



Fisheries Management and
Evaluation for 2018
Willamette River Spring Chinook

Oregon Department of Fish and Wildlife
Ocean Salmon and Columbia River Program
Columbia River Management

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Introduction

Upper Willamette River wild spring Chinook salmon were listed as a threatened species under the federal Endangered Species Act (ESA) in May 1999. In February 2001, the Oregon Department of Fish and Wildlife (ODFW) submitted a Fisheries Management and Evaluation Plan (FMEP) for upper Willamette River 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).

The NMFS evaluated ODFW's FMEP and determined the FMEP adequately addressed all of the criteria specified in limit number 4 of the 4(d) 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 requires freshwater harvest fisheries for Willamette spring Chinook to be selective for hatchery fish. Willamette hatchery spring Chinook have been mass-marked with an adipose fin clip beginning with the 1997 brood. The FMEP limits the total fishery impact on Willamette wild spring Chinook to an annual average rate of 15% or less in combined freshwater fisheries. This fishery impact rate limit ensures the survival and rebuilding of wild populations.

The FMEP indicates that 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 to NMFS by January 31 of each year.

2018 Willamette Spring Chinook Run

The estimated 2018 Willamette spring Chinook return was 39,660 fish to the mouth of the Columbia River. This was approximately 70.3% of the 5-year average of 56,420 and 63.5% of the 10-year average of 62,470 (Table 1 and Figure 1).

The 2018 preseason forecast developed by ODFW was for a return of 53,820 adult spring Chinook entering the Columbia River with the wild adult population estimated at 20% or 10,764 fish. Forecasts have generally under-predicted when runs were increasing and over-predicted when runs were decreasing (Figure 2).

The primary subbasins within the upper Willamette that support natural production of spring Chinook are the Clackamas, North Santiam and McKenzie rivers. The Clackamas, North Santiam and McKenzie rivers were sampled for wild fish escapement in 2018. Angler creel surveys have not been conducted in areas above Willamette Falls since 2004; therefore, 2018 harvest information must be based on angler harvest card returns, which are not currently available. Harvest estimates from angler harvest cards do not include estimates of released fish, precluding their use in directly estimating impacts to wild fish. For areas above Willamette Falls, estimates of 2018 fishery impacts to wild runs are based upon estimated average encounter rates for hatchery fish in recent years from harvest cards, and an assumed post-release mortality of 12.2% (Lindsay

et al. 2003) for wild fish caught and released in recreational fisheries in the Willamette River and tributaries. Because much of the information needed to accurately reconstruct total wild fish escapements are inexact or unavailable, escapement and impact estimates in this report are similarly inexact. As catch card information and other related data become available, annual impact estimates are revised and updated in subsequent annual reports.

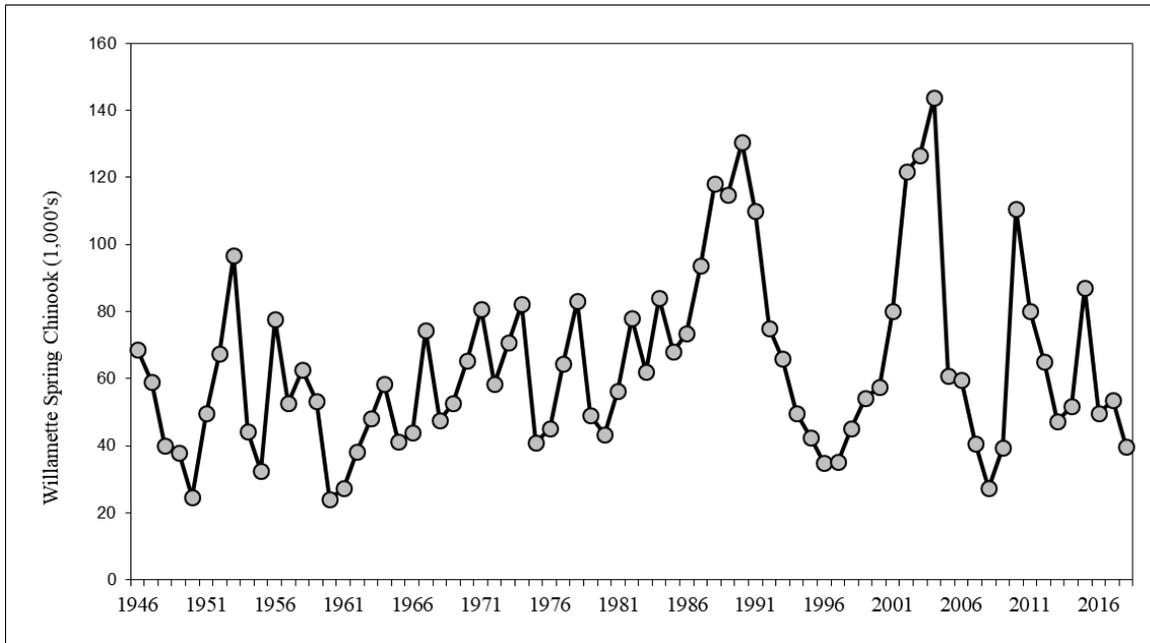


Figure 1. Historic Willamette spring Chinook returns, 1946-2018

Table 1. Willamette River spring Chinook returns and lower Willamette River recreational harvest, 1946-2018¹.

