

Table 1. Historical summer commercial red king crab fishery economic performance, Norton Sound Section, eastern Bering Sea, 1977-2017. Bold type shows data that are used for the assessment model.

Year	Guideline Harvest	Commercial Harvest (lb) ^{a, b}		Number Harvest	Total Number (Open Access)			Total Pots		ST CPUE		Season Length		Mid-day from July
	Level (lb) ^b	Open Access	CDQ		Vessels	Permits	Landings	Registered	Pulls	CPUE	SD	Days	Dates	
1977	^c	517.787		195,877	7	7	13		5,457	3.32	0.67	60	^c	0.049
1978	3,000.000	2,091.961		660,829	8	8	54		10,817	4.72	0.64	60	6/07-8/15	0.142
1979	3,000.000	2,931.672		970,962	34	34	76		34,773	2.89	0.63	16	7/15-7/31	0.088
1980	1,000.000	1,186.596		329,778	9	9	50		11,199	3.11	0.64	16	7/15-7/31	0.066
1981	2,500.000	1,379.014		376,313	36	36	108		33,745	0.87	0.62	38	7/15-8/22	0.096
1982	500.000	228.921		63,949	11	11	33		11,230	0.20	0.61	23	8/09-9/01	0.151
1983	300.000	368.032		132,205	23	23	26	3,583	11,195	0.90	0.64	3.8	8/01-8/05	0.096
1984	400.000	387.427		139,759	8	8	21	1,245	9,706	1.61	0.64	13.6	8/01-8/15	0.110
1985	450.000	427.011		146,669	6	6	72	1,116	13,209	0.50	0.65	21.7	8/01-8/23	0.118
1986	420.000	479.463		162,438	3	3		578	4,284	1.79	0.69	13	8/01-8/25	0.153
1987	400.000	327.121		103,338	9	9		1,430	10,258	0.62	0.63	11	8/01-8/12	0.107
1988	200.000	236.688		76,148	2	2		360	2,350	2.39	0.84	9.9	8/01-8/11	0.110
1989	200.000	246.487		79,116	10	10		2,555	5,149	1.21	0.60	3	8/01-8/04	0.096
1990	200.000	192.831		59,132	4	4		1,388	3,172	1.09	0.67	4	8/01-8/05	0.099
1991	340.000			0	No Summer Fishery									
1992	340.000	74.029		24,902	27	27		2,635	5,746	0.17	0.59	2	8/01-8/03	0.093
1993	340.000	335.790		115,913	14	20	208	560	7,063	0.85	0.35	52	7/01-8/28	0.093
1994	340.000	327.858		108,824	34	52	407	1,360	11,729	0.75	0.34	31	7/01-7/31	0.044
1995	340.000	322.676		105,967	48	81	665	1,900	18,782	0.39	0.34	67	7/01-9/05	0.093
1996	340.000	224.231		74,752	41	50	264	1,640	10,453	0.48	0.35	57	7/01-9/03	0.101
1997	80.000	92.988		32,606	13	15	100	520	2,982	0.79	0.36	44	7/01-8/13	0.074
1998	80.000	29.684	0.00	10,661	8	11	50	360	1,639	0.74	0.37	65	7/01-9/03	0.110
1999	80.000	23.553	0.00	8,734	10	9	53	360	1,630	0.86	0.37	66	7/01-9/04	0.104
2000	336.000	297.654	14.87	111,728	15	22	201	560	6,345	1.17	0.34	91	7/01-9/29	0.126
2001	303.000	288.199	0	98,321	30	37	319	1,200	11,918	0.60	0.34	97	7/01-9/09	0.104
2002	248.000	244.376	15.226	86,666	32	49	201	1,120	6,491	1.16	0.34	77	6/15-9/03	0.060
2003	253.000	253.284	13.923	93,638	25	43	236	960	8,494	0.80	0.34	68	6/15-8/24	0.058
2004	326.500	314.472	26.274	120,289	26	39	227	1,120	8,066	1.20	0.34	51	6/15-8/08	0.033
2005	370.000	370.744	30.06	138,926	31	42	255	1,320	8,867	1.13	0.34	73	6/15-8/27	0.058
2006	454.000	419.191	32.557	150,358	28	40	249	1,120	8,867	1.23	0.34	68	6/15-8/22	0.052
2007	315.000	289.264	23.611	110,344	38	30	251	1,200	9,118	0.97	0.34	52	6/15-8/17	0.036
2008	412.000	364.235	30.9	143,337	23	30	248	920	8,721	1.25	0.34	73	6/23-9/03	0.079
2009	375.000	369.462	28.125	143,485	22	27	359	920	11,934	0.79	0.34	98	6/15-9/20	0.090
2010	400.000	387.304	30	149,822	23	32	286	1,040	9,698	1.14	0.34	58	6/28-8/24	0.074
2011	358.000	373.990	26.851	141,626	24	25	173	1,040	6,808	1.48	0.34	33	6/28-7/30	0.038
2012	465.450	441.080	34.91	161,113	40	29	312	1,200	10,041	1.22	0.34	72	6/29-9/08	0.093
2013	495.600	373.278	18.585	130,603	37	33	460	1,420	15,058	0.63	0.34	74	7/3-9/14	0.110
2014	382.800	360.860	28.148	129,657	52	33	309	1,560	10,127	1.06	0.34	52	6/25-8/15	0.052
2015	394.600	371.520	29.595	144,255	42	36	251	1,480	8,356	1.37	0.34	26	6/29-7/24	0.033
2016	517.200	416.576	3,583	138,997	36	37	220	1,520	8,009	1.20	0.34	25	6/27-7/21	0.025
2017	496,800	411,736	0	135,322	36	36	270	1,640	9,401	1.06	0.34	30	6/26-7/25	0.027
2018	290,282	298,396	0	89,613	34	34	256	1,400	8,797	0.62	0.34	35	6/24-7/29	0.038

^a Deadloss included in total. ^b Millions of pounds. ^c Information not available.

