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RUN SIZE FORECASTS FOR ADULT SPRING CHINOOK SALMON IN THE COWLITZ, KALAMA, AND LEWIS RIVERS, 1992

Columbia River Progress Report 91-7

Washington Department of Fisheries
Planning, Research, and Harvest Management
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Introduction

Spring chinook returns to the lower Columbia River tributaries in 1991 have been tallied in order to produce run size forecasts for 1992. The forecasts are used for fishery modeling exercises and to determine stock specific abundance estimates. Primary harvest of these runs occurs in the tributary recreational fisheries, and to a lesser extent in the mainstem Columbia River recreational and commercial fisheries.

This report documents the 1991 tributary accountability of spring chinook in the Cowlitz, Kalama, and Lewis rivers, and the run size forecasts for 1992.

The 1992 total adult run size forecast for these tributaries is **26,600** and includes a forecast of **12,600** to the **Cowlitz River**, **2,600** to the **Kalama River**, and **11,400** to the **Lewis River**. Table 1 lists the pre-season forecasts and the actual returns to the three tributaries from 1988-1992.

1991 Tributary Run Size

Tributary accountability of spring chinook in the Cowlitz, Kalama, and Lewis rivers from 1980-1991 is presented in Table 2. The return in 1991 for all three rivers was 19,800 adults and 29,000 adults and jacks combined.

Cowlitz River

The adult return to the Cowlitz River in 1991 was 8,700 (Tables 3 and 4), an increase over the recent 2 years, but less than the forecast of 10,500. Hatchery escapement was 5,400 adults (Table 5), the escapement goal of 1,100 was achieved.

Sport catch was 3,200 adults (Table 6); harvest rate was 37%, an increase over the recent 5 year average of 28%. Natural spawning escapement was less than 200 adults (Table 7). Releases of spring chinook in the Cowlitz River are presented in Table 8.

Kalama River

The 1991 adult return to the Kalama River was 2,900 (Tables 9 and 10) and matched the pre-season forecast. This was the largest adult return since 1983. The hatchery escapement of 1,200 (Table 11) was sufficient to achieve the escapement goal of 300.

The sport catch of adults in 1991 (Table 12) was 1,700 -- the largest catch since 1983 and represented a harvest rate of 58%. The 5-year average harvest rate is 38%. Natural spawning escapement was minor again in 1991 (Table 13). Listed in Table 14 are spring chinook releases in the Kalama River.

Lewis River

The adult return to the Lewis River in 1991 was 8,100 -- greater than the pre-season forecast of 6,300, but below the 5-year average of 11,400 (Tables 15 and 16). The hatchery escapement of 600 adults (Table 17) was slightly less than the 800 needed for production. Surplus fish from Kalama Falls Hatchery were shipped to Speelyai Hatchery to meet production needs.

Table 18 shows sport harvest in the Lewis River. The adult catch in 1991 was 5,900 with a harvest rate of 72%. Natural spawning escapement was 1,600 -- 20% of the return (Table 19). Spring chinook releases into the Lewis River are presented in Table 20. Yearling releases in 1990 include 326,400 Willamette stock spring chinook.

1992 Run size forecasts

The forecast for the Cowlitz River in 1992 is for a return of 12,600 adults. This would be the largest return since 1987. The 4-year-old age class is projected to make up 73% of the return.

The return to the Kalama River in 1992 is projected to be 2,600 adults, with 4 and 5-year-old fish being equally represented. A return of 2,600 would be slightly greater than the 5-year average of 2,300.

The 1992 run size forecast for the Lewis River is 11,400 adults, near the recent 5-year average. The dominant age class should be the 4-year-olds. 1992 will represent the first adult returns from a release of 326,400 Willamette stock fish in the Lewis River.

Shown below are the point estimates by age of the 1992 projected return to the Cowlitz, Kalama and Lewis rivers.

	4's	5's	6's	Total
Cowlitz	9,157	3,347	96	12,600
Kalama	1,369	1,221	10	2,600
Lewis	7,872	3,378	150	11,400
Total	18,398	7,946	256	26,600

Table 1. Predicted and actual returns of adult spring chinook to the Cowlitz, Kalama, and Lewis Rivers, 1988-1992.