Year	Run Entering		Mortalities		Run	Lower Willamette Fishery					Harvest Rate	Wild Impact
	Columbia	Willamette ¹	W. Falls Count	Below W. Falls ²	Entering Clackamas	Kept Catch ³	Released (Morts)	Angler Days ⁴	Catch/Trip	Trips/Fish		
1946-50 ave.		46,080	33,900		2,020	10,160		79,260	0.13	8.08	24%	
1951-55 ave.		58,160	43,200		2,420	12,540		93,660	0.13	7.64	23%	
1956-60 ave.		54,160	37,880		2,380	13,900		108,780	0.13	8.25	27%	
1961-65 ave.		42,660	28,120	150	3,140	11,340		85,320	0.13	8.14	26%	
1966-70 ave.		54,400	36,760	300	2,400	15,100		97,560	0.15	6.47	28%	
1971	80,900	67,400	44,600	600	2,200	20,000		112,800	0.18	5.64	30%	
1972	58,400	47,100	26,200	200	2,200	18,500		91,200	0.20	4.93	39%	
1973	70,700	54,500	42,000	300	2,200	10,000		90,300	0.11	9.03	18%	
1974	82,400	71,800	44,500	100	2,200	25,000		154,000	0.16	6.16	35%	
1975	40,800	32,800	19,100	100	1,100	12,500		143,800	0.09	11.50	38%	
1976	45,100	40,800	22,100	100	2,200	16,400		149,100	0.11	9.09	40%	
1977	64,400	58,100	40,000	100	4,000	14,000		126,400	0.11	9.03	24%	
1978	83,330	71,400	47,500	100	4,000	19,800		157,600	0.13	7.96	28%	
1979	49,200	44,600	26,600	100	5,000	12,800		132,700	0.10	10.37	29%	
1980	43,300	42,400	27,000		8,500	7,000		83,600	0.08	11.94	17%	
1981	56,300	48,600	30,100		8,000	10,500		124,300	0.08	11.84	22%	
1982	78,000	72,500	46,200	100	7,300	18,900		142,900	0.13	7.56	26%	
1983	62,200	55,100	30,600	300	10,400	13,800		136,100	0.10	9.86	25%	
1984	84,200	74,500	43,500	400	11,300	19,400		136,900	0.14	7.06	26%	
1985	68,100	57,100	34,500	400	6,600	15,500		185,600	0.08	11.97	27%	
1986	73,600	62,500	39,200	400	7,900	15,000		171,900	0.09	11.46	24%	
1987	93,600	82,900	54,800	500	8,700	18,800		173,500	0.11	9.23	23%	
1988	118,100	104,000	70,500	200	8,700	24,600		209,700	0.12	8.52	24%	
1989	114,900	102,000	69,200	200	8,400	24,200		186,200	0.13	7.69	24%	
1990	130,600	106,300	71,300	600	11,500	23,000		200,400	0.11	8.71	22%	
1991	109,900	95,300	52,500	400	11,900	30,500		235,800	0.13	7.73	32%	
1992	75,000	68,000	42,000	1,000	11,500	13,500		188,500	0.07	13.96	20%	
1993	65,900	63,900	32,000	400	10,800	20,700		174,100	0.12	8.41	32%	
1994	49,600	47,200	26,100	1,400	7,500	11,500		155,700	0.07	13.54	24%	
1995	42,600	42,500	20,600	600	6,600	14,700		145,300	0.10	9.88	35%	
1996	34,800	34,600	21,600	1,100	5,900	6,100		63,800	0.10	10.46	18%	
1997	35,300	35,000	26,900	400	5,800	1,900		15,000	0.13	7.89	5%	
1998	45,100	45,000	34,500	300	7,400	2,800		34,500	0.08	12.32	6%	
1999	54,200	53,900	40,400	600	7,400	5,500		45,400	0.12	8.25	10%	
2000	57,500	56,100	39,100	300	7,700	8,700	2,670(299)	76,100	0.11	8.75	16%	14.0%
2001	80,400	73,000	54,000	600	10,800	7,000	5,400(706)	101,500	0.07	14.50	10%	2.1%
2002	121,700	109,100	83,100	600	14,400	10,500	3,200(369)	89,400	0.12	8.51	10%	3.0%
2003	126,600	117,600	87,700	700	15,400	13,100	3,100(373)	91,400	0.14	6.98	11%	2.4%
2004	144,500	131,300	96,000	500	21,900	11,600	2,900(327)	110,800	0.10	9.55	9%	2.9%
2005	61,000	55,800	36,600	700	12,700	5,600	1,900(231)	78,700	0.07	14.05	10%	3.6%
2006	59,700	55,000	37,000	300	10,400	7,000	1,600(203)	75,600	0.09	10.80	13%	4.3%
2007	40,500	37,600	23,100	200	8,600	5,400	2,000(244)	74,800	0.07	13.85	14%	4.2%
2008	27,400	27,100	14,700	200	7,556	4,400	1,900(233)	47,300	0.09	10.75	16%	4.8%
2009	39,400	37,700	28,500	300	4,300	4,200	1,100(134)	32,500	0.13	7.74	11%	3.6%
2010	110,500	101,800	67,100	900	11,000	23,100	3,200(400)	115,600	0.20	5.00	23%	6.9%
2011	80,300	75,900	45,100	1,100	6,800	22,400	3,900(472)	123,500	0.18	5.51	30%	6.3%
2012	65,100	59,600	37,200	600	5,800	15,500	2,600(319)	108,300	0.14	6.99	26%	4.5%
2013	47,300	43,800	27,900	600	6,200	7,200	1,300(164)	98,960	0.07	13.74	16%	2.8%
2014	51,800	48,200	31,700	2,900	5,600	7,900	1,400(171)	77,000	0.10	9.75	16%	3.9%
2015	87,100	81,000	53,100	6,000	8,400	13,300	1,900(228)	94,400	0.14	7.10	16%	4.0%
2016	49,800	47,400	32,500	3,200	5,800	5,900	1,200(144)	68,000	0.09	11.53	12%	2.2%
2017	53,700	51,100	36,600	2,200	4,500	7,300	1,300(154)	53,700	0.14	7.36	14%	2.5%
2018	39,660	37,943	26,542	2,522	2,657	6,069	1,256(153)	58,852	0.10	9.70	16%	2.9%
5 yr. ave.	56,412	53,129	36,088	3,364	5,391	8,094	1,410(170)	70,390	0.11	9.08	15%	
10 yr. ave.	62,466	58,444	38,624	2,032	6,106	11,287	1,915(234)	83,081	0.13	8.44	18%	

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

² Number of mortalities below Willamette Falls includes predation by sea lions in the area around the fishway entrances.

³ Catch totals include estimates for the mainstem Willamette bank fishery in 1947, and 1951-2001.

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

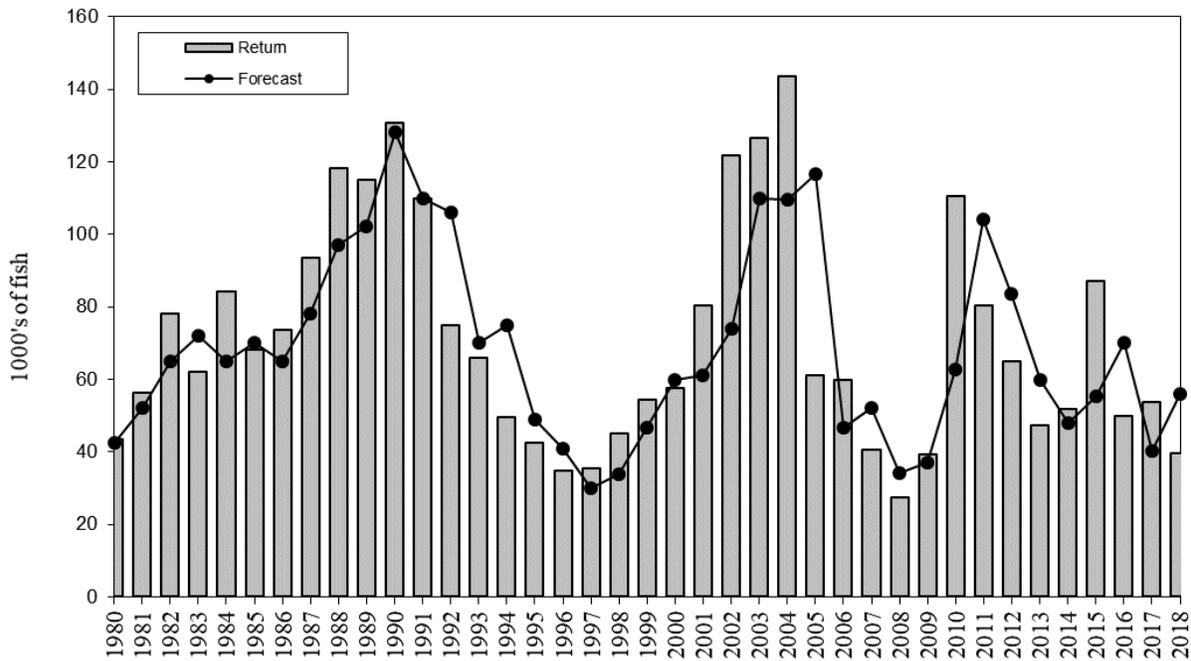


Figure 2. Predicted and observed Willamette River spring Chinook returns to the Columbia River mouth, 1980-2018.

