Table 1. Historical summer commercial red king crab fishery economic performance, Norton Sound Section, eastern Bering Sea, 1977-2013. Bold type shows data used for assessment model.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Guideline | Commercial | |  |  |  |  |  |  |  |  |  |  |  |  | **Mid-day from July 1** |
|  | Harvest | Harvest (lb) a, b | |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Level | Open |  |  | Total Number (Open Access)  CDQ) | | |  | Total Pots | | **ST CPUE** | | Season Length | | |
| **Year** | (lbs) b | Access | CDQ | **Harvest (lb)** | Vessels | Permits | Landings |  | Registered | Pulls | **CPUE** | **SD** | Days | Dates | |
| **1977** | c | 0.52 |  | **195,877** | 7 | 7 | 13 |  |  | 5,457 | **NA** | **NA** | 60 | c | | **0.03** |
| **1978** | 3.00 | 2.09 |  | **660,829** | 8 | 8 | 54 |  |  | 10,817 | **1.55** | **0.36** | 60 | 6/07-8/15 | | **0.03** |
| **1979** | 3.00 | 2.93 |  | **970,962** | 34 | 34 | 76 |  |  | 34,773 | **3.01** | **0.23** | 16 | 7/15-7/31 | | **0.063** |
| **1980** | 1.00 | 1.19 |  | **329,778** | 9 | 9 | 50 |  |  | 11,199 | **1.60** | **0.22** | 16 | 7/15-7/31 | | **0.063** |
| **1981** | 2.50 | 1.38 |  | **376,313** | 36 | 36 | 108 |  |  | 33,745 | **1.97** | **0.27** | 38 | 7/15-8/22 | | **0.093** |
| **1982** | 0.50 | 0.23 |  | **63,949** | 11 | 11 | 33 |  |  | 11,230 | **0.66** | **0.19** | 23 | 8/09-9/01 | | **0.14** |
| **1983** | 0.30 | 0.37 |  | **132,205** | 23 | 23 | 26 |  | 3,583 | 11,195 | **0.12** | **0.26** | 3.8 | 8/01-8/05 | | **0.093** |
| **1984** | 0.40 | 0.39 |  | **139,759** | 8 | 8 | 21 |  | 1,245 | 9,706 | **1.10** | **0.23** | 13.6 | 8/01-8/15 | | **0.107** |
| **1985** | 0.45 | 0.43 |  | **146,669** | 6 | 6 | 72 |  | 1,116 | 13,209 | **1.17** | **0.24** | 21.7 | 8/01-8/23 | | **0.132** |
| **1986** | 0.42 | 0.48 |  | **162,438** | 3 | 3 |  |  | 578 | 4,284 | **0.42** | **0.22** | 13 | 8/01-8/25 | | **0.153** |
| **1987** | 0.40 | 0.33 |  | **103,338** | 9 | 9 |  |  | 1,430 | 10,258 | **1.28** | **0.44** | 11 | 8/01-8/12 | | **0.118** |
| **1988** | 0.20 | 0.24 |  | **76,148** | 2 | 2 |  |  | 360 | 2,350 | **0.74** | **0.33** | 9.9 | 8/01-8/11 | | **0.115** |
| **1989** | 0.20 | 0.25 |  | **79,116** | 10 | 10 |  |  | 2,555 | 5,149 | **1.76** | **0.72** | 3 | 8/01-8/04 | | **0.096** |
| **1990** | 0.20 | 0.19 |  | **59,132** | 4 | 4 |  |  | 1,388 | 3,172 | **2.02** | **0.34** | 4 | 8/01-8/05 | | **0.099** |
