,000	<1%	<360
37,000	20,000	3,000	23,000	14,000	100%	14,000	<1%	<370
38,000	20,000	3,000	23,000	15,000	100%	15,000	<1%	<380
39,000	20,000	3,000	23,000	16,000	100%	16,000	<1%	<390
40,000	22,000	3,300	25,300	14,700	85%	12,495	15%	2,205
41,000	22,000	3,300	25,300	15,700	85%	13,345	15%	2,355
42,000	22,000	3,300	25,300	16,700	85%	14,195	15%	2,505
43,000	22,000	3,300	25,300	17,700	85%	15,045	15%	2,655
44,000	22,000	3,300	25,300	18,700	85%	15,895	15%	2,805
45,000	22,000	3,300	25,300	19,700	80%	15,760	20%	3,940
46,000	22,000	3,300	25,300	20,700	80%	16,560	20%	4,140
47,000	22,000	3,300	25,300	21,700	80%	17,360	20%	4,340
48,000	22,000	3,300	25,300	22,700	80%	18,160	20%	4,540
49,000	22,000	3,300	25,300	23,700	80%	18,960	20%	4,740
50,000	24,000	3,600	27,600	22,400	76%	17,024	24%	5,376
51,000	24,000	3,600	27,600	23,400	76%	17,784	24%	5,616
52,000	24,000	3,600	27,600	24,400	76%	18,544	24%	5,856
53,000	24,000	3,600	27,600	25,400	76%	19,304	24%	6,096
54,000	24,000	3,600	27,600	26,400	76%	20,064	24%	6,336
55,000	24,000	3,600	27,600	27,400	76%	20,824	24%	6,576
56,000	24,000	3,600	27,600	28,400	76%	21,584	24%	6,816
57,000	24,000	3,600	27,600	29,400	76%	22,344	24%	7,056
58,000	24,000	3,600	27,600	30,400	76%	23,104	24%	7,296
59,000	24,000	3,600	27,600	31,400	76%	23,864	24%	7,536
60,000	26,500	4,000	30,500	29,500	73%	21,535	27%	7,965
61,000	26,500	4,000	30,500	30,500	73%	22,265	27%	8,235
62,000	26,500	4,000	30,500	31,500	73%	22,995	27%	8,505
63,000	26,500	4,000	30,500	32,500	73%	23,725	27%	8,775
64,000	26,500	4,000	30,500	33,500	73%	24,455	27%	9,045
65,000	26,500	4,000	30,500	34,500	73%	25,185	27%	9,315
66,000	26,500	4,000	30,500	35,500	73%	25,915	27%	9,585
67,000	26,500	4,000	30,500	36,500	73%	26,645	27%	9,855
68,000	26,500	4,000	30,500	37,500	73%	27,375	27%	10,125
69,000	26,500	4,000	30,500	38,500	73%	28,105	27%	10,395

Table 9 Continued, Next Page

Table 9. Willamette spring chinook allocation schedule. (Continued)

Predicted Willamette Hatchery Run Size	Hatchery Fish Escapement Targets			Number of Hatchery Fish Available	Harvest Shares Below the Falls			
	Willamette Falls Escapement Target	Clackamas Escapement Target	Combined Escapement Target		Sport			
					Sport		Commercial	
					Share	Catch	Share	Catch
70,000	29,000	4,400	33,400	36,600	73%	26,718	27%	9,882
71,000	29,000	4,400	33,400	37,600	73%	27,448	27%	10,152
72,000	29,000	4,400	33,400	38,600	73%	28,178	27%	10,422
73,000	29,000	4,400	33,400	39,600	73%	28,908	27%	10,692
74,000	29,000	4,400	33,400	40,600	73%	29,638	27%	10,962
75,000	29,000	4,400	33,400	41,600	73%	30,368	27%	11,232
76,000	29,000	4,400	33,400	42,600	70%	29,820	30%	12,780
77,000	29,000	4,400	33,400	43,600	70%	30,520	30%	13,080
78,000	29,000	4,400	33,400	44,600	70%	31,220	30%	13,380
79,000	29,000	4,400	33,400	45,600	70%	31,920	30%	13,680
80,000	32,000	4,900	36,900	43,100	70%	30,170	30%	12,930
81,000	32,000	4,900	36,900	44,100	70%	30,870	30%	13,230
82,000	32,000	4,900	36,900	45,100	70%	31,570	30%	13,530
83,000	32,000	4,900	36,900	46,100	70%	32,270	30%	13,830
84,000	32,000	4,900	36,900	47,100	70%	32,970	30%	14,130
85,000	32,000	4,900	36,900	48,100	70%	33,670	30%	14,430
86,000	32,000	4,900	36,900	49,100	70%	34,370	30%	14,730
87,000	32,000	4,900	36,900	50,100	70%	35,070	30%	15,030
88,000	32,000	4,900	36,900	51,100	70%	35,770	30%	15,330
89,000	32,000	4,900	36,900	52,100	70%	36,470	30%	15,630
90,000	35,000	5,400	40,400	49,600	70%	34,720	30%	14,880
91,000	35,000	5,400	40,400	50,600	70%	35,420	30%	15,180
92,000	35,000	5,400	40,400	51,600	70%	36,120	30%	15,480
93,000	35,000	5,400	40,400	52,600	70%	36,820	30%	15,780
94,000	35,000	5,400	40,400	53,600	70%	37,520	30%	16,080
95,000	35,000	5,400	40,400	54,600	70%	38,220	30%	16,380
96,000	35,000	5,400	40,400	55,600	70%	38,920	30%	16,680
97,000	35,000	5,400	40,400	56,600	70%	39,620	30%	16,980
98,000	35,000	5,400	40,400	57,600	70%	40,320	30%	17,280
99,000	35,000	5,400	40,400	58,600	70%	41,020	30%	17,580
100,000	39,000	6,000	45,000	55,000	70%	38,500	30%	16,500
101,000	39,000	6,000	45,000	56,000	70%	39,200	30%	16,800
102,000	39,000	6,000	45,000	57,000	70%	39,900	30%	17,100
103,000	39,000	6,000	45,000	58,000	70%	40,600	30%	17,400
104,000	39,000	6,000	45,000	59,000	70%	41,300	30%	17,700
105,000	39,000	6,000	45,000	60,000	70%	42,000	30%	18,000
106,000	39,000	6,000	45,000	61,000	70%	42,700	30%	18,300
107,000	39,000	6,000	45,000	62,000	70%	43,400	30%	18,600
108,000	39,000	6,000	45,000	63,000	70%	44,100	30%	18,900
109,000	39,000	6,000	45,000	64,000	70%	44,800	30%	19,200
110,000	39,000	6,000	45,000	65,000	70%	45,500	30%	19,500

ODFW is currently working with the U. S. Army Corps of Engineers on proposals to implement measures in the upper Willamette hatchery and hydro biological opinions. It is likely the Corps will fund ODFW beginning in 2002 to conduct monitoring of fisheries, hatcheries, and wild fish returns. The Corps-funded activities when added to ODFW's Sport Fish Restoration and State-funded activities should provide for a holistic monitoring program for Willamette spring chinook beginning in 2002.

Steven D. King
ODFW
January 31, 2002

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