Columbia River Mouth Return

The estimated escapement of Willamette spring Chinook salmon to the mouth of the Columbia in 2018 was 39,660 fish (Table 1). The age composition of the return is displayed in Table 2.

Clackamas River Return

The estimated return to the Clackamas River in 2018 was 2,657 fish (Table 2). The age composition of the return is displayed in Table 2

The return to North Fork Dam on the Clackamas River in 2018 was 2,390 adult fish (Table 3 and Figure 3). Sampling showed the adult return to be 77 (3%) marked hatchery fish and 2,313 (97%) unmarked fish. Fin-clipped fish were not allowed to pass the dam to reach natural spawning areas.

Of the marked hatchery fish returning to the dam, 62 marked adults were taken directly to Clackamas Hatchery. Based on preliminary run reconstructions (Table 4), of the 2,528 adult Chinook that returned to the Clackamas River in 2018 (Table 5) about 92% (2,330 fish) were wild fish.

The Clackamas River Basin Fish Management Plan for Spring Chinook (ODFW 1998) identifies a goal of 2,900 fish to fully seed the watershed. The estimated escapement to the North Fork Dam in 2018 was 2,330 fish, which represents 80% of the escapement goal.

Table 2. 2018 Willamette River spring Chinook return.

Catch	Age 3	Age 4	Age 5	Age 6	Total
SAF Commercial (kept catch)	0	177	280	0	457
LCR Recreational (kept catch)	7	679	546	0	1,232
LCR Recreational (release mortality)	0	16	12	0	28
L. Will. Recreational Fishery (kept catch)	58	4,331	1,666	14	6,069
L. Will. Recreational Fishery (rel. mortality)	2	109	42	0	153
Lower Clackamas Recreational (kept catch)	0	5	2	0	7
Lower Clackamas Recreational (rel. mortality)	0	1	0	0	1
Total	67	5,318	2,548	14	7,947
Escapement					
Willamette Falls Count	1,999	17,682	6,805	56	26,542
Mortality Below Falls	1	76	29	0	106
Clackamas Hatchery Return ¹	12	109	31	0	152
Eagle Creek Hatchery Return	0	28	8	0	36
North Fork Dam, Passed Upstream	117	1,799	514	0	2,430
North Fork Dam, Recycled Downstream	0	12	3	0	15
Natural Spawn Bel. N.F. Dam	0	12	4	0	16
Sea Lion Predation	23	1,724	663	6	2,416
Total	2,152	21,442	8,057	62	31,713
Run Entering Columbia	2,219	26,760	10,605	76	39,660
Percent	5.6%	59.0%	26.7%	0.2%	
Run Entering Willamette	2,212	25,888	9,767	76	37,943
Percent	5.8%	68.2%	25.7%	0.2%	
Run Entering Clackamas	129	1,966	562	0	2,657
Percent	4.9%	74.0%	21.1%	0.0%	

¹ Includes 62 hatchery fish transferred to Clackamas Hatchery from N. Fork Dam trap.

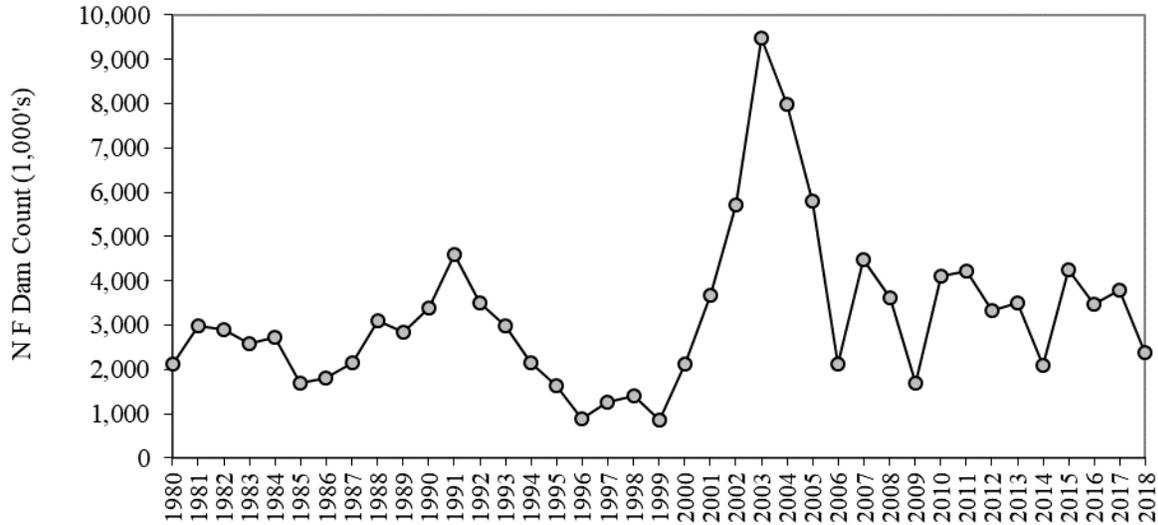


Figure 3. Total adult spring Chinook returns (wild and hatchery) to North Fork Dam, 1980-2018.

Table 3. 1999-2018 adult spring Chinook returns to North Fork Dam, Clackamas River, Oregon.

Year	Unclipped	Marked Hatchery	Total Adults
1999	NA	NA	857
2000	1,927	200	2,127
2001	2,184	1,482	3,666
2002	1,505	4,224	5,729
2003	2,637	6,843	9,480
2004	4,053	3,932	7,985
2005	1,790	4,017	5,807
2006	798	1,339	2,137
2007	1,178	3,302	4,480
2008	1,276	2,336	3,612
2009	590	1,101	1,691
2010	1,140	2,976	4,116
2011	1,637	2,593	4,230
2012	1,647	1,684	3,331
2013	2,126	1,388	3,514
2014	888	1,210	2,098
2015	2,310	1,944	4,254
2016	3,481	846	4,327
2017	3,586	201	3,787
2018	2,313	77	2,390

Table 4. Run reconstruction for wild and hatchery spring Chinook (adults only), and fishery impacts to wild run Clackamas River, 2003-2018.