| **1991** | 0.34 |  |  | **0** | No Summer Fishery | | |  |  |  |  |  |  |  | |  |
| **1992** | 0.34 | 0.07 |  | **24,902** | 27 | 27 |  |  | 2,635 | 5,746 | **0.31** | **0.33** | 2 | 8/01-8/03 | | **0.093** |
| **1993** | 0.34 | 0.33 |  | **115,913** | 14 | 20 | 208 |  | 560 | 7,063 | **1.00** | **0.10** | 52 | 7/01-8/28 | | **0.09** |
| **1994** | 0.34 | 0.32 |  | **108,824** | 34 | 52 | 407 |  | 1,360 | 11,729 | **0.88** | **0.06** | 31 | 7/01-7/31 | | **0.044** |
| **1995** | 0.34 | 0.32 |  | **105,967** | 48 | 81 | 665 |  | 1,900 | 18,782 | **0.47** | **0.05** | 67 | 7/01-9/05 | | **0.066** |
| **1996** | 0.34 | 0.22 |  | **74,752** | 41 | 50 | 264 |  | 1,640 | 10,453 | **0.56** | **0.08** | 57 | 7/01-9/03 | | **0.096** |
| **1997** | 0.08 | 0.09 |  | **32,606** | 13 | 15 | 100 |  | 520 | 2,982 | **0.92** | **0.10** | 44 | 7/01-8/13 | | **0.101** |
| **1998** | 0.08 | 0.03 | 0.00 | **10,661** | 8 | 11 | 50 |  | 360 | 1,639 | **0.87** | **0.13** | 65 | 7/01-9/03 | | **0.088** |
| **1999** | 0.08 | 0.02 | 0.00 | **8,734** | 10 | 9 | 53 |  | 360 | 1,630 | **0.89** | **0.12** | 66 | 7/01-9/04 | | **0.101** |
| **2000** | 0.33 | 0.29 | 0.01 | **111,728** | 15 | 22 | 201 |  | 560 | 6,345 | **1.29** | **0.06** | 91 | 7/01- 9/29 | | **0.11** |
| **2001** | 0.30 | 0.28 | 0.00 | **98,321** | 30 | 37 | 319 |  | 1,200 | 11,918 | **0.67** | **0.05** | 97 | 7/01- 9/09 | | **0.085** |
| **2002** | 0.24 | 0.24 | 0.01 | **86,666** | 32 | 49 | 201 |  | 1,120 | 6,491 | **1.27** | **0.06** | 77 | 6/15-9/03 | | **0.074** |
| **2003** | 0.25 | 0.25 | 0.01 | **93,638** | 25 | 43 | 236 |  | 960 | 8,494 | **0.91** | **0.05** | 68 | 6/15-8/24 | | **0.079** |
| **2004** | 0.35 | 0.31 | 0.03 | **120,289** | 26 | 39 | 227 |  | 1,120 | 8,066 | **1.34** | **0.05** | 51 | 6/15-8/08 | | **0.063** |
| **2005** | 0.37 | 0.37 | 0.03 | **138,926** | 31 | 42 | 255 |  | 1,320 | 8,867 | **1.27** | **0.05** | 73 | 6/15-8/27 | | **0.071** |
| **2006** | 0.45 | 0.42 | 0.03 | **150,358** | 28 | 40 | 249 |  | 1,120 | 8,867 | **1.36** | **0.05** | 68 | 6/15-8/22 | | **0.09** |
| **2007** | 0.32 | 0.29 | 0.02 | **110,344** | 38 | 30 | 251 |  | 1,200 | 9,118 | **1.08** | **0.05** | 52 | 6/15-8/17 | | **0.063** |
| **2008** | 0.41 | 0.36 | 0.03 | **143,337** | 23 | 30 | 248 |  | 920 | 8,721 | **1.41** | **0.05** | 73 | 6/23-9/03 | | **0.063** |
| **2009** | 0.38 | 0.37 | 0.03 | **143,485** | 22 | 27 | 359 |  | 920 | 11,934 | **0.88** | **0.04** | 98 | 6/15-9/20 | | **0.1** |