	Cowlitz	Kalama	Lewis	Total
1988				
Forecast	12.000	2,000	18,000	32,000
Actual	12,300	1,900	10,600	24,800
1989				
Forecast	6,100	900	9,100	16,100
Actual	8,300	2,000	12,000	22,300
1990				
Forecast	6,100	1,100	11,400	18,600
Actual	7,600	2,000	9,300	18,900
1991				
Forecast	10,500	2,900	6,300	19,700
Actual	8,700	2,900	8,100	19,800
1992				
Forecast	**12,600**	**2,600**	**11,400**	**26,600**

Table 2. Spring chinook returns to the Cowlitz, Kalama and Lewis Rivers, 1980 - 1991.

Year	Cowlitz		Kalama		Lewis		Combined Cowlitz, Kalama, Lewis	
	Total	Adults	Total	Adults	Total	Adults	Total	Adults
1980	32,500	23,700	2,800	2,500	2,600	2,300	37,900	28,500
1981	33,300	27,900	3,800	3,300	3,100	3,000	40,200	34,200
1982	25,800	19,300	9,100	8,400	4,200	3,900	39,100	31,600
1983	29,600	21,400	5,400	4,900	4,000	3,700	39,000	29,900
1984	23,300	21,300	1,900	1,800	6,800	6,400	31,900	29,500
1985	15,000	9,900	400	300	4,600	4,100	20,000	14,400
1986	13,800	7,300	1,200	1,100	9,400	8,300	24,400	16,700
1987	22,800	18,000	2,700	2,400	17,600	16,600	43,000	37,000
1988	15,100	12,300	2,100	1,900	11,700	10,600	28,800	24,900
1989	10,200	8,300	2,100	2,000	12,500	12,000	24,800	22,300
1990	21,600	7,600	2,500	2,000	9,500	9,300	33,600	18,900
1991 1/	16,600	8,700	3,100	2,900	9,300	8,100	29,000	19,800

1/ Preliminary.

Table 3. Cowlitz River spring chinook run by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	1,048	7,710	15,404	8,197	148	32,507	23,749
1981	3,100	2,277	19,507	8,166	248	33,298	27,921
1982	915	5,562	9,256	9,903	178	25,814	19,337
1983	3,138	5,128	18,285	2,984	81	29,616	21,350
1984	566	1,381	16,863	4,440	24	23,274	21,327
1985	4,646	451	7,339	2,561	11	15,008	9,911
1986	2,540	3,977	4,961	2,298	66	13,842	7,325
1987	2,587	2,231	16,621	1,324	38	22,801	17,983
1988	2,273	441	7,784	4,524	29	15,051	12,337
1989	1,056	806	3,856	4,331	140	10,189	8,327
1990	12,166	1,847	4,841	2,289	462	21,605	7,592
1991 1/	5,567	2,356	5,783	2,845	83	16,634	8,711

1/ Preliminary.

Table 4. Cowlitz River spring chinook run by brood year.

Brood Year	Age 2	3	4	5	6	Total	Adults
1974					148	148	148
1975				8,197	248	8,445	8,445
1976			15,404	8,166	178	23,748	23,748
1977		7,710	19,507	9,903	81	37,201	29,491
1978	1,048	2,277	9,256	2,984	24	15,589	12,264
1979	3,100	5,562	18,285	4,440	11	31,398	22,736
1980	915	5,128	16,863	2,561	66	25,533	19,490
1981	3,138	1,381	7,339	2,298	38	14,194	9,675
1982	566	451	4,961	1,324	29	7,331	6,314
1983	4,646	3,977	16,621	4,524	140	29,908	21,285
1984	2,540	2,231	7,784	4,331	462	17,348	12,577
1985	2,587	441	3,856	2,289	83	9,256	6,228
1986	2,273	806	4,841	2,845			
1987	1,056	1,847	5,783				
1988	12,166	2,356					
1989	5,567						

Table 5. Cowlitz River spring chinook hatchery escapement by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	426	2,615	9,283	6,483	94	18,901	15,860
1981	2,364	1,139	14,219	7,172	215	25,109	21,606
1982	742	2,744	5,046	7,076	114	15,722	12,236
1983	2,565	2,015	10,991	2,246	81	17,898	13,318
1984	502	832	10,931	2,690	24	14,979	13,645
1985	4,210	407	5,090	1,743	0	11,450	6,833
1986	2,054	2,920	3,225	1,431	62	9,692	4,718
1987	2,058	1,433	12,481	1,160	38	17,170	13,679
1988	2,178	301	5,715	3,336	29	11,559	9,080
1989	959	569	2,404	3,207	92	7,231	5,703
1990 1/	11,940	712	3,021	1,506	151	17,330	4,678
1991 2/	4,306	1,172	3,550	1,762	60	10,850	5,372

1/ Six seven-year-olds are included with the 1990 six-year-olds. Escapement equals Salmon Culture total plus recycled fish.
2/ Preliminary. Seven seven-year-olds are included with the 1991 six-year-olds.