Table 2. Historical winter commercial and subsistence red king crab fisheries, Norton Sound Section, eastern Bering Sea, 1977-2016. Bold typed data are used for the assessment model.

Model Year	Year ^a	Commercial		Winter ^b	Subsistence			Total Crab	
		# of Fishers	# of Crab Harvested		Issued	Permits Returned	Fished	Caught ^c	Retained ^d
1978	1978	37	9,625	1977/78	290	206	149	NA	12,506
1979	1979	1 ^f	221^f	1978/79	48	43	38	NA	224
1980	1980	1 ^f	22^f	1979/80	22	14	9	NA	213
1981	1981	0	0	1980/81	51	39	23	NA	360
1982	1982	1 ^f	17^f	1981/82	101	76	54	NA	1,288
1983	1983	5	549	1982/83	172	106	85	NA	10,432
1984	1984	8	856	1983/84	222	183	143	15,923	11,220
1985	1985	9	1,168	1984/85	203	166	132	10,757	8,377
1986	1985/86	5	2,168	1985/86	136	133	107	10,751	7,052
1987	1986/87	7	1,040	1986/87	138	134	98	7,406	5,772
1988	1987/88	10	425	1987/88	71	58	40	3,573	2,724
1989	1988/89	5	403	1988/89	139	115	94	7,945	6,126
1990	1989/90	13	3,626	1989/90	136	118	107	16,635	12,152
1991	1990/91	11	3,800	1990/91	119	104	79	9,295	7,366
1992	1991/92	13	7,478	1991/92	158	105	105	15,051	11,736
1993	1992/93	8	1,788	1992/93	88	79	37	1,193	1,097
1994	1993/94	25	5,753	1993/94	118	95	71	4,894	4,113
1995	1994/95	42	7,538	1994/95	166	131	97	7,777	5,426
1996	1995/96	9	1,778	1995/96	84	44	35	2,936	1,679
1997	1996/97	2 ^f	83^f	1996/97	38	22	13	1,617	745
1998	1997/98	5	984	1997/98	94	73	64	20,327	8,622
1999	1998/99	5	2,714	1998/99	95	80	71	10,651	7,533
2000	1999/00	10	3,045	1999/00	98	64	52	9,816	5,723
2001	2000/01	3	1,098	2000/01	50	27	12	366	256
2002	2001/02	11	2,591	2001/02	114	61	45	5,119	2,177
2003	2002/03	13	6,853	2002/03	107	70	61	9,052	4,140
2004	2003/04	2 ^f	522^f	2003/04 ^h	96	77	41	1,775	1,181
2005	2004/05	4	2,091	2004/05	170	98	58	6,484	3,973
2006	2005/06	1 ^f	75^f	2005/06	98	97	67	2,083	1,239
2007	2006/07	8	3,313	2006/07	129	127	116	21,444	10,690
2008	2007/08	9	5,796	2007/08	139	137	108	18,621	9,485
2009	2008/09	7	4,951	2008/09	105	105	70	6,971	4,752
2010	2009/10	10	4,834	2009/10	125	123	85	9,004	7,044
2011	2010/11	5	3,365	2010/11	148	148	95	9,183	6,640
2012	2011/12	35	9,157	2011/12	204	204	138	11,341	7,311
2013	2012/13	26	22,639	2012/13	149	148	104	21,524	7,622
2014	2013/14	21	14,986	2013/14	103	103	75	5,421	3,252
2015	2014/15	44	41,062	2014/15	155	153	107	9,840	7,651
2016	2015/16	25	29,792	2015/16	139	97	64	6,468	5,340
2017	2017	43	26,008	2017	163	163	109	7,185	6,039
2018	2018	28	9,180	2018	123	120	82	5,767	4,424

a Prior to 1985 the winter commercial fishery occurred from January 1 - April 30. As of March 1985, fishing may occur from November 15 - May 15.

b The winter subsistence fishery occurs during months of two calendar years (as early as December, through May).

c The number of crab actually caught; some may have been returned.

d The number of crab retained is the number of crab caught and kept.

f Confidentiality was waived by the fishers.

h Prior to 2005, permits were only given out of the Nome ADF&G office. Starting with the 2004-5 season, permits were given out in Elim, Golovin, Shaktoolik, and White Mountain.

Table 3. Summary of triennial trawl survey Norton Sound male red king crab abundance estimates (CL $\geq$ 64mm) . Trawl survey abundance estimate is based on 10 $\times$ 10 nm² grid, except for 2010 and 2017 (20 $\times$ 20 nm²). Bold typed data are used for the assessment model.