| **2010** | 0.40 | 0.39 | 0.03 | **149,822** | 23 | 32 | 286 |  | 1,040 | 9,698 | **1.26** | **0.05** | 58 | 6/28-8/24 | | **0.096** |
| **2011** | 0.36 | 0.37 | 0.03 | **141,626** | 24 | 25 | 173 |  | 1,040 | 6,808 | **1.68** | **0.06** | 33 | 6/28-7/30 | | **0.038** |
| **2012** | 0.47 | 0.44 | 0.03 | **161,113** | 29 | 29 | 289 |  | 1,200 | 10,041 | **1.34** | **0.05** | 72 | 6/29-9/08 | | **0.077** |
| **2013** | 0.50 | 0.37 | 0.02 | **130,603** | 33 | 33 | 435 |  | 1,530 | 15,058 | **0.71** | **0.04** | 74 | 7/3-9/15 | | **0.107** |

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

Table 2. Historical winter commercial and subsistence red king crab fishery, Norton Sound Section, eastern Bering Sea, 1977-2013. Bold typed were used for assessment model.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Commercial | | Subsistence | | | | | |
| **Model Year** | Yeara | # of  Fishers | # of Crab Harvested | Winterb | Permits | | | Total Crab | |
| Issued | Returned | Fished | Caughtc | Retainedd |
| **1978** | 1978 | 37 | **9,625** | 1977/78 | 290 | 206 | 149 | **NA** | **12,506** |
| **1979** | 1979 | 1f | **221f** | 1978/79 | 48 | 43 | 38 | **NA** | **224** |
| **1980** | 1980 | 1f | **22f** | 1979/80 | 22 | 14 | 9 | **NA** | **213** |
| **1981** | 1981 | 0 | **0** | 1980/81 | 51 | 39 | 23 | **NA** | **360** |
| **1982** | 1982 | 1f | **17f** | 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 | 2f | **83f** | 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** | 1999/2000 | 10 | **3,045** | 1999/2000 | 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 | 2f | **522** f | 2003/04g | 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 | 1f | **75f** | 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 | 30 | **22,641** | 2012/13 | 149 | 140 | 67 | **21,524** | **7,622** |

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. Trawl survey abundance estimates are based on a 10×10 nm grid, except for 2010 (20×20 nm).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | Survey coverage | | Abundance  ≥74 mm | |
| Year | Dates | Survey  Agency | Survey  method | surveyed  stations | Stations w/  NSRKC | n mile2  covered |  | CV |
| 1976 | 9/02 - 9/05 | 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 | **1264.7** | **0.317** |
| 1999 | 7/28 - 8/07 | ADFG | Trawl | 53 | 31 | 5221 | **2276.1** | **0.194** |
| 2002 | 7/27 - 8/06 | ADFG | Trawl | 57 | 37 | 5621 | **1747.6** | **0.125** |