Table 6. Cowlitz River spring chinook sport catch by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	618	5,068	6,024	1,646	53	13,409	7,723
1981	630	1,087	4,658	675	23	7,073	5,356
1982	157	2,764	4,124	2,706	62	9,813	6,892
1983	559	3,102	7,236	726	0	11,623	7,962
1984	59	540	5,814	1,721	0	8,134	7,535
1985	340	35	2,133	778	11	3,297	2,922
1986	283	768	1,417	723	0	3,191	2,140
1987	518	790	4,075	158	0	5,541	4,233
1988	54	132	1,962	1,123	0	3,271	3,085
1989	27	186	1,213	810	38	2,274	2,061
1990	198	1,121	1,639	695	302	3,955	2,636
1991 1/	1,166	1,144	2,134	1,034	22	5,500	3,190

1/ Preliminary.

Table 7. Cowlitz River spring chinook natural spawn escapement by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	4	27	97	68	1	197	166
1981	106	51	630	319	10	1,116	959
1982	16	54	86	121	2	279	209
1983	14	11	58	12	0	95	70
1984	5	9	118	29	0	161	147
1985	96	9	116	40	0	261	156
1986	203	289	319	144	4	959	467
1987	11	8	65	6	0	90	71
1988	41	8	107	65	0	221	172
1989	70	51	239	314	10	684	563
1990	28	14	181	88	9	320	278
1991 1/	95	40	99	49	1	284	149

1/ Preliminary.

Table 8. Spring chinook releases in the Cowlitz River by brood year.

Brood Year	Yearlings (*1000)	Fingerlings (*1000)	Fall release (*1000)	Total (*1000)
1970	972.2	0.0	3,132.8	4,105.0
1971	696.4	0.0	2,656.9	3,353.3
1972	1,011.8	0.0	653.8	1,665.6
1973	997.8	57.6	746.8	1,802.2
1974	910.6	121.1	1,501.2	2,532.9
1975	900.1	769.7	666.9	2,336.7
1976	504.6	873.7	867.6	2,245.9
1977	635.4	263.1	875.8	1,774.3
1978	635.4	0.0	991.7	1,627.1
1979	742.6	0.0	1,136.6	1,879.2
1980	722.5	220.7	1,055.0	1,998.2
1981	631.0	1,286.0	0.0	1,917.0
1982	619.4	2,239.5	0.0	2,858.9
1983	603.1	2,805.9	0.0	3,409.0
1984	665.5	2,984.8	24.0	3,674.3
1985	638.4	2,332.8	0.0	2,971.2
1986	596.8	2,563.6	0.0	3,160.4
1987	643.8	2,714.8	192.0	3,550.6
1988	1,074.5	2,382.6	47.6	3,504.7
1989	1,252.3 1/	440.5	0.0	1,692.8
1990		491.5 1/	0.0	491.5

1/ Preliminary.

Table 9. Kalama River spring chinook run by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	0	344	1,923	554	0	2,821	2,477
1981	0	562	2,540	725	0	3,827	3,265
1982	0	683	6,616	1,804	0	9,103	8,420
1983	0	503	3,237	1,620	0	5,360	4,857
1984	0	51	1,075	732	0	1,858	1,807
1985	0	48	218	120	0	386	338
1986	0	135	888	189	0	1,212	1,077
1987	0	272	1,753	668	0	2,693	2,421
1988	0	125	1,032	905	0	2,062	1,937
1989	0	130	808	1,143	35	2,116	1,986
1990	0	474	1,328	686	7	2,495	2,021
1991 1/	3	209	2,227	658	25	3,122	2,910

1/ Preliminary.

Table 10. Kalama River spring chinook run by brood year.