Year	Wild				Hatchery					Total Run	Wild %	Wild Impact
	Dam Count	Nat. Spawn	Rel. Mort.	Total	Dam Count	Nat. Spawn	Harvest	Hatchery Returns	Total			
2003	3,364	159	34	3,557	6,116	289	1,205	3,308	10,918	14,475	25%	0.96%
2004	5,176	390	30	5,596	7,854	592	1,379	11,395	21,220	26,816	21%	0.54%
2005	2,882	350	38	3,270	2,914	353	1,256	4,714	9,237	12,507	26%	1.16%
2006	798	205	14	1,017	1,339	345	405	7,247	9,336	10,353	10%	1.38%
2007	1,178	13	7	1,198	3,302	36	205	3,732	7,275	8,473	14%	0.58%
2008	1,276	25	11	1,312	2,336	47	202	3,522	6,107	7,419	18%	0.84%
2009	590	20	7	617	1,101	37	208	1,609	2,955	3,572	17%	1.13%
2010	1,140	12	12	1,164	2,976	33	707	5,664	9,380	10,544	11%	1.03%
2011	1,637	21	15	1,673	2,593	34	488	1,728	4,843	6,516	26%	0.90%
2012	1,647	30	20	1,697	1,684	30	545	1,683	3,942	5,639	30%	1.18%
2013	2,126	7	16	2,149	1,388	4	368	1,870	3,630	5,779	37%	0.74%
2014	888	14	5	907	1,210	19	307	2,937	4,473	5,380	17%	0.55%
2015	2,310	5	6	2,321	1,944	4	412	3,448	5,808	8,129	29%	0.26%
2016	3,481	6	3	3,490	846	1	42	1,186	2,075	5,565	63%	0.09%
2017	3,586	6	17	3,609	201	0	86	470	757	4,366	83%	0.47%
2018	2,313	16	1	2,330	77	0	7	114	198	2,528	92%	0.04%

Table 5. Estimated return of adult spring Chinook to the Clackamas River, 1995-2018.

Year	L. Clackamas Recreational Catch		North Fork Dam Count		Natural Spawn	Hatchery Return		Total Return
	Kept	Released (est. mort.)	Passed	Not Passed	Below N.F. Dam	Eagle Cr. NFH	Clackamas	
1995	1,592		1,638		140	18	3,049	6,437
1996	1,809		888		97	2	2,975	5,771
1997	1,673		1,264		145	0	2,624	5,706
1998	1,232		1,395		95	4	4,446	7,192
1999	1,862		857		98	4	4,522	7,343
2000	1,148		2,127		97	8	4,155	7,535
2001	630	582 (71)	2,365	1,302	49	3	6,010	10,430
2002	2,488	1,115 (136)	2,171	3,558	48	15	6,220	14,636
2003	1,205	279 (34)	3,364	6,116	448	9	3,299	14,475
2004	1,379	246 (30)	5,176	7,854	982	296	11,099	26,816
2005	1,256	311 (38)	2,882	2,914	703	250	4,464	12,507
2006	405	115 (14)	1,049	1,088	550	3	7,244	10,353
2007	205	57 (7)	1,660	2,820	49	3	3,729	8,473
2008	202	86 (11)	1,772	1,878	72	20	3,464	7,419
2009	208	95 (7)	819	872	57	38	1,571	3,572
2010	707	83 (12)	1,140	2,976	45	247	5,417	10,544
2011	488	131 (15)	1,637	2,593	55	11	1,717	6,516
2012	545	172 (20)	1,647	1,684	60	195	1,488	5,639
2013	368	131 (16)	1,388	2,126	11	69	1,801	5,779
2014	307	49 (5)	888	1,210	33	109	2,828	5,380
2015	412	52 (6)	2,310	1,944	9	82	3,366	8,129
2016	42	27 (3)	3,481	846	7	198	988	5,565
2017	86	139 (17)	3,586	201	6	174	296	4,366
2018	7	2 (1)	2,313	77	16	36	78	2,528

North Santiam River Return

The 2001-2005 North Santiam spring Chinook returns were monitored at Upper and Lower Bennett dams by ODFW staff (Table 6). Counts were unavailable for 2006-2009. ODFW resumed counting fish at the Bennett dams in 2010 (Table 7). The 2018 run was monitored at Upper and Lower Bennett dams and count data was provided by ODFW South Willamette District Staff.

Because dam counts for the North Santiam are not available for the 2006-2009 runs, we interpolated the counts based on past data. From 2001-2005, counts of total fish to the North Santiam ranged from 12.6% to 20.9% of the total passage at Willamette Falls and averaged 16.0%. If the average held true for 2006 through 2009, the total return of adult Chinook to the North Santiam would be expected to be 5,965 fish for 2006, 3,720 fish for 2007, 2,363 fish for 2008 and 4,155 fish for 2009. During 2001-2005, an average of 94.6% of fish returning to the North Santiam were hatchery fish (Table 6). This average was applied to the 2006-2009 estimates. In 2018, a total of 3,595 fish were reported passing the Bennett Dams site. Of these, 3,022 were hatchery fish, and the remainder of the run (573 fish) was wild (Table 7).

Harvest impacts for wild fish are calculated as the average encounter rate for hatchery fish (hatchery fish catch divided by estimated hatchery fish run size) for North Santiam fisheries from catch card information multiplied by the estimated North Santiam wild fish return, with the product then multiplied by 12.2% release mortality. Redd counts of spring Chinook salmon in the North Santiam River and the Little North Fork Santiam in 2018 were 56% less than the 2005-2017 average (Table 8).

Table 6. Adult spring Chinook counts at Bennett dams, adjusted for non-clipped hatchery returns, 2001-2005. Counts were not available for 2006 through 2009.

Year	Adult Dam Count			% Non-clipped carcasses with thermal marks	Estimated Adults		Adjusted Percent Wild
	Non- clipped	Clipped	Total		Wild	Hatchery	
2001	388	6,398	6,786	43.4	220	6,566	3
2002	1,233	6,407	7,640	51.0	604	7,036	8
2003	1,262	11,570	12,832	78.5	271	12,561	2
2004	1,510	12,021	13,531	67.6	489	13,042	4
2005	924	3,959	4,883	27.8	667	4,216	14

Table 7. Run reconstruction for wild and hatchery spring Chinook (adults only), and fishery impacts to wild run, North Santiam River, 2002-2018.

Year ¹	Wild Run				Hatchery Run				Total Run	Wild %	Wild Impact
	Dam Count	Nat. Spawn	Rel. Mort.	Total	Dam Count	Nat. Spawn	Harvest	Total			
2002	604	32	21	657	7,036	80	2,714	9,830	10,487	6.3%	3.20%
2003	271	7	103	846	12,561	64	4,903	17,528	18,374	4.6%	12.17%
2004	489	17	48	554	13,042	53	2,973	16,068	16,622	3.3%	8.66%
2005	667	46	8	721	4,215	175	441	4,831	5,552	13.0%	1.11%
2006	323	30	5	358	4,821	113	673	5,607	5,965	6.0%	1.40%
2007	186	35	3	223	3,009	131	356	3,496	3,719	6.0%	1.35%
2008	139	3	0	142	2,196	13	12	2,221	2,363	6.0%	0.00%
2009	187	59	4	250	3,198	210	497	3,905	4,155	6.0%	1.60%
2010	744	87	13	844	5,065	308	800	6,173	7,017	12.0%	1.54%
2011	515	54	6	575	6,846	191	644	7,681	8,256	7.0%	1.04%
2012	1,014	24	22	1,059	2,923	55	596	3,574	4,633	22.9%	2.08%
2013	1,167	6	12	1,179	3,100	2	293	3,395	4,574	25.8%	1.02%
2014	1,630	9	42	1,681	5,421	11	1,403	6,835	8,516	19.7%	2.50%
2015	1,074	5	28	1,107	6,687	10	1,747	8,444	9,551	11.6%	2.53%
2016	870	5	12	887	3,941	6	498	4,445	5,332	16.6%	1.35%
2017	883	2	13	898	4,204	5	516	4,725	5,623	16.0%	1.45%
2018	573	4	17	594	3,022	29	943	3,994	4,588	12.9%	2.86%

¹ Dam counts unavailable for 2006 through 2009. See text for interpolation methods.