| 2006 | 7/25 - 8/08 | ADFG | Trawl | 101 | 45 | 10008 | **2549.7** | **0.288** |
| 2008 | 7/24 - 8/11 | ADFG | Trawl | 74 | 44 | 7330 | **2707.1** | **0.164** |
| 2010a | 7/27 - 8/09 | NMFS | Trawl | 35 | 15 | 13749 | **2041.0** | **0.455** |
| 2011 | 7/18 - 8/15 | ADFG | Trawl | 65 | 34 | 6447 | **2701.7** | **0.133** |

Table 4. Size and shell condition composition of retained catch in the summer commercial fishery for Norton Sound red king crab. Size classes are defined by 10 mm carapace length (CL) bin from ≥74 to ≥124+ mm CL. Legal size (4.75 inch carapace width) is approximately equal to 124 mm CL.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | New Shell | | | | | Old Shell | | | | | |
| Year | Sample | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 1977 | 1549 | 0 | 0 | 0.0032 | 0.4196 | 0.3422 | 0.1220 | 0 | 0 | 0 | 0.0626 | 0.040 | 0.0103 |
| 1978 | 389 | 0 | 0 | 0.0103 | 0.1851 | 0.473 | 0.3059 | 0 | 0 | 0 | 0.0051 | 0.0103 | 0.0103 |
| 1979 | 1660 | 0 | 0 | 0.0253 | 0.2325 | 0.3831 | 0.3217 | 0 | 0 | 0 | 0.0253 | 0.0006 | 0.0114 |
| 1980 | 1068 | 0 | 0 | 0.0037 | 0.0983 | 0.3062 | 0.5543 | 0 | 0 | 0 | 0.0028 | 0.0112 | 0.0234 |
| 1981 | 1748 | 0 | 0 | 0.0039 | 0.0734 | 0.1541 | 0.5090 | 0 | 0 | 0 | 0.0045 | 0.0504 | 0.2046 |
| 1982 | 1093 | 0 | 0 | 0.0421 | 0.1921 | 0.1647 | 0.5050 | 0 | 0 | 0.0037 | 0.0128 | 0.022 | 0.0576 |
| 1983 | 802 | 0 | 0 | 0.0387 | 0.4127 | 0.3579 | 0.0973 | 0 | 0 | 0.0037 | 0.0362 | 0.010 | 0.0436 |
| 1984 | 963 | 0 | 0 | 0.0966 | 0.4195 | 0.2804 | 0.0717 | 0 | 0 | 0.0104 | 0.0654 | 0.0488 | 0.0073 |
| 1985 | 2691 | 0 | 0.0004 | 0.0643 | 0.3122 | 0.3716 | 0.1747 | 0 | 0 | 0.0026 | 0.0334 | 0.0312 | 0.0097 |
| 1986 | 1138 | 0 | 0 | 0.029 | 0.3559 | 0.3937 | 0.1353 | 0 | 0 | 0.0018 | 0.0202 | 0.0378 | 0.0264 |
| 1987 | 1542 | 0 | 0 | 0.0166 | 0.1788 | 0.2912 | 0.3798 | 0 | 0 | 0.0025 | 0.0267 | 0.0650 | 0.0393 |
| 1988 | 1522 | 0.0007 | 0 | 0.0237 | 0.2004 | 0.3003 | 0.2181 | 0 | 0 | 0.0059 | 0.0644 | 0.0972 | 0.0894 |
| 1989 | 2595 | 0 | 0 | 0.0127 | 0.1643 | 0.3185 | 0.2148 | 0 | 0 | 0.0042 | 0.0555 | 0.1215 | 0.1084 |
| 1990 | 1289 | 0 | 0 | 0.0147 | 0.1435 | 0.3468 | 0.3251 | 0 | 0 | 0.0008 | 0.0372 | 0.0737 | 0.0582 |
| 1991 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 | 2566 | 0 | 0 | 0.0172 | 0.201 | 0.2662 | 0.2244 | 0 | 0 | 0.0027 | 0.0792 | 0.1292 | 0.080 |
| 1993 | 1813 | 0 | 0 | 0.0142 | 0.2312 | 0.3939 | 0.263 | 0 | 0 | 0.0004 | 0.0173 | 0.0437 | 0.0362 |