Brood Year	Age 2	3	4	5	6	Total	Adults
1975				554	0	554	554
1976			1,923	725	0	2,648	2,648
1977		344	2,540	1,804	0	4,688	4,344
1978	0	562	6,616	1,620	0	8,798	8,236
1979	0	683	3,237	732	0	4,652	3,969
1980	0	503	1,075	120	0	1,698	1,195
1981	0	51	218	189	0	458	407
1982	0	48	888	668	0	1,604	1,556
1983	0	135	1,753	905	35	2,828	2,693
1984	0	272	1,032	1,143	7	2,454	2,182
1985	0	125	808	686	25	1,644	1,519
1986	0	130	1,328	658			
1987	0	474	2,227				
1988	0	209					
1989	3						

Table 11. Kalama River spring chinook hatchery escapement by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	0	261	1,421	409	0	2,091	1,830
1981	0	284	1,251	357	0	1,892	1,608
1982	0	232	2,747	749	0	3,728	3,496
1983	0	246	1,170	585	0	2,001	1,755
1984	0	4	478	325	0	807	803
1985	0	11	62	34	0	107	96
1986	0	47	391	83	0	521	474
1987	0	124	749	285	0	1,158	1,034
1988	0	40	568	356	0	964	924
1989	0	63	373	315	18	769	706
1990	0	183	631	428	7	1,249	1,066
1991 1/	3	108	719	458	0	1,288	1,177

1/ Preliminary. Includes 149 adults transferred to Speelyai Hatchery.

Table 12. Kalama River spring chinook sport catch by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	0	41	271	78	0	390	349
1981	0	151	728	208	0	1,087	936
1982	0	271	1,738	474	0	2,483	2,212
1983	0	116	1,395	698	0	2,209	2,093
1984	0	46	518	353	0	917	871
1985	0	37	156	86	0	279	242
1986	0	72	361	77	0	510	438
1987	0	92	663	253	0	1,008	916
1988	0	64	170	368	0	602	538
1989	0	55	382	326	0	763	708
1990	0	291	679	242	0	1,212	921
1991 1/	0	99	1,480	196	25	1,800	1,701

1/ Preliminary.

Table 13. Kalama River spring chinook natural spawn escapement by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	0	42	231	67	0	340	298
1981	0	127	561	160	0	848	721
1982	0	180	2,131	581	0	2,892	2,712
1983	0	141	672	337	0	1,150	1,009
1984	0	1	79	54	0	134	133
1985	0	0	0	0	0	0	0
1986	0	16	136	29	0	181	165
1987	0	56	341	130	0	527	471
1988	0	21	294	181	0	496	475
1989	0	12	53	502	17	584	572
1990	0	0	18	16	0	34	34
1991 1/	0	2	28	4	0	34	32

1/ Preliminary.

Table 14. Spring chinook releases in the Kalama River by brood year.

Brood Year	Yearlings (*1000)	Fingerlings (*1000)	Fall release (*1000)	Total (*1000)
1965	253.4	0.0	0.0	253.4
1966	0.0	0.0	0.0	0.0
1967	125.3	0.0	0.0	125.3
1968	184.3	0.0	0.0	184.3
1969	90.8	144.4	92.9	328.1
1970	71.2	19.3	27.9	118.4
1971	96.4	62.4	70.2	229.0
1972	131.3	0.0	106.6	237.9
1973	44.1	0.0	69.2	113.3
1974	195.9	0.0	335.1	531.0
1975	283.7	0.0	220.0	503.7
1976	120.0	0.0	0.0	120.0
1977	152.4	324.7	0.0	477.1
1978	116.5	0.0	0.0	116.5
1979	600.8	0.0	0.0	600.8
1980	160.0	0.0	0.0	160.0
1981	228.0	0.0	0.0	228.0
1982	325.9	0.0	0.0	325.9
1983	569.3	0.0	0.0	569.3
1984	404.0	0.0	55.0	459.0
1985	176.0	0.0	0.0	176.0
1986	300.2	0.0	0.0	300.2
1987	537.2	0.0	0.0	537.2
1988	528.7	0.0	160.4	689.1
1989 1/	657.7	111.9	0.0	769.6

1/ Preliminary.

Table 15. Lewis River spring chinook run by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	144	162	1,510	755	0	2,571	2,265
1981	29	119	1,984	980	0	3,112	2,964
1982	75	255	1,850	2,039	0	4,219	3,889
1983	113	227	1,835	1,834	0	4,009	3,669
1984	60	297	5,938	475	0	6,770	6,413
1985	50	474	3,756	360	0	4,640	4,116
1986	0	1,125	7,430	829	0	9,384	8,259
1987	119	833	10,450	6,150	0	17,552	16,600
1988	617	430	4,933	5,631	54	11,665	10,618
1989	32	475	5,299	6,558	161	12,525	12,018
1990	37	136	4,057	5,127	135	9,492	9,319
1991 1/	406	751	4,047	3,558	527	9,289	8,132

1/ Preliminary.