Table 8. Redd counts of spring Chinook salmon in the North Santiam River, 2005-2018.

Area	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mainstem North Santiam: Stayton to Minto	240	202	410	121	251	396	568	548	362	478 ^a	239	411	230	198
Little North Fork of the Santiam	61	34	64	103	26	na	na	na	na	na	na	na	na	na
Total	301	236	474	224	277	396	568	548	362	478 ^a	239	411	230	198

^a Includes Little North Fork Santiam.

McKenzie River Return

The 2018 estimated return to the McKenzie River was 8,894 adult Chinook (Table 9). The 2018 Leaburg Dam count was comprised of 1,838 non-fin-clipped adults and 469 adipose-fin-clipped hatchery adults (Table 10, Figure 4). The preliminary unmarked fish escapement of 1,838 fish above Leaburg Dam is less than the escapement goal of 3,000-5,000 fish specified in the McKenzie River Basin Fish Management Plan for Spring Chinook (ODFW 1998). Based on preliminary run reconstructions (Table 11), an estimated 2,447 of the 2018 run were wild fish (27%).

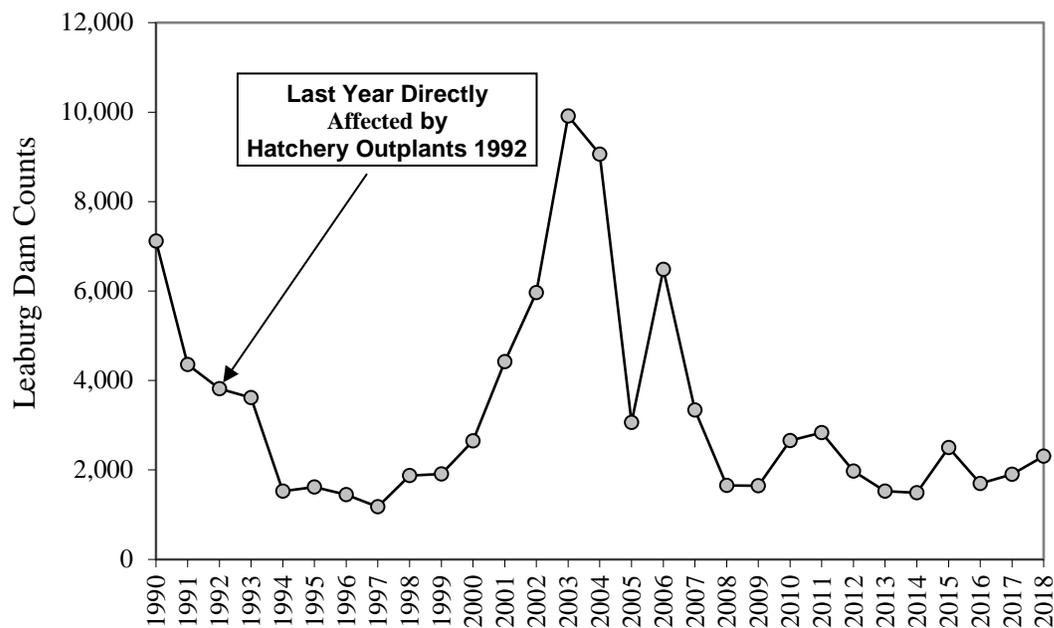


Figure 4. Spring Chinook returns to Leaburg Dam (McKenzie River), 1990-2018.

Table 9. Estimated return of adult spring Chinook to the McKenzie River, 1970-2018 ¹.
 (Estimated total return will not match Table 10 due to differences in calculations of wild fish at Leaburg Dam and natural spawning below Leaburg Dam.)

Run Year	Leaburg Dam Count	McKenzie Hatchery Return	Recreational Catch			Est. Natural Spawn Below Leaburg Dam		Total Return
			Above Leaburg Dam	Below Leaburg Dam	Total	Redds	No. Fish ¹	
1970-79 Ave.	2,599	478	--	--	770	447	2,014	5,861
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	4,302	3,852	3	447	450	100	450	9,054
2002	6,087 ⁴	6,768	21	1,726	1,747	115	518	15,120
2003	9,327 ⁵	6,171	6	1,236	1,242	171	770	17,510
2004	9,034	6,581	16	2,667	2,683	99	446	18,744
2005	3,094	3,213	32	623	655	75	338	7,300
2006	3,170	3,092	15	1,071	1,086	72	324	7,672
2007	3,315	2,485	4	563	567	141	635	7,002
2008	1,655	2,988	8	8	16	240	1,080	5,739
2009	1,645	3,477	27	769	796	167	752	6,670
2010	2,655	6,779	25	1,769	1,794	263	1,105	12,333
2011	2,836	5,784	20	1,269	1,289	220	990	10,899
2012	1,977	3,838	29	1,168	1,197	253	1,139	8,151
2013	1,529	2,367	18	595	613	75	338	4,846
2014	1,490	2,718	35	601	636	187	842	5,685
2015	2,681	6,070	6	669	675	150	675	10,101
2016	3,058	2,899	0	570	570	190	855	7,382
2017	1,902	6,442	--	--	738 ⁶	45	203	9,174
2018	2,307	5,135	--	--	624 ⁶	184	828	8,894

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 An additional 690 adipose fin-clipped hatchery fish were removed from Leaburg Dam ladder and hauled and released primarily above Cougar Dam into the South Fork McKenzie River.

⁵ An additional 1,197 adipose fin-clipped hatchery fish were removed from Leaburg Dam ladder and hauled and released primarily above Cougar Dam into the South Fork McKenzie River.

⁶ Estimated from mean harvest rate from previous five years.

Table 10. Adult spring Chinook counts at Leaburg Dam on the McKenzie River, 1994-2018.

Year	Wild/Unmarked		Hatchery/Marked		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	2,880	67%	1,422	33%	4,302
2002	3,602	59%	2,485	41%	6,087
2003	4,899	53%	4,428	47%	9,327
2004	4,419	49%	4,615	51%	9,034
2005	2,435	79%	659	21%	3,094
2006	2,189	69%	981	31%	3,170
2007	2,757	83%	558	17%	3,315
2008	1,365	82%	290	18%	1,655
2009	1,185	72%	460	28%	1,645
2010	1,357	51%	1,298	49%	2,655
2011	2,288	81%	548	19%	2,836
2012	1,654	84%	323	16%	1,977
2013	1,236	81%	293	19%	1,529
2014	1,003	67%	487	33%	1,490
2015	1,589	59%	1,092	41%	2,681
2016	1,698	56%	1,360	44%	3,058
2017	1,477	78%	425	22%	1,902
2018	1,838	80%	469	20%	2,307

Table 11. Run reconstruction for wild and hatchery spring Chinook (adults only), and fishery impacts to wild run, McKenzie River, 2002-2018. (Estimated total return will not match Table 9 due to differences in calculations of wild fish at Leaburg Dam and natural spawning below Leaburg Dam.)