| 1994 | 404 | 0 | 0 | 0.0248 | 0.0941 | 0.0817 | 0.0891 | 0 | 0 | 0.0248 | 0.1881 | 0.25 | 0.2475 |
| 1995 | 1174 | 0 | 0 | 0.0392 | 0.2615 | 0.2853 | 0.207 | 0 | 0 | 0.0077 | 0.0486 | 0.0741 | 0.0767 |
| 1996 | 787 | 0 | 0 | 0.0318 | 0.2236 | 0.2389 | 0.141 | 0 | 0 | 0.014 | 0.1194 | 0.136 | 0.0953 |
| 1997 | 1198 | 0 | 0 | 0.0292 | 0.3656 | 0.3414 | 0.1244 | 0 | 0 | 0.0033 | 0.0559 | 0.0417 | 0.0384 |
| 1998 | 1055 | 0 | 0 | 0.0284 | 0.2332 | 0.2427 | 0.1071 | 0 | 0 | 0.0218 | 0.1118 | 0.1431 | 0.1118 |
| 1999 | 561 | 0 | 0 | 0.0026 | 0.2434 | 0.2698 | 0.3836 | 0 | 0 | 0 | 0 | 0.0423 | 0.0582 |
| 2000 | 17213 | 0 | 0 | 0.0194 | 0.2991 | 0.3917 | 0.1249 | 0 | 0 | 0.0028 | 0.0531 | 0.0654 | 0.0436 |
| 2001 | 20030 | 0 | 0 | 0.0243 | 0.2232 | 0.3691 | 0.2781 | 0 | 0 | 0.0008 | 0.0241 | 0.0497 | 0.0304 |
| 2002 | 5198 | 0 | 0 | 0.0442 | 0.2341 | 0.2814 | 0.3253 | 0 | 0 | 0.0046 | 0.0282 | 0.0419 | 0.0402 |
| 2003 | 5220 | 0 | 0 | 0.0232 | 0.3680 | 0.3197 | 0.1523 | 0 | 0 | 0.0011 | 0.0218 | 0.0465 | 0.0674 |
| 2004 | 9605 | 0 | 0 | 0.0087 | 0.3811 | 0.3880 | 0.1395 | 0 | 0 | 0.0004 | 0.0255 | 0.0347 | 0.0221 |
| 2005 | 5360 | 0 | 0 | 0.0022 | 0.2539 | 0.4709 | 0.1823 | 0 | 0 | 0 | 0.0205 | 0.0451 | 0.025 |
| 2006 | 6707 | 0 | 0 | 0.0021 | 0.1822 | 0.3484 | 0.199 | 0 | 0 | 0.0003 | 0.0498 | 0.1375 | 0.0807 |
| 2007 | 6125 | 0 | 0 | 0.0111 | 0.3574 | 0.3407 | 0.1714 | 0 | 0 | 0.0008 | 0.0247 | 0.0573 | 0.0366 |
| 2008 | 5766 | 0 | 0 | 0.0047 | 0.3512 | 0.3476 | 0.0668 | 0 | 0 | 0.0014 | 0.0895 | 0.0928 | 0.0461 |
| 2009 | 6026 | 0 | 0 | 0.0105 | 0.3445 | 0.3294 | 0.1339 | 0 | 0 | 0.0012 | 0.0768 | 0.0795 | 0.0242 |
| 2010 | 5902 | 0 | 0 | 0.0053 | 0.3855 | 0.3617 | 0.1095 | 0 | 0 | 0.0019 | 0.0546 | 0.0546 | 0.0271 |
| 2011 | 2552 | 0 | 0 | 0.0043 | 0.3170 | 0.3969 | 0.1387 | 0 | 0 | 0.0020 | 0.0611 | 0.0588 | 0.0212 |
| 2012 | 5056 | 0 | 0 | 0.0026 | 0.2421 | 0.4620 | 0.2067 | 0 | 0 | 0.0002 | 0.0259 | 0.0423 | 0.0182 |
| 2013 | 4203 | 0 | 0 | 0.0044 | 0.2388 | 0.3710 | 0.3020 | 0 | 0 | 0.0003 | 0.0140 | 0.0422 | 0.0272 |

Table 5. Size and shell condition composition of summer trawl survey catch for Norton Sound red king crab. Size classes are defined by 10 mm carapace length (CL) bin from ≥74 to ≥124+ mm CL. Legal size (4.75 inch carapace width) is approximately equal to 124 mm CL.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | New Shell | | | | | | Old Shell | | | | | |