Year	Dates	Survey Agency	Survey method	Total surveyed stations	Survey coverage		Abundance	
					Stations w/ NSRKC	n mile ² covered	$\geq$ 74 mm (1982-1991)	$\geq$ 64 mm (1996- 2007)
								CV
1976	9/02 – 9/25	NMFS	Trawl	103	62	10260	4247.5	0.31
1979	7/26 - 8/05	NMFS	Trawl	85	22	8421	1417.2	0.20
1980	7/04 - 7/14	ADFG	Pots				2092.3	N/A
1981	6/28 - 7/14	ADFG	Pots				2153.4	N/A
1982	7/06 - 7/20	ADFG	Pots				1140.5	N/A
1982	9/05 - 9/11	NMFS	Trawl	58	37	5721	2791.7	0.29
1985	7/01 - 7/14	ADFG	Pots				2320.4	0.083
1985	9/16 -10/01	NMFS	Trawl	78	49	7688	2306.3	0.25
1988	8/16 - 8/30	NMFS	Trawl	78	41	7721	2263.4	0.29
1991	8/22 - 8/30	NMFS	Trawl	52	38	5183	3132.5	0.43
1996	8/07 - 8/18	ADFG	Trawl	50	30	4938	1283.0	0.25
1999	7/28 - 8/07	ADFG	Trawl	52	31	5221	2608.0	0.24
2002	7/27 - 8/06	ADFG	Trawl	57	37	5621	2056.0	0.36
2006	7/25 - 8/08	ADFG	Trawl	114	45	10008	3336.0	0.39
2008	7/24 - 8/11	ADFG	Trawl	86	44	7330	2894.2	0.31
2010 ^a	7/27 - 8/09	NMFS	Trawl	35	15	5841	1980.1	0.44
2011	7/18 - 8/15	ADFG	Trawl	65	34	6447	3209.3	0.29
2014	7/18 - 7/30	ADFG	Trawl	47	34	4700	5934.6	0.47
2017	7/28 - 8/08	ADFG	Trawl	60	41	6000	1762.1	0.22
2017	8/18 - 8/29	NMFS	Trawl	35	18	5841	1035.8	0.40
2018	7/22 - 7/29	ADFG	Trawl	60	34	6000	1108.9	0.25

Table 4. Summer commercial retained catch length-shell compositions.

Year	Sample	New Shell								Old Shell							
		64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+	64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+
1977	1549	0	0	0	0.00	0.42	0.34	0.08	0.05	0	0	0	0.00	0.06	0.04	0.01	0.00
1978	389	0	0	0	0.01	0.19	0.47	0.26	0.04	0	0	0	0.00	0.01	0.01	0.01	0.00
1979	1660	0	0	0	0.03	0.23	0.38	0.26	0.07	0	0	0	0.00	0.03	0.00	0.00	0.01
1980	1068	0	0	0	0.00	0.10	0.31	0.37	0.18	0	0	0	0.00	0.00	0.01	0.02	0.01
1981	1784	0	0	0	0.00	0.07	0.15	0.28	0.23	0	0	0	0.00	0.00	0.05	0.12	0.09
1982	1093	0	0	0	0.04	0.19	0.16	0.22	0.29	0	0	0	0.00	0.01	0.02	0.03	0.03
1983	802	0	0	0	0.04	0.41	0.36	0.06	0.03	0	0	0	0.00	0.04	0.01	0.02	0.02
1984	963	0	0	0	0.10	0.42	0.28	0.06	0.01	0	0	0	0.01	0.07	0.05	0.01	0.00
1985	2691	0	0	0.00	0.06	0.31	0.37	0.15	0.02	0	0	0	0.00	0.03	0.03	0.01	0.00
1986	1138	0	0	0	0.03	0.36	0.39	0.12	0.02	0	0	0	0.00	0.02	0.04	0.02	0.00
1987	1985	0	0	0	0.02	0.18	0.29	0.27	0.11	0	0	0	0.00	0.03	0.06	0.03	0.01
1988	1522	0	0.00	0	0.02	0.20	0.30	0.18	0.04	0	0	0	0.01	0.06	0.10	0.07	0.02
1989	2595	0	0	0	0.01	0.16	0.32	0.17	0.05	0	0	0	0.00	0.06	0.12	0.09	0.02
1990	1289	0	0	0	0.01	0.14	0.35	0.26	0.07	0	0	0	0.00	0.04	0.07	0.05	0.01
1991																	
1992	2566	0	0	0	0.02	0.20	0.27	0.14	0.09	0	0	0	0.00	0.08	0.13	0.06	0.02
1993	17804	0	0	0	0.01	0.23	0.39	0.23	0.03	0	0	0	0.00	0.02	0.04	0.03	0.01
1994	404	0	0	0	0.02	0.09	0.08	0.07	0.02	0	0	0	0.02	0.19	0.25	0.20	0.05
1995	1167	0	0	0	0.04	0.26	0.29	0.15	0.05	0	0	0	0.01	0.05	0.07	0.06	0.01
1996	787	0	0	0	0.03	0.22	0.24	0.09	0.05	0	0	0	0.01	0.12	0.14	0.08	0.02
1997	1198	0	0	0	0.03	0.37	0.34	0.10	0.03	0	0	0	0.00	0.06	0.04	0.03	0.01
1998	1055	0	0	0	0.03	0.23	0.24	0.08	0.03	0	0	0	0.02	0.11	0.14	0.08	0.03
1999	562	0	0	0	0.06	0.29	0.24	0.18	0.09	0	0	0	0.00	0.02	0.05	0.04	0.00
2000	17213	0	0	0	0.02	0.30	0.39	0.11	0.02	0	0	0	0.00	0.05	0.07	0.04	0.01
2001	20030	0	0	0	0.02	0.22	0.37	0.21	0.07	0	0	0	0.00	0.02	0.05	0.02	0.01
2002	5219	0	0	0	0.04	0.23	0.28	0.25	0.07	0	0	0	0.00	0.03	0.04	0.03	0.01
2003	5226	0	0	0	0.02	0.37	0.32	0.12	0.03	0	0	0	0.00	0.02	0.05	0.05	0.01
2004	9606	0	0	0	0.01	0.38	0.39	0.11	0.03	0	0	0	0.00	0.03	0.03	0.01	0.01
2005	5360	0	0	0	0.00	0.25	0.47	0.16	0.02	0	0	0	0.00	0.02	0.05	0.02	0.01
2006	6707	0	0	0	0.00	0.18	0.35	0.17	0.02	0	0	0	0.00	0.05	0.14	0.07	0.01
2007	6125	0	0	0	0.01	0.36	0.34	0.14	0.03	0	0	0	0.00	0.02	0.06	0.03	0.01
2008	5766	0	0	0	0.00	0.35	0.35	0.06	0.01	0	0	0	0.00	0.09	0.09	0.04	0.01
2009	6026	0	0	0	0.01	0.34	0.33	0.11	0.02	0	0	0	0.00	0.08	0.08	0.02	0.01
2010	5902	0	0	0	0.01	0.39	0.36	0.10	0.01	0	0	0	0.00	0.05	0.05	0.02	0.00
2011	2552	0	0	0	0.00	0.32	0.40	0.12	0.02	0	0	0	0.00	0.06	0.06	0.02	0.00
2012	5056	0	0	0	0.00	0.24	0.46	0.18	0.02	0	0	0	0.00	0.03	0.04	0.02	0.00
2013	6072	0	0	0	0.00	0.24	0.37	0.24	0.06	0	0	0	0.00	0.01	0.04	0.02	0.00
2014	4682	0	0	0	0.01	0.28	0.24	0.18	0.07	0	0	0	0.00	0.04	0.09	0.07	0.02
2015	4173	0	0	0	0.01	0.48	0.28	0.10	0.03	0	0	0	0.00	0.02	0.03	0.03	0.01
2016	1543	0	0	0	0.00	0.25	0.47	0.16	0.03	0	0	0	0.00	0.02	0.02	0.03	0.01
2017	3412	0	0	0	0.00	0.18	0.39	0.21	0.03	0	0	0	0.01	0.03	0.12	0.05	0.01
2018	2609	0	0	0	0.00	0.11	0.32	0.32	0.08	0	0	0	0	0.01	0.08	0.08	0.02