Year	Wild Run				Hatchery Run					Total Run	Wild %	Wild Impact
	Dam Count	Nat. Spawn	Rel. Mort.	Total	Dam Count	Nat. Spawn	Harvest	Hatchery Returns	Total			
2002	3,602	599	80	4,281	2,485	413	1,747	6,768	11,413	15,694	27%	1.87%
2003	4,899	790	88	5,777	4,428	714	1,242	6,171	12,555	18,332	32%	1.52%
2004	4,419	426	237	5,082	4,615	445	2,683	6,581	14,324	19,406	26%	4.66%
2005	2,435	519	52	3,006	659	141	655	3,213	4,668	7,673	39%	1.73%
2006	2,189	438	67	2,694	981	196	1,086	3,092	5,355	8,048	33%	2.49%
2007	2,757	1,032	70	3,859	558	209	567	2,485	3,819	7,678	50%	1.81%
2008	1,365	1,742	2	3,109	290	370	16	2,988	3,664	6,773	46%	0.06%
2009	1,185	1,059	43	2,287	460	411	796	3,477	5,144	7,431	31%	1.88%
2010	1,357	1,183	52	2,592	1,298	1,131	1,794	6,779	11,002	13,594	19%	2.01%
2011	2,288	1,562	77	3,927	548	374	1,289	5,784	7,995	11,922	33%	1.96%
2012	1,654	490	45	2,189	323	1737	1,197	3,838	7,095	9,283	24%	2.06%
2013	1,236	158	28	1,422	293	502	613	2,367	3,775	5,197	27%	1.97%
2014	1,003	94	21	1,118	487	374	636	2,718	4,215	5,332	21%	1.88%
2015	1,589	143	18	1,750	1092	233	675	6,070	8,070	9,819	18%	1.03%
2016	1,698	67	24	1,789	1,360	408	570	2,899	5,237	7,026	25%	1.34%
2017	1,477	33	15	1,525	425	80	627	6,442	8,201	9,099	17%	0.98%
2018	2,307	115	25	2,447	469	345	702	5,135	6,651	9,098	27%	1.02%

2018 Fisheries

The Willamette FMEP, implemented in 2001, calls for mark-selective fisheries for hatchery spring Chinook. Beginning in 2001, only adipose fin-clipped spring Chinook were allowed to be retained in freshwater recreational fisheries. Mark-selective freshwater commercial fisheries followed beginning in 2002. All unmarked fish must be released unharmed in these fisheries. The goal of Willamette Basin fishery management for spring Chinook is to limit fishery impacts on wild fish to levels that ensure the survival and rebuilding of wild populations while providing fishery access to abundant hatchery fish. An average annual impact rate of less than 15% in combined freshwater fisheries in the Willamette Basin and lower Columbia was established to achieve this goal. The expectations for fisheries is described in detail in ODFW/WDFW February 2018 Joint Staff Report.

The 2018 preseason forecast for Willamette River spring Chinook was for a total of 55,950 fish to the Columbia River mouth and 20% of those were expected to be wild fish, leaving 44,760 hatchery fish in the expected return. According to the Willamette FMEP, the 44,760 hatchery fish return minus escapement and hatchery broodstock needs for the Clackamas River and areas above Willamette Falls left a projected harvestable surplus of 18,700 hatchery fish (Table 15). This surplus was to be allocated 100% to recreational fisheries downstream of Willamette Falls including the lower Columbia River with less than 1% of the available fish allocated to commercial fisheries in the lower Columbia River.

The majority of catch in these fisheries occurs well before the peak of migration over Willamette Falls and up the Clackamas River. This late migration precludes early updating of the run size for use in in-season management. These fisheries are most often managed based on preseason expectations. Based on the post-season run reconstruction, 29,562 hatchery fish returned to the

Columbia River mouth in 2018. The allocations for that size return are 7,000 fish for the recreational fishery below Willamette Falls (including fisheries in the Columbia River) and less than 300 fish for the commercial fishery in the lower Columbia River. In total, 7,615 adult hatchery Willamette spring Chinook were harvested in all fisheries downstream of Willamette Falls and below North Fork Dam on the Clackamas River.

Fisheries impacting wild Willamette spring Chinook in 2018 were managed successfully below the 15% impact rate limit. Table 12 provides 2018 catch estimates by fishery and fishery impact estimates on three populations of Willamette wild spring Chinook. Spring Chinook stock separations in Columbia River fisheries were made through visual stock identification verified by coded-wire-tag analyses. The mortality rate for released salmon in Columbia River recreational fisheries is assumed to be 10%. Estimated commercial fishery release mortality rates for spring Chinook are 40% in large-mesh gill nets and 14.7% in tangle nets (ODFW/WDFW 2008). In the Willamette Basin, the lower Willamette and lower Clackamas recreational fisheries have been sampled for many years. Recreational fisheries above Willamette Falls were not sampled in 2005-2018 and estimated impacts to wild fish are derived from analysis of encounter rates of hatchery fish in these fisheries. The estimated mortality rate for released fish in all Willamette Basin recreational fisheries is 12.2% (Lindsay et al. 2003). The total freshwater fisheries impact on wild Willamette River spring Chinook in 2018 was 4.92% for the entire wild run. For specific populations, the impact was 4.22% for Clackamas, 4.41% for North Santiam and 4.24% for McKenzie populations (Table 12).

Lower Columbia Commercial Fishery

No spring mainstem Columbia River commercial salmon fishery occurred in 2018. Existing Commission guidance prioritized use of any commercial allocation of upriver spring chinook impacts in Select Area commercial fisheries.

Select Area Fisheries

Commercial fisheries for net-pen reared spring Chinook occurred in 2018 in Youngs Bay, Blind Slough/Knappa Slough, Tongue Point/South Channel and Deep River (WA). Select Area fisheries are not mark-selective. These off-channel net pen and fishing sites are dominated by returns of local spring Chinook. A total of 10,981 Chinook were caught in 2018 winter/spring/summer Select Area commercial fisheries, including 457 adult Willamette spring Chinook. About 23% of this catch was estimated to be comprised of unmarked fish; therefore the estimated mortality of Willamette wild spring Chinook was 105 adults. The proportion of non-local fish (not from Select Area releases) landed in 2018 was similar to the long term averages.

Lower Columbia Recreational Fishery

The 2018 lower Columbia River recreational spring Chinook fishery was open under mark-selective, fin-clipped-only regulations for the seventeenth consecutive year. The 2018 lower

Columbia River recreational fishery was structured to maximize opportunity on an expected upriver spring Chinook return of 166,700 adult fish and a Willamette spring Chinook return of 53,820 adult fish.

The 2018 lower Columbia recreational fishery from Buoy 10 to the I-5 Bridge was open seven days per week during the months of January and February under permanent regulations (two fish bag limit). Beginning March 1, anglers could only keep one hatchery Chinook per day. The fishery was open March 1-April 7, April 14, and May 25-June 15 between Buoy 10 and Bonneville Dam with only Oregon and Washington banks open for angling between Beacon Rock and Bonneville Dam. The total catch for the 2018 spring Chinook fishery below Bonneville Dam was 7,509 adult spring Chinook (7,509 kept and 1,530 released) from 89,882 angler trips.