| Year | Sample | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 1976 | 1311 | 0.0214 | 0.1053 | 0.1915 | 0.3455 | 0.1831 | 0.0290 | 0.0046 | 0.0114 | 0.0252 | 0.032 | 0.0366 | 0.0145 |
| 1979 | 133 | 0.0151 | 0.0075 | 0.0301 | 0.0752 | 0.0827 | 0.0602 | 0 | 0.0075 | 0.0301 | 0.1203 | 0.3835 | 0.188 |
| 1982 | 256 | 0.0898 | 0.2031 | 0.2891 | 0.2109 | 0.0352 | 0.0078 | 0 | 0.0156 | 0.0195 | 0.043 | 0.0234 | 0.0625 |
| 1985 | 311 | 0.1190 | 0.2122 | 0.1865 | 0.1768 | 0.0643 | 0.0193 | 0 | 0 | 0.0193 | 0.0514 | 0.0868 | 0.0643 |
| 1988 | 306 | 0.2255 | 0.1405 | 0.1536 | 0.1275 | 0.0686 | 0.0392 | 0 | 0.0065 | 0.0131 | 0.0392 | 0.0882 | 0.0980 |
| 1991 | 250 | 0.0967 | 0.0223 | 0.0372 | 0.0743 | 0.0409 | 0.0223 | 0.0706 | 0.0297 | 0.0967 | 0.197 | 0.1747 | 0.1375 |
| 1996 | 196 | 0.2959 | 0.1786 | 0.1224 | 0.0816 | 0.0051 | 0.0153 | 0.0051 | 0.0357 | 0.0459 | 0.0612 | 0.0612 | 0.0918 |
| 1999 | 274 | 0.0109 | 0.1058 | 0.2993 | 0.2701 | 0.1314 | 0.0401 | 0 | 0.0036 | 0.0292 | 0.0511 | 0.0401 | 0.0182 |
| 2002 | 230 | 0.1261 | 0.1435 | 0.1565 | 0.0304 | 0.0348 | 0.0348 | 0.0304 | 0.0739 | 0.1087 | 0.0957 | 0.0913 | 0.0739 |
| 2006 | 208 | 0.3235 | 0.2614 | 0.1405 | 0.0752 | 0.0458 | 0.0294 | 0 | 0 | 0.0196 | 0.0458 | 0.0458 | 0.0131 |
| 2008 | 242 | 0.1743 | 0.2407 | 0.1286 | 0.112 | 0.0332 | 0.029 | 0.0083 | 0.0498 | 0.0705 | 0.0954 | 0.0125 | 0.0456 |
| 2010 | 68 | 0.1202 | 0.1366 | 0.2077 | 0.1257 | 0.1093 | 0.0437 | 0.0109 | 0.0328 | 0.082 | 0.071 | 0.0383 | 0.0219 |
| 2011 | 320 | 0.1282 | 0.0989 | 0.1282 | 0.2051 | 0.1612 | 0.0476 | 0.0037 | 0.0147 | 0.0256 | 0.0989 | 0.0513 | 0.0366 |

Table 6. Size and shell condition composition of winter pot survey catch for Norton Sound red king crab. Size classes are defined by 10 mm carapace length (CL) bin from ≥74 to ≥124+ mm CL. Legal size (4.75 inch carapace width) is approximately equal to 124 mm CL.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | New Shell | | | | | | Old Shell | | | | | |
| Year | CPUE | Sample | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 1981/82 | NA | 243 | 0.1481 | 0.3374 | 0.3169 | 0.1029 | 0.0288 | 0.0247 | 0 | 0 | 0.0041 | 0.0082 | 0.0082 | 0.0206 |
| 1982/83 | 24.2 | 2520 | 0.0855 | 0.2824 | 0.2854 | 0.2155 | 0.0706 | 0.0085 | 0 | 0 | 0.004 | 0.0194 | 0.0097 | 0.0189 |
| 1983/84 | 24.0 | 1655 | 0.1638 | 0.2626 | 0.2291 | 0.1502 | 0.0601 | 0.0057 | 0 | 0 | 0.0178 | 0.065 | 0.0329 | 0.0127 |
| 1984/85 | 24.5 | 773 | 0.0932 | 0.2589 | 0.3618 | 0.1586 | 0.057 | 0.0097 | 0 | 0 | 0.0065 | 0.0291 | 0.0239 | 0.0013 |