Table 5. Winter commercial catch length-shell compositions.

Year	Sample	New Shell								Old Shell							
		64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+	64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+
2016	1016	0	0	0	0.03	0.45	0.31	0.03	0.00	0	0	0	0.01	0.09	0.04	0.02	0.01
2017	540	0	0	0	0.00	0.20	0.30	0.13	0.02	0	0	0	0.00	0.08	0.19	0.06	0.02
2018	401	0	0	0	0.00	0.11	0.25	0.27	0.05	0	0	0	0	0.04	0.16	0.10	0.02

Table 6. Summer Trawl Survey length-shell compositions.

Year	Survey	Sample	New Shell								Old Shell							
			64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+	64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+
1976	NMFS	1326	0.01	0.02	0.10	0.19	0.34	0.18	0.02	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.01	0.01
1979	NMFS	220	0.01	0.01	0.00	0.02	0.05	0.05	0.03	0.01	0.01	0.00	0.01	0.04	0.14	0.40	0.19	0.03
1982	NMFS	327	0.22	0.07	0.16	0.23	0.17	0.03	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.02	0.02	0.03
1985	NMFS	350	0.11	0.11	0.19	0.17	0.16	0.06	0.01	0.00	0.00	0.00	0.00	0.02	0.05	0.08	0.05	0.01
1988	NMFS	366	0.16	0.19	0.12	0.13	0.11	0.06	0.03	0.00	0.00	0.00	0.01	0.01	0.03	0.07	0.05	0.03
1991	NMFS	340	0.18	0.08	0.02	0.03	0.06	0.03	0.01	0.01	0.03	0.06	0.02	0.08	0.16	0.14	0.09	0.02
1996	ADFG	269	0.29	0.21	0.13	0.09	0.05	0.00	0.00	0.01	0.00	0.00	0.03	0.03	0.04	0.04	0.04	0.03
1999	ADFG	283	0.03	0.01	0.10	0.29	0.26	0.13	0.03	0.01	0.00	0.00	0.00	0.03	0.05	0.04	0.02	0.00
2002	ADFG	244	0.09	0.12	0.14	0.11	0.02	0.03	0.02	0.01	0.01	0.03	0.07	0.10	0.09	0.09	0.05	0.02
2006	ADFG	373	0.18	0.26	0.21	0.11	0.06	0.04	0.02	0.00	0.00	0.00	0.00	0.02	0.04	0.04	0.01	0.00
2008	ADFG	275	0.12	0.15	0.21	0.11	0.10	0.03	0.02	0.01	0.00	0.01	0.04	0.06	0.08	0.01	0.04	0.00
2010	NMFS	69	0.01	0.04	0.06	0.17	0.06	0.03	0.00	0.00	0.00	0.03	0.09	0.20	0.19	0.07	0.03	0.01
2011	ADFG	315	0.13	0.11	0.09	0.11	0.18	0.14	0.03	0.01	0.00	0.00	0.01	0.02	0.09	0.04	0.03	0.00
2014	ADFG	387	0.08	0.15	0.24	0.18	0.09	0.02	0.01	0.01	0.00	0.00	0.03	0.10	0.05	0.04	0.01	0.00
2017	ADFG	116	0.14	0.12	0.05	0.09	0.10	0.04	0.00	0.00	0.01	0.02	0.02	0.02	0.07	0.18	0.04	0.00
2017	NMFS	58	0.09	0.10	0.14	0.05	0.05	0.05	0.05	0.03	0.03	0.00	0.03	0.05	0.03	0.19	0.05	0.03
2018	ADFG	73	0.37	0.10	0.11	0.03	0.01	0.03	0.04	0.01	0	0.07	0.01	0.04	0.03	0.03	0.10	0.03