Table 16. Lewis River spring chinook run by brood year.

Brood Year	Age 2	3	4	5	6	Total	Adults
1975				755	0	755	755
1976			1,510	980	0	2,490	2,490
1977		162	1,984	2,039	0	4,185	4,023
1978	144	119	1,850	1,834	0	3,947	3,684
1979	29	255	1,835	475	0	2,594	2,310
1980	75	227	5,938	360	0	6,600	6,298
1981	113	297	3,756	829	0	4,995	4,585
1982	60	474	7,430	6,150	54	14,168	13,634
1983	50	1,125	10,450	5,631	161	17,417	16,242
1984	0	833	4,933	6,558	135	12,459	11,626
1985	119	430	5,299	5,127	527	11,502	10,953
1986	617	475	4,057	3,558			
1987	32	136	4,047				
1988	37	751					
1989	406						

Table 17. Lewis River/Speelyai spring chinook hatchery escapement by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	0	2	56	28	0	86	84
1981	0	0	477	236	0	713	713
1982	0	4	232	256	0	492	488
1983	0	1	52	51	0	104	103
1984	35	1	418	33	0	487	451
1985	0	30	372	36	0	438	408
1986	0	102	407	46	0	555	453
1987	12	21	163	99	0	295	262
1988	185	35	223	109	0	552	332
1989	0	26	326	535	1	888	862
1990	0	5	336	471	4	816	811
1991 1/	0	61	212	382	2	657	596

1/ Preliminary.

Table 18. Lewis River spring chinook sport catch by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	139	155	793	396	0	1,483	1,189
1981	25	102	1,290	637	0	2,054	1,927
1982	53	178	1,149	1,266	0	2,646	2,415
1983	90	180	1,417	1,417	0	3,104	2,834
1984	18	215	4,071	326	0	4,630	4,397
1985	50	426	2,917	279	0	3,672	3,196
1986	0	843	5,336	595	0	6,774	5,931
1987	69	761	6,036	3,452	0	10,318	9,488
1988	432	385	3,070	1,949	0	5,836	5,019
1989	32	338	4,376	3,177	120	8,043	7,673
1990	0	94	3,012	4,020	131	7,257	7,163
1991 1/	406	665	2,856	2,548	525	7,000	5,929

1/ Preliminary.

Table 19. Lewis River spring chinook natural spawn escapement by return year.

Return Year	Age 2	3	4	5	6	Total	Adults
1980	5	5	661	331	0	1,002	992
1981	4	17	217	107	0	345	324
1982	22	73	469	517	0	1,081	986
1983	23	46	366	366	0	801	732
1984	7	81	1,449	116	0	1,653	1,565
1985	0	18	467	45	0	530	512
1986	0	180	1,687	188	0	2,055	1,875
1987	38	51	4,251	2,599	0	6,939	6,850
1988	0	10	1,640	3,573	54	5,277	5,267
1989	0	111	597	2,846	40	3,594	3,483
1990	37	37	709	636	0	1,419	1,345
1991 1/	0	25	979	628	0	1,632	1,607

1/ Preliminary.

Table 20. Spring chinook releases in the Lewis River by brood year.

Brood Year	Yearlings (*1000)	Fingerlings (*1000)	Fall release (*1000)	Total (*1000)
1971	45.8	122.4	0.0	168.2
1972	94.4	0.0	148.3	242.7
1973	114.9	0.0	153.5	268.4
1974	127.9	0.0	75.6	203.5
1975	54.4	166.4	176.4	397.2
1976	0.0	0.0	326.4	326.4
1977	0.0	201.0	316.9	517.9
1978	0.0	25.8	368.9	394.7
1979	0.0	0.0	807.4	807.4
1980	0.0	811.8	325.1	1,136.9
1981	0.0	0.0	1,015.3	1,015.3
1982	850.4	0.0	0.0	850.4
1983	1,047.5	0.0	0.0	1,047.5
1984	1,047.1	0.0	0.0	1,047.1
1985	901.7	0.0	0.0	901.7
1986	725.5	0.0	0.0	725.5
1987	498.8	0.0	0.0	498.8
1988	855.0 1/	0.0	0.0	855.0
1989	1,383.8 2/	0.0	0.0	1,383.8
1990		1,229.8 2/	0.0	1,229.8

1/ Includes 326,400 Willamette stock.
2/ Preliminary.