| 1985/86 | 19.2 | 568 | 0.1276 | 0.1831 | 0.2553 | 0.2025 | 0.0863 | 0.0132 | 0 | 0 | 0.015 | 0.0607 | 0.044 | 0.0123 |
| 1986/87 | 5.8 | 144 | 0.0556 | 0.1597 | 0.1944 | 0.0694 | 0.0417 | 0 | 0 | 0 | 0.0417 | 0.2986 | 0.1111 | 0.0278 |
| 1987/88 |  |  |  | | | | | | | | | | |
| 1988/89 | 13.0 | 492 | 0.1341 | 0.1514 | 0.1352 | 0.1941 | 0.1758 | 0.0346 | 0 | 0 | 0.002 | 0.0528 | 0.0854 | 0.0346 |
| 1989/90 | 21.0 | 2072 | 0.0495 | 0.2075 | 0.2616 | 0.1795 | 0.1221 | 0.0726 | 0 | 0 | 0.001 | 0.0263 | 0.056 | 0.0239 |
| 1990/91 | 22.9 | 1281 | 0.0125 | 0.0921 | 0.2857 | 0.2678 | 0.096 | 0.0109 | 0 | 0 | 0.0039 | 0.0265 | 0.1163 | 0.0882 |
| 1992/93 | 5.5 | 181 | 0.0055 | 0.0331 | 0.0552 | 0.1271 | 0.116 | 0.0276 | 0 | 0 | 0.0166 | 0.1934 | 0.2707 | 0.1547 |
| 1993/94 |  |  |  | | | | | | | | | | |
| 1994/95 | 6.2 | 850 | 0.0588 | 0.08 | 0.0988 | 0.2576 | 0.2341 | 0.0847 | 0 | 0 | 0.0035 | 0.0329 | 0.0718 | 0.0776 |
| 1995/96 | 9.9 | 776 | 0.1214 | 0.1835 | 0.1733 | 0.1022 | 0.0599 | 0.0265 | 0 | 0 | 0.0181 | 0.1214 | 0.1242 | 0.0695 |
| 1996/97 | 2.9 | 1582 | 0.2297 | 0.2351 | 0.1189 | 0.1568 | 0.1216 | 0.0676 | 0 | 0 | 0 | 0.0189 | 0.027 | 0.0243 |
| 1997/98 | 10.9 | 399 | 0.1395 | 0.4136 | 0.2653 | 0.0544 | 0.0236 | 0.0034 | 0 | 0 | 0.0238 | 0.0317 | 0.017 | 0.0272 |
| 1998/99 | 10.7 | 882 | 0.0192 | 0.1168 | 0.3566 | 0.3605 | 0.0838 | 0.0154 | 0 | 0 | 0.01 | 0.0223 | 0.0069 | 0.0085 |
| 1999/00 | 6.2 | 1308 | 0.0885 | 0.1062 | 0.1646 | 0.3345 | 0.1788 | 0.0372 | 0 | 0 | 0.0018 | 0.0513 | 0.023 | 0.0142 |
| 2000/01 | 3.1 | 44 |  | | | | | | | | | | |
| 2001/02 | 13.0 | 832 | 0.3136 | 0.2763 | 0.1761 | 0.0681 | 0.0668 | 0.0501 | 0 | 0 | 0.0077 | 0.0051 | 0.0154 | 0.0064 |
| 2002/03 | 9.6 | 826 | 0.0994 | 0.2236 | 0.2994 | 0.1801 | 0.0559 | 0.0261 | 0 | 0 | 0.0224 | 0.0273 | 0.0261 | 0.0273 |
| 2003/04 | 3.7 | 286 | 0.0175 | 0.1643 | 0.2622 | 0.3462 | 0.1119 | 0.0105 | 0 | 0 | 0.0175 | 0.021 | 0.014 | 0.0245 |
| 2004/05 | 4.4 | 406 | 0.0741 | 0.1407 | 0.1827 | 0.2173 | 0.1852 | 0.0765 | 0 | 0 | 0.0025 | 0.0395 | 0.0593 | 0.0173 |
| 2005/06 | 6.0 | 512 | 0.1406 | 0.2266 | 0.209 | 0.1563 | 0.0547 | 0.0215 | 0 | 0 | 0.0176 | 0.043 | 0.0742 | 0.0352 |
| 2006/07 | 7.3 | 160 | 0.1486 | 0.2095 | 0.3784 | 0.1419 | 0.0473 | 0 | 0 | 0 | 0.0068 | 0.0203 | 0.0405 | 0 |
| 2007/08 | 25.0 | 3482 | 0.1898 | 0.3219 | 0.1703 | 0.1479 | 0.0672 | 0.0083 | 0 | 0 | 0.0359 | 0.0339 | 0.0155 | 0.0092 |