Table 7. Winter pot survey length-shell compositions.

Year	CPUE	Sample	New Shell								Old Shell							
			64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+	64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+
1981/82	NA	719	0.00	0.10	0.23	0.21	0.07	0.02	0.02	0.00	0.00	0.05	0.11	0.11	0.04	0.02	0.02	0.00
1982/83	24.2	2583	0.03	0.08	0.28	0.28	0.21	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.01
1983/84	24.0	1677	0.01	0.16	0.26	0.23	0.15	0.06	0.01	0.00	0.00	0.00	0.00	0.02	0.06	0.03	0.01	0.01
1984/85	24.5	789	0.02	0.09	0.25	0.35	0.16	0.06	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.00
1985/86	19.2	594	0.04	0.12	0.17	0.24	0.19	0.08	0.01	0.00	0.00	0.00	0.00	0.01	0.06	0.04	0.01	0.00
1986/87	5.8	144	0.00	0.06	0.15	0.19	0.07	0.04	0.00	0.00	0.00	0.00	0.01	0.04	0.30	0.11	0.03	0.00
1987/88																		
1988/89	13.0	500	0.02	0.13	0.15	0.13	0.19	0.17	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.08	0.03	0.00
1989/90	21.0	2076	0.00	0.05	0.21	0.26	0.18	0.12	0.06	0.01	0.00	0.00	0.00	0.00	0.03	0.06	0.02	0.00
1990/91	22.9	1283	0.00	0.01	0.09	0.29	0.27	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.07	0.02
1992/93	5.5	181	0.00	0.01	0.03	0.06	0.13	0.12	0.03	0.00	0.00	0.00	0.00	0.02	0.19	0.27	0.10	0.05
1993/94																		
1994/95	6.2	858	0.01	0.06	0.08	0.10	0.26	0.23	0.07	0.01	0.00	0.00	0.00	0.00	0.03	0.07	0.06	0.02
1995/96	9.9	1580	0.06	0.14	0.20	0.19	0.11	0.07	0.03	0.00	0.00	0.00	0.00	0.01	0.06	0.07	0.03	0.01
1996/97	2.9	398	0.07	0.21	0.22	0.11	0.15	0.11	0.05	0.01	0.00	0.00	0.00	0.00	0.02	0.03	0.01	0.01
1997/98	10.9	881	0.00	0.14	0.41	0.27	0.05	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.02	0.02	0.01
1998/99	10.7	1307	0.00	0.02	0.12	0.36	0.36	0.08	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00
1999/00	6.2	575	0.02	0.09	0.10	0.16	0.33	0.18	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.02	0.01	0.00
2000/01	3.1	44																
2001/02	13.0	828	0.05	0.29	0.26	0.17	0.06	0.06	0.04	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00
2002/03	9.6	824	0.02	0.10	0.22	0.28	0.18	0.06	0.02	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.01
2003/04	3.7	296	0.00	0.02	0.16	0.26	0.32	0.14	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.02	0.01
2004/05	4.4	405	0.00	0.07	0.14	0.18	0.22	0.19	0.07	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.01	0.00
2005/06	6.0	512	0.00	0.14	0.23	0.21	0.16	0.05	0.02	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.03	0.01
2006/07	7.3	159	0.07	0.14	0.19	0.35	0.13	0.04	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.00	0.00
2007/08	25.0	3552	0.01	0.14	0.25	0.17	0.14	0.07	0.01	0.00	0.01	0.04	0.07	0.03	0.03	0.01	0.01	0.00
2008/09	21.9	525	0.00	0.07	0.13	0.35	0.20	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.00	0.00
2009/10	25.3	578	0.01	0.05	0.13	0.21	0.24	0.11	0.02	0.00	0.00	0.00	0.01	0.06	0.10	0.05	0.01	0.00
2010/11	22.1	596	0.02	0.08	0.13	0.20	0.17	0.13	0.05	0.00	0.00	0.00	0.01	0.03	0.11	0.05	0.01	0.00
2011/12	29.4	675	0.03	0.11	0.23	0.19	0.12	0.13	0.04	0.00	0.00	0.00	0.00	0.01	0.05	0.05	0.03	0.00

Table 8. Summer commercial 1987-1994, 2012-2017 observer discards length-shell compositions.