Catch estimates are derived from creel surveys and all unmarked fish released by anglers are assumed to be wild fish. Of the 2018 kept catch, an estimated 1,225 fin-clipped adult Willamette hatchery fish were retained and 280 non-clipped Willamette fish were released. The estimated post-release mortality of Willamette wild spring Chinook was 28 adult fish.

Lower Willamette Recreational Fishery

The 2018 lower Willamette River (below Willamette Falls) opened for retention of spring Chinook seven days per week the entire year. This was the seventeenth consecutive year of full implementation of a mark-selective spring Chinook fishery. Partial-season mark-selective fisheries occurred in 2000 and 2001.

ODFW Research and District staff conducted a study of post-release mortality of Chinook in the lower Willamette recreational fishery during 1998-2000 (Lindsay et al. 2003). Estimates of hooking mortality by anatomical hook locations were made from catch and release of recreational caught fish immediately below Willamette Falls and compared to uncaught fish in a control situation from a trap in the Willamette Fall's fishway. Meanwhile, ODFW sport fish samplers in the lower Willamette recreational fishery noted anatomical hooking locations from landed Chinook. Applying the estimates of hooking mortality rates made at Willamette Falls to the distribution of hook locations in the recreational fishery provided an estimated 12.2% catch-and-release hooking mortality in the lower Willamette river recreational fishery. The 12.2% rate has been used to estimate the fishery impact on released fish in the lower Willamette River and Willamette tributary recreational fisheries since 2002.

Catch estimates are derived from creel surveys and all unmarked fish released by anglers are assumed to be wild fish. The effect of unmarked hatchery fish being contained in this group has not yet been analyzed. A total of 58,852 angler trips were made to catch 7,325 adult spring Chinook in 2018; 6,069 (83%) were kept fin-clipped adults and 1,256 (17%) were released non-fin-clipped adults. The estimated mortality of Willamette wild spring Chinook was 151 adult fish.

Clackamas Recreational Fishery

The lower Clackamas River fishery was open to salmon and steelhead angling seven days per week the entire year, catch limits were consistent with the lower Willamette River recreational fishery. Anglers in the 2018 lower Clackamas River recreational fishery caught an estimated nine adult spring Chinook from 1,884 angler trips; seven were adipose fin-clipped adults kept and two adults released. The estimated mortality of adult Clackamas wild spring Chinook was one fish.

Upper Willamette Mainstem Recreational Fishery

The 2018 upper Willamette mainstem recreational fishery (from Willamette Falls upstream to the mouth of the McKenzie River) was restricted to retention of fin-clipped Chinook the entire year. This fishery was open seven days per week with regulations similar to the lower Willamette River. The recreational fishery in the upper Willamette is generally smaller than the fishery in the lower Willamette, and has not been sampled since 2004. Estimates of mortality of adult wild spring Chinook in the upper Willamette were made using average encounter rates of hatchery Chinook derived from angler harvest cards for the most recent available years. Because this method calculates the number of wild fish released based on encounter rates, the estimate should not be influenced by unmarked hatchery fish being counted in the catch, as is the case with estimates generated by creel surveys. The estimated 2018 mortality of upper Willamette wild spring Chinook was seven adult fish.

Upper Willamette Tributary Recreational Fisheries

All tributary recreational fisheries in the Willamette Basin have been restricted to retention of adipose fin-clipped spring Chinook since 2002. This fishery was open seven days per week until December 31, 2018. Angler surveys are not conducted in these areas. Estimates of impacts on Willamette wild spring Chinook in the North Santiam and McKenzie rivers were made using average encounter rates of hatchery Chinook derived from angler harvest cards for the most recent available years. Because this method calculates the number of wild fish released based on encounter rates, the estimate should not be influenced by unmarked hatchery fish being counted in the catch, as is the case with estimates generated by creel surveys. The estimated 2018 mortality of wild spring Chinook in the North Santiam and McKenzie rivers were 17 adult fish and 25 adult fish, respectively.

Table 12. 2018 adult Willamette spring Chinook freshwater catches and impacts on wild fish returns.

Fishery	Catch		Wild Fish Mortalities ¹	Percentage Impact on Wild Return ²
	Kept	Released		
Select Area Commercial	457	0	85	1.64%
Lower Columbia Recreational	1,225	280	28	0.54%
Lower Willamette Recreational	6,011	1,256	151	2.92%
	7,693	1,536	264	5.10%
Clackamas Recreational	7	8	1	0.02%
Upper Willamette Recreational	433	57	7	0.14%
North Santiam Recreational	943	139	17	0.33%
McKenzie Recreational	702	205	25	0.48%
	2,085	410	50	0.97%
Total	9,778	1,946	314	6.07%

Totals by Population

Clackamas	5.12%
North Santiam	5.57%
McKenzie	5.72%

¹ Estimated release mortality rates are 10% in the lower Columbia recreational fisheries and 12.2% in the Willamette and tributary recreational fisheries. Release mortalities for commercial fisheries vary by gear type used (14.7% and 40%).

² Aggregate wild return estimated at 5,174 adults at the mouth of the Columbia River (13.8%) of the total 2018 Willamette spring Chinook adult run of 37,441. Wild return to the Clackamas River estimated at 2,331 adults (92.2%) of the 2,528 Clackamas adult return).

Table 13. Freshwater fishery percent impact on wild Willamette River spring Chinook, 2002-2018.

Fishery	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
L. Col. Commercial ¹	2.4	1.1	4.2	2.0	8.0	2.7	0.5	1.5	6.0	4.7	2.5	4.6	3.0	3.4	1.6	1.4	1.6
L. Col. Recreational	1.1	1.2	1.0	0.7	0.8	0.8	0.2	0.8	1.8	0.6	1.0	0.5	0.9	0.7	0.3	0.1	0.5
L. Willamette	3.0	2.4	2.7	3.0	4.3	4.2	4.8	3.6	6.9	6.2	4.5	2.8	3.9	4.0	2.2	2.4	2.9
L. Clackamas	4.9	0.8	0.3	0.5	0.3	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.3	0.0
U. Willamette	0.3	0.3	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
N. Santiam	0.4	0.1	0.4	0.1	0.1	0.1	0.0	0.1	0.3	0.1	0.3	0.2	0.7	0.2	0.4	0.4	0.3
McKenzie Recreational	0.0	5.4	1.9	0.7	1.4	1.3	0.1	1.3	1.0	1.1	1.3	0.8	0.5	0.4	0.5	0.2	0.5
<i>Sum</i>	<i>9.7</i>	<i>10.2</i>	<i>6.3</i>	<i>5.1</i>	<i>7.0</i>	<i>6.6</i>	<i>5.4</i>	<i>6.1</i>	<i>10.4</i>	<i>8.2</i>	<i>7.5</i>	<i>4.7</i>	<i>6.2</i>	<i>5.5</i>	<i>3.6</i>	<i>3.5</i>	<i>4.3</i>
Wild Harvest Rate	12.1	11.3	10.5	7.1	15.0	9.3	5.9	7.6	16.4	12.9	10.0	9.3	8.9	9.0	5.1	4.9	5.9

Totals by Population

Clackamas	11.3	5.4	8.1	6.2	13.4	7.8	5.7	6.1	14.8	11.7	8.3	8.2	7.9	8.3	4.2	4.2	5.1
North Santiam	7.1	5.0	8.3	6.0	13.3	7.8	5.6	6.1	15.1	11.7	8.4	8.2	8.6	8.5	4.6	4.4	5.6
McKenzie	6.7	10.3	9.8	6.5	14.6	9.0	5.6	7.3	15.8	12.8	9.5	8.7	8.4	8.6	4.6	4.2	5.7

¹ Includes mainstem and SAFE salmon/sturgeon fisheries through 2016. Beginning in 2017 includes SAF fisheries only.

