

**Table S1. Juvenile spring/summer Snake River Chinook salmon with PIT tags included in the study.** Year of emigration and date and size at tagging are reported. The otolith-derived estimates for size at marine entry ( $FL_{ME}$ ) and duration of time at liberty prior to marine entry (Release to ME) are included with estimated mean in-river migration rate (In-river), date of marine entry (ME) and the date and location of final detection along the Columbia River hydropower system. “DOY” indicates day of year. “na’ indicates that no data were available. Interrogation information for Fish 11-14 (*italicized*) indicates likely in-river transport via barge. Abbreviations are for juvenile fish rearing, collection or detection facilities at: JDJ = John Day Dam; RPJ = Rapid River Hatchery; BCC = Bonneville Dam; GOJ = Little Goose Dam; MCJ = McNary Dam; ICH = Ice Harbor Dam; LMJ = Lower Monumental Dam; LOL = Lolo Creek, Idaho screw trap; LGR = Lower Granite Dam.

Fish	Migration Year	Tag (DOY)	Tag FL (mm)	$FL_{ME}$ (mm)	Release to ME (d)	In-river (km/d)	ME (DOY)	Final detection DOY (locale)
1	2003	51	121	132	71	7	147	144 (JDJ)
2	2008	35	na	147	69	8	145	97 (RPJ)
3	2007	36	na	nd	68	8	142	142 (BCC)
4	2008	36	na	152	66	8	142	133 (GOJ)
5	2008	37	122	142	65	8	142	130 (MCJ)
6	2003	43	119	nd	62	8	141	144 (JDJ)
7	2008	39	na	138	62	8	138	142 (ICH)
8	2008	36	na	142	66	8	140	141 (LMJ)
9	2008	129	148	158	21	25	151	130 (LGR)
10	2007	299	94	145	28	28	131	125 (JDJ)
11	<i>2004</i>	<i>149</i>	<i>103</i>	<i>109</i>	<i>10</i>	<i>52</i>	<i>159</i>	<i>155 (JDJ)</i>
12	<i>2006</i>	<i>128</i>	<i>97</i>	<i>118</i>	<i>10</i>	<i>52</i>	<i>138</i>	<i>128 (LOL)</i>
13	2008	131	138	129	9	58	141	132 (LGR)
14	2003	150	115	108	3	174	154	152 (GOJ)

**Table S2. Comparison between marked and unmarked Snake River yearling sp/su Chinook salmon.** Mean (SE) size at marine entry, marine growth rate, date of marine entry, marine migration rate (body length per second), and size at capture by emigration year. Smaller samples size indicate the number of juveniles that were included in otolith analyses and displayed adequate otolith growth in marine environment to estimate size at marine entry and marine growth rate. Size at capture was based on all ocean collections. \*Bold text indicates significant difference between groups ( $p < 0.05$ ). ND indicates sample size was too small to calculate a mean value.

Mark	Size at marine entry (FL, mm)	Marine growth (% d <sup>-1</sup> , mm)	Day of marine entry	Marine migration rate (bl s <sup>-1</sup> )	n	Size at capture (FL, mm)	n
1999							
Y	134.0 (6.3)	0.78 (0.12)	127 (4.6)	0.45 (0.10)	7	158.5 (2.1)	122
N	128.3 (4.3)	0.68 (0.06)	120 (3.0)	0.40 (0.04)	20	160.9 (4.1)	48
2000							
Y	136.4 (5.5)	0.92 (0.12)	112 (3.1)	0.33 (0.05)	7	166.57 (5.1)	28
N	130.2 (6.4)	0.66 (0.21)	119 (4.5)	0.41 (0.02)	3	159.93 (7.7)	14
2002							
Y	144.7 (2.4)	0.51 (0.14)	126 (2.6)	0.24 (0.03)	7	154.25 (5.1)	28
N	159.7 (14.7)	0.40 (0.27)	131 (7.9)	0.47(0.14)	4	156.71 (9.0)	7
2003							
Y	136.7 (5.6)	0.61 (0.06)	131 (4.0)	0.49 (0.07)	14	152.00 (3.8)	40
N	115.4 (8.4)	0.77 (0.09)	142 (5.7)	0.84 (0.10)	4	131.00 (4.5)	15
2004							
Y	138.8 (8.8)	0.58 (0.12)	131 (7.0)	0.54 (0.14)	8	145.71 (7.5)	24
N	ND	ND	ND	ND	1	130.00 (2.0)	3
2006							
Y	126.9 (5.4)	0.61 (0.10)	112 (3.1)	0.56 (0.13)	10	147.82 (2.0)	90
N	125.9 (9.1)	0.41 (0.17)	119 (4.5)	1.20 (0.10)	2	136.36 (11.1)	11
2007							
Y	143.8 (2.9)	0.54 (0.04)	127 (3.4)	0.51 (0.06)	17	149.41 (1.9)	88
N	127.8 (5.8)	0.68 (0.14)	128 (4.6)	0.54 (0.09)	6	139.57 (5.2)	14
2008							
Y	140.2 (2.8)	0.69 (0.06)	133 (3.2)	<b>*0.51 (0.05)</b>	22	<b>*165.9 (1.6)</b>	175
N	111.6 (2.2)	0.99 (0.07)	140 (4.0)	<b>0.85 (0.09)</b>	14	<b>141.9 (3.8)</b>	24

**Table S3. Annual values for model parameters.** Smolt-to-adult return ratios (SAR) for Snake River spring/summer Chinook salmon;  $NPGO_{4_6}$  = mean value from April to June;  $PDO_{7_9}$  = mean value from July to September;  $CPUE_6$  = catch of yearling Chinook (fish  $km^{-1}$ ) in June; and  $CCI_6$  = Copepod Community Index in June are included.

<b>Emigration year</b>	<b>SAR</b>	<b><math>NPGO_{4_6}</math></b>	<b><math>PDO_{7_9}</math></b>	<b><math>CPUE_6</math></b>	<b><math>CCI_6</math></b>
1998	0.012	0.306	-0.490	0.264	1.092
1999	0.024	1.719	-1.050	1.271	-1.061
2000	0.017	2.229	-1.030	1.040	-1.156
2001	0.013	2.169	-1.150	0.435	-0.811
2002	0.009	1.202	0.240	0.845	-1.075
2003	0.003	0.933	0.617	0.630	-0.257
2004	0.005	0.370	0.680	0.424	-0.231
2005	0.002	-1.149	0.150	0.128	1.142
2006	0.007	-0.056	-0.413	0.690	-0.051
2007	0.010	0.910	0.307	0.864	-0.855
2008	0.027	1.546	-1.640	2.559	-1.146
2009	0.015	0.791	0.027	0.970	-0.838
2010	0.005	1.689	-1.310	0.890	-0.240
2011	<sup>1</sup> 0.006	1.438	-1.797	0.460	-0.676

<sup>1</sup>The 2011 SARs was estimated based on the relationship between SARs and adult returns of sp/su Chinook salmon to Lower Granite Dam (LGD) at a -2-yr lag ( $r = 0.816$ , 1998-2010) and the 2013 sp/su adult return to LGD (43,454 adults).