Year	Sample	New Shell								Old Shell							
		64- 73	74- 83	84- 93	94- 103	104- 113	114- 123	124- 133	134+	64- 73	74- 83	84- 93	94- 103	104- 113	114- 123	124- 133	134+
1987	1146	0.06	0.19	0.32	0.33	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00
1988	722	0.01	0.04	0.15	0.48	0.14	0.00	0.00	0.00	0.00	0.01	0.03	0.10	0.04	0.00	0.00	0.00
1989	1000	0.07	0.19	0.24	0.22	0.03	0.00	0.00	0.00	0.02	0.03	0.07	0.11	0.03	0.00	0.00	0.00
1990	507	0.08	0.23	0.27	0.27	0.04	0.00	0.00	0.00	0.02	0.02	0.02	0.05	0.01	0.00	0.00	0.00
1992	580	0.11	0.17	0.30	0.29	0.03	0.00	0.00	0.00	0.01	0.02	0.02	0.04	0.01	0.00	0.00	0.00
1994	850	0.07	0.06	0.11	0.15	0.02	0.00	0.00	0.00	0.07	0.07	0.15	0.24	0.05	0.00	0.00	0.00
2012	939	0.21	0.11	0.19	0.32	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00
2013	2617	0.34	0.29	0.16	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	1755	0.05	0.10	0.26	0.41	0.12	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.00	0.00	0.00
2015	824	0.01	0.08	0.18	0.44	0.23	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00
2016	426	0.04	0.05	0.17	0.50	0.17	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00
2017	544	0.10	0.16	0.13	0.31	0.26	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
2018	532	0.10	0.17	0.36	0.30	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00

Table 9. Summer commercial 2012-2018 observer total catch length-shell compositions.

Year	Sample	New Shell								Old Shell							
		64- 73	74- 83	84- 93	94- 103	104- 113	114- 123	124- 133	134+	64- 73	74- 83	84- 93	94- 103	104- 113	114- 123	124- 133	134+
2012	3055	0.10	0.05	0.08	0.15	0.15	0.17	0.06	0.01	0.00	0.00	0.00	0.03	0.08	0.09	0.03	0.00
2013	4762	0.19	0.16	0.09	0.10	0.16	0.16	0.09	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00
2014	3506	0.02	0.05	0.13	0.22	0.22	0.12	0.08	0.03	0.00	0.00	0.00	0.02	0.03	0.03	0.02	0.01
2015	1671	0.01	0.04	0.09	0.23	0.37	0.14	0.05	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.00
2016	2114	0.01	0.01	0.03	0.12	0.29	0.36	0.08	0.02	0.00	0.00	0.00	0.01	0.03	0.03	0.02	0.00
2017	2748	0.02	0.03	0.03	0.06	0.19	0.33	0.18	0.02	0.00	0.00	0.00	0.00	0.02	0.07	0.03	0.01
2018	1628	0.03	0.06	0.12	0.11	0.09	0.17	0.18	0.04	0.00	0.00	0.01	0.01	0.15	0.07	0.08	0.02

Table 10. The number of tagged data released and recovered after 1 year (Y1) – 3 year (Y3) during 1980-1992 and 1993-2017 periods.

Release Length Class	Recap Length Class	1980-1992			1993-2017		
		Y1	Y2	Y3	Y1	Y2	Y3
64 – 73	64 – 73						
64 – 73	74 - 83	1					
64 – 73	84 - 93	1	1		3		
64 – 73	94 - 103		1			5	
64 – 73	104 – 113		1			3	6
64 – 73	114 – 123						7
64 – 73	124 – 133						
64 – 73	134+						
74 - 83	74 - 83						
74 - 83	84 - 93	3			18		
74 - 83	94 - 103	7			15	11	
74 - 83	104 – 113		13		4	79	14
74 - 83	114 – 123		1	2		4	22
74 - 83	124 – 133						2
74 - 83	134+						
84 - 93	84 - 93						
84 - 93	94 - 103	15	1		34	4	1
84 - 93	104 – 113	19	5	1	72	21	11
84 - 93	114 – 123		5	2	7	53	5
84 - 93	124 – 133				1	2	2
84 - 93	134+						
94 - 103	94 - 103	4	1		6	1	
94 - 103	104 – 113	53	5	1	143	20	
94 - 103	114 – 123	31	5	7	77	8	9
94 - 103	124 – 133	2	2	2		11	6
94 - 103	134+				1		
104 – 113	104 – 113	18			57	2	
104 – 113	114 – 123	38	15	3	105	27	3
104 – 113	124 – 133	7	8	4	15	3	8
104 – 113	134+						1
114 – 123	114 – 123	17	2		71	5	
114 – 123	124 – 133	27	10	2	71	31	8
114 – 123	134+	5	1		19	4	3
124 – 133	124 – 133	15			41	6	
124 – 133	134+	10	4	2	15	8	6
134+	134+	15	6	1	11		

Table 11. Summary of initial input parameter values and bounds for a length-based population model of Norton Sound red king crab. Parameters with “log_” indicate log scaled parameters.