2018 Total Wild Fish Impacts

The estimated wild fish impact totals by population from the 2018 freshwater fisheries are 4.2%, 4.4% and 4.2% for the Clackamas, North Santiam, and McKenzie populations, respectively (Table 12). These estimates are below the 15% maximum limit established in the FMEP. Wild impact rates since 2001 have been much lower than the average rates of 37%-54% from 1981-1997 (Table 13).

Estimates of wild fish handled in fisheries where catch is estimated by creel survey (or observer programs) are derived by assuming that 100% of released fish are wild. Calculating the true number of wild fish handled by such fisheries is also confounded by the presence of a small number of unmarked hatchery fish, which would be counted as wild. This would cause the handle and mortality of wild fish to be slightly overestimated and would also slightly overestimate the abundance of wild fish. The overall effect of these overestimates has not been evaluated. The discontinuation of unclipped double-index tagging (DIT) releases in the Clackamas River may provide an opportunity to examine this issue in the Clackamas River fishery. Handle of wild fish estimated by encounter rates of hatchery fish calculated from angler catch cards should not be affected by the presence of DIT fish in the same way but this method presents other difficulties that make the method less desirable for assessing wild fish impacts than are direct surveys, even considering the confounding issues of released DIT fish in surveyed fisheries.

Table 14. Run reconstructions for Willamette River wild spring Chinook (adults only), 2003-2018.

Year	Above Falls					Below Falls					Col River Mouth Return
	Tributary Returns		Fishery Mortalities			Clackamas Return	Fishery Mortalities			Sum	
	Mckenzie	N Santiam	Mid Sect	Upper			Will Sport	Lower Col River			
				Santiam	Willamette			Comm	Sport		
2003	5,777	846	1	16	6,640	3,557	367	261	178	4,363	11,003
2004	5,082	553	0	5	5,640	5,596	325	506	127	6,554	12,196
2005	3,006	721	1	12	3,740	3,270	226	148	48	3,692	7,430
2006	2,693	358	0	5	3,056	1,017	201	376	35	1,629	4,686
2007	3,859	223	0	3	4,085	1,198	241	153	48	1,640	5,726
2008	3,109	142	0	6	3,257	1,312	230	24	8	1,574	4,831
2009	2,287	250	0	4	2,541	617	122	49	25	813	3,353
2010	2,591	844	1	8	3,444	1,164	370	323	97	1,954	5,399
2011	3,927	575	1	9	4,512	1,673	434	327	44	2,478	6,990
2012	2,189	1,059	1	7	3,256	1,697	310	175	67	2,249	5,505
2013	1,423	1,186	2	2	2,613	2,149	157	257	27	2,590	5,202
2014	1,117	1,681	2	5	3,068	907	169	127	38	1,241	4,046
2015	1,749	1,107	1	3	2,860	2,321	226	194	39	2,780	5,640
2016	1,789	887	0	3	2,679	3,490	142	104	19	3,755	6,434
2017	1,525	910	1	3	2,439	3,609	150	90	9	3,858	6,297
2018	1,978	594	1	7	2,580	2,330	151	85	28	2,594	5,174

More analysis is needed regarding the techniques for run reconstructions for Willamette River spring Chinook populations using currently available information. Estimates of wild and hatchery returns based upon run reconstructions from the tributaries downstream yield different total abundance estimates than estimates based on Willamette Falls’ fish ladder counts of marked and unmarked Chinook.

For instance, in 2018 the total estimated wild fish run to the Willamette River based on tributary returns was 6,297 adult fish (including an escapement of 2,349 adult fish above Willamette Falls) to the mouth of the Columbia River (Table 14). In contrast, the 2018 Willamette Falls count of unmarked adult fish was 5,914 excluding 266 additional fish removed in downstream fisheries and 375 fish taken by sea lions prior to passing Willamette Falls.

The disparity in these two methods may be attributable to several individual and combinations of factors. These include incomplete counting at upriver return sites and process errors in various components of the estimation. Given available information, the current method of reconstructing the runs from the tributaries “backwards” (i.e. moving downstream), seems to be the best method available at this time. However, the disparity between the two information sources highlights a need for further information in order to achieve more complete accounting of Willamette Basin returns.

2018 Angler Compliance with Regulations

Oregon State Police (OSP) Fish and Wildlife Division officers and their volunteers, with assistance from ODFW fish checkers and commercial fishery observers, enforce Willamette spring Chinook angling regulations. A priority task is enforcement of the regulation requiring release of wild (non-finclipped) spring Chinook in recreational fisheries. In 2018, anglers had a chance to fish with two rods, if they purchased a two rod validation. Compliance with these regulations was relatively high.

Outlook for 2019 Willamette Spring Chinook Management

The 2019 Willamette spring Chinook run size forecast is for a total run of 42,490 fish, including 8,510 (20%) wild fish (Figure 2). The forecast includes 2,290 age-3 fish, 30,690 (72%) age-4 fish, 9,430 (22%) age-5 fish and 80 age-6 fish. In December 2001, the Oregon Fish and Wildlife Commission established a long-term allocation plan between the lower Columbia commercial fishery and the recreational fishery below Willamette Falls (including the lower Columbia River) for sharing of the harvestable surplus of Willamette River hatchery spring Chinook. The allocations used for 2019, based on the forecast of 32,150 hatchery fish are 9,000 hatchery fish to the recreational fishery downstream of Willamette Falls and 320 hatchery fish to the commercial fishery (Table 15).

Mainstem and tributary spring Chinook fisheries will continue to be mark-selective for fin-clipped fish in 2019. All Willamette Basin recreational fisheries are restricted to hatchery (fin-clipped) fish under permanent rule and regulations are printed as such in the *2019 Oregon Sport Fishing Regulations* pamphlet.

The cumulative freshwater fishery impact on Willamette wild spring Chinook is expected to be below the maximum impact rate of 15% specified in the FMEP.

ODFW
January 2020

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Table 15. Willamette River 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		Recreational		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 15 continued.

Predicted Willamette Hatchery Run Size	Hatchery Fish Escapement Targets			Number of Hatchery Fish Available	Harvest Shares Below the Falls			
	Willamette Falls	Clackamas	Combined		Recreational		Commercial	
	Escapement Target	Escapement Target	Escapement Target		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