Parameter	Parameter description	Equation Number in Appendix A	Lower	Upper
log_q _{1,2}	Commercial fishery catchability (1977-92, 1993-2017)	(22)	-20.5	20
log_N ₇₆	Initial abundance	(1)	2.0	15.0
R ₀	Mean Recruit	(13)	2.0	12.0
log_σ _R ²	Recruit standard deviation	(13)	-40.0	40.0
a ₁₋₇	Intimal length proportion	(2)	0	10.0
r ₁	Proportion of length class 1 for recruit	(14)	0	10.0
log_α	Inverse logistic molting parameter	(15)	-5.0	-1.0
log_β	Inverse logistic molting parameter	(15)	1.0	5.5
log_φ _{st1}	Logistic trawl selectivity parameter	(16)	-5.0	1.0
log_φ _{w1}	Inverse logistic winter pot selectivity parameter	(18)	-5.0	1.0
log_φ _{w2}	Inverse logistic winter pot selectivity parameter	(18)	0.0	6.0
Sw _{1,2}	Winter pot selectivity of length class 1,2	(18)	0.1	1.0
log_φ ₁	Logistic commercial catch selectivity parameter	(17)	-5.0	1.0
log_φ ₂	Logistic commercial catch selectivity parameter	(17)	0.0	6.0
w ² _t	Additional variance for standard CPUE	(31)	0.0	6.0
ms	Natural mortality multipliers		0.5	5.0
q	Survey q for NMFS trawl 1976-91	(31)	0.1	1.0
σ	Growth transition sigma	(19)	0.0	30.0
β ₁	Growth transition mean	(19)	0.0	20.0
β ₂	Growth transition increment	(19)	0.0	20.0

Table 12. Summary of parameter estimates and standard deviations of Norton Sound red king crab.
(Base Model 0)

name	Estimate	std.dev
log_q ₁	-6.965	0.168
log_q ₂	-6.816	0.109
log_N ₇₆	9.029	0.130
R ₀	6.440	0.081
log_R ₇₆	0.013	0.416
log_R ₇₇	-0.541	0.370
log_R ₇₈	-0.725	0.353
log_R ₇₉	0.373	0.315
log_R ₈₀	0.500	0.283
log_R ₈₁	0.404	0.263
log_R ₈₂	0.372	0.314
log_R ₈₃	0.540	0.275
log_R ₈₄	0.147	0.291
log_R ₈₅	0.447	0.276
log_R ₈₆	0.061	0.286
log_R ₈₇	0.021	0.246
log_R ₈₈	0.025	0.258
log_R ₈₉	-0.329	0.280
log_R ₉₀	-0.276	0.253
log_R ₉₁	-0.526	0.285
log_R ₉₂	-0.673	0.302
log_R ₉₃	-0.577	0.289
log_R ₉₄	-0.292	0.257
log_R ₉₅	-0.063	0.225
log_R ₉₆	0.576	0.217
log_R ₉₇	-0.016	0.293
log_R ₉₈	-0.624	0.320
log_R ₉₉	-0.008	0.310
log_R ₀₀	0.311	0.263
log_R ₀₁	0.390	0.241
log_R ₀₂	-0.005	0.314
log_R ₀₃	-0.280	0.330
log_R ₀₄	0.300	0.241
log_R ₀₅	0.425	0.222
log_R ₀₆	0.477	0.243

name	Estimate	std.dev
log_R ₀₇	0.540	0.231
log_R ₀₈	0.134	0.287
log_R ₀₉	-0.367	0.294
log_R ₁₀	-0.002	0.253
log_R ₁₁	0.282	0.274
log_R ₁₂	0.890	0.185
log_R ₁₃	-0.196	0.284
log_R ₁₄	-0.568	0.294
log_R ₁₅	-0.751	0.269
log_R ₁₆	-0.389	0.226
log_R ₁₇	-0.018	0.275
a ₁	1.543	4.575
a ₂	2.316	4.264
a ₃	3.826	4.069
a ₄	4.106	4.055
a ₅	4.325	4.046
a ₆	3.550	4.075
a ₇	2.117	4.335
r ₁	10.000	0.845
r ₂	9.680	0.863
log_a	-2.645	0.087
log_b	4.824	0.014553
log_φ _{st1}	3.145	5183.900
log_φ _{wa}	-2.115	0.317
log_φ _{wb}	4.798	0.028
Sw ₁	0.073	0.035
Sw ₂	0.500	353.550
log_φ _l	3.795	6501.300
w ² _t	0.052	0.016
q	0.766	0.131
σ	3.876	0.216
β ₁	12.301	0.705
β ₂	7.700	0.175
ms78	3.189	0.272

Table 13. Estimated selectivity, mortality, molting probabilities, and proportions of legal crab by length class (mm CL) for Norton Sound male red king crab (Model 0).

Model 0

Length Class	Legal Proportion	Summer Com Retention (Model 1)	Winter Com Retention (Model 2)	Mean weight (lb)	Natural mortality (M)	Selectivity			
						Trawl	Winter Pot	Summer Fishery	Molting Probability
64 - 73	0.00	0.00	0.00	0.44	0.18	1.00	0.07	0.15	0.98
74 - 83	0.00	0.00	0.00	0.87	0.18	1.00	0.50	0.38	0.96
84 - 93	0.00	0.00	0.00	1.31	0.18	1.00	0.98	0.68	0.93
94 - 103	0.14	0.08	0.03	1.80	0.18	1.00	0.94	0.88	0.86
104 - 113	0.88	0.86	0.73	2.37	0.18	1.00	0.82	0.96	0.76
114 - 123	1.00	1.00	1.00	3.04	0.18	1.00	0.58	0.99	0.60
124 - 133	1.00	1.00	1.00	3.80	0.57	1.00	0.30	1.00	0.43
134+	1.00	1.00	1.00	4.60	0.57	1.00	0.11	1.00	0.27

Model 1

Length Class	Natural mortality (M)	Selectivity			
		Trawl	Winter Pot	Summer Fishery	Molting Probability
64 - 73	0.18	1.00	0.07	0.06	0.98
74 - 83	0.18	1.00	0.50	0.21	0.97
84 - 93	0.18	1.00	0.98	0.51	0.93
94 - 103	0.18	1.00	0.94	0.80	0.87
104 - 113	0.18	1.00	0.83	0.94	0.76
114 - 123	0.18	1.00	0.60	0.98	0.61
124 - 133	0.58	1.00	0.30	1.00	0.43
134+	0.58	1.00	0.11	1.00	0.27

Table 14. Estimated molting probability incorporated transition matrix.

Model 0								
Pre-molt Length Class	Post-molt Length Class							
	64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+
64 - 73	0.02	0.10	0.79	0.10	0.00	0.00	0.00	0.00
74 - 83		0.04	0.23	0.70	0.03	0.00	0.00	0.00
84 - 93			0.08	0.42	0.50	0.01	0.00	0.00
94 - 103				0.15	0.58	0.27	0.00	0.00
104 - 113					0.29	0.60	0.11	0.00
114 - 123						0.50	0.47	0.03
124 - 133							0.73	0.27
134+								1.00

Model 1								
Pre-molt Length Class	Post-molt Length Class							
	64-73	74-83	84-93	94-103	104-113	114-123	124-133	134+
64 - 73	0.02	0.10	0.78	0.09	0.00	0.00	0.00	0.00
74 - 83		0.04	0.26	0.68	0.03	0.00	0.00	0.00
84 - 93			0.07	0.44	0.48	0.00	0.00	0.00
94 - 103				0.15	0.58	0.26	0.00	0.00
104 - 113					0.29	0.60	0.11	0.00
114 - 123						0.51	0.47	0.03
124 - 133							0.73	0.27
134+								1.00

Table 15. Annual abundance estimates (million crab) and mature male biomass (Feb 01) (MMB, million lb) for Norton Sound red king crab estimated by a length-based analysis from 1976 to 2018.

Year	Abundance			Legal (≥ 104 mm)				MMB	
	Recruits	Total (≥ 64 mm)	Mature (≥ 94 mm)	Abundance	S.D	Biomass	S.D	Biomass	S.D.
1976									
1977									
1978									
1979									
1980									
1981									
1982									
1983									
1984									
1985									
1986									
1987									
1988									
1989									
1990									
1991									
1992									
1993									
1994									
1995									
1996									
1997									
1998									
1999									
2000									
2001									
2002									
2003									
2004									
2005									
2006									
2007									
2008									
2009									
2010									
2011									
2012									
2013									
2014									
2015									
2016									
2017									
2018									

Table 16. Summary of catch and estimated discards (million lb) for Norton Sound red king crab. Assumed average crab weight is 2.0 lb for winter subsistence catch and 1.0 lb for Winter subsistence discards. Summer and winter commercial discards were estimated from the model.

Year	Summer Com	Winter Com	Winter Sub	Modeled Discards Summer	Discards Winter Sub	Modeled Discards Winter com	Total	Catch/ MMB
1977	0.52	0.000	0.000		0.000			
1978	2.09	0.024	0.025		0.008			
1979	2.93	0.001	0.000		0.000			
1980	1.19	0.000	0.000		0.000			
1981	1.38	0.000	0.001		0.000			
1982	0.23	0.000	0.003		0.001			
1983	0.37	0.001	0.021		0.006			
1984	0.39	0.002	0.022		0.005			
1985	0.43	0.003	0.017		0.002			
1986	0.48	0.005	0.014		0.004			
1987	0.33	0.003	0.012		0.002			
1988	0.24	0.001	0.005		0.001			
1989	0.25	0.000	0.012		0.002			
1990	0.19	0.010	0.024		0.004			
1991	0	0.010	0.015		0.002			
1992	0.07	0.021	0.023		0.003			
1993	0.33	0.005	0.002		0.000			
1994	0.32	0.017	0.008		0.001			
1995	0.32	0.022	0.011		0.002			
1996	0.22	0.005	0.003		0.001			
1997	0.09	0.000	0.001		0.001			
1998	0.03	0.002	0.017		0.012			
1999	0.02	0.007	0.015		0.003			
2000	0.3	0.008	0.011		0.004			
2001	0.28	0.003	0.001		0.000			
2002	0.25	0.007	0.004		0.003			
2003	0.26	0.017	0.008		0.005			
2004	0.34	0.001	0.002		0.001			
2005	0.4	0.006	0.008		0.003			
2006	0.45	0.000	0.002		0.001			
2007	0.31	0.008	0.021		0.011			
2008	0.39	0.015	0.019		0.009			
2009	0.4	0.012	0.010		0.002			
2010	0.42	0.012	0.014		0.002			
2011	0.4	0.009	0.013		0.003			
2012	0.47	0.025	0.015		0.004			
2013	0.35	0.061	0.015		0.014			
2014	0.39	0.035	0.007		0.002			
2015	0.40	0.099	0.019		0.005			
2016	0.42	0.080	0.011		0.001			
2017	0.41	0.078	0.012		0.001			
2018	0.30	0.029	0.008		0.002			