| 2008/09 | 21.9 | 526 | 0.0706 | 0.1336 | 0.3511 | 0.2023 | 0.084 | 0.0134 | 0 | 0 | 0.0019 | 0.0382 | 0.0992 | 0.0057 |
| 2009/10 | 25.3 | 581 | 0.047 | 0.1357 | 0.2157 | 0.2452 | 0.113 | 0.0191 | 0 | 0 | 0.0591 | 0.1009 | 0.0539 | 0.0104 |
| 2010/11 | 22.1 | 597 | 0.0786 | 0.1368 | 0.2103 | 0.1744 | 0.1333 | 0.0513 | 0 | 0.0120 | 0.0325 | 0.1128 | 0.0462 | 0.0120 |
| 2011/12 | 29.4 | 676 | 0.1155 | 0.2340 | 0.1945 | 0.1246 | 0.1292 | 0.0456 | 0.0030 | 0.0030 | 0.0912 | 0.0532 | 0.0532 | 0.0350 |

Table 7. Size and shell condition composition of sublegal males caught and measured by fishery observers during the summer commercial fishery for Norton Sound red king crab from 1987-1994 and in 2012. Size classes are defined by 10 mm carapace length (CL) bin from ≥74 to ≥124+ mm CL. Legal size (4.75 inch carapace width) is approximately equal to 124 mm CL.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | New Shell | | | | | Old Shell | | | | | |
| Year | Sample | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ | 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 1987 | 1076 | 0.2026 | 0.3625 | 0.3522 | 0.0344 | 0 | 0 | 0 | 0 | 0.0437 | 0.0046 | 0 | 0 |
| 1988 | 712 | 0.052 | 0.184 | 0.4831 | 0.139 | 0 | 0 | 0 | 0 | 0.0969 | 0.0449 | 0 | 0 |
| 1989 | 911 | 0.2492 | 0.3392 | 0.2371 | 0.0274 | 0 | 0 | 0 | 0 | 0.1196 | 0.0274 | 0 | 0 |
| 1990 | 459 | 0.2702 | 0.3203 | 0.3028 | 0.0414 | 0 | 0 | 0 | 0 | 0.0588 | 0.0065 | 0 | 0 |
| 1992 | 515 | 0.2175 | 0.3592 | 0.332 | 0.0369 | 0 | 0 | 0 | 0 | 0.0447 | 0.0097 | 0 | 0 |
| 1994 | 726 | 0.1556 | 0.303 | 0.1736 | 0.0262 | 0 | 0 | 0 | 0 | 0.2824 | 0.0592 | 0 | 0 |
| 2012 | 738 | 0.1396 | 0.2398 | 0.4106 | 0.1314 | 0.0122 | 0 | 0.0027 | 0.0027 | 0.0298 | 0.0285 | 0.0014 | 0.0014 |
| 2013 | 1457 | 0.4379 | 0.2352 | 0.2520 | 0.0639 | 0.0029 | 0.0012 | 0.0006 | 0.0006 | 0.0035 | 0.0012 | 0.0006 | 0.0006 |

Table 8. Growth transition matrix (proportion of crabs molting from a given pre-molt carapace length range into post-molt length ranges) for Norton Sound male red king crab. Length is measured as mm CL. Results are derived from mark-recapture and winter tagging data from 1980 to 2007.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-molt  Length  Class | Post-molt Length Class | | | | | |
| 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 74-83 | 0 | 0.33 | 0.67 | 0 | 0 | 0 |
| 84-93 | 0 | 0 | 0.56 | 0.44 | 0 | 0 |
| 94-103 | 0 | 0 | 0 | 0.76 | 0.24 | 0 |
| 104-113 | 0 | 0 | 0 | 0.18 | 0.61 | 0.21 |
| 114-123 | 0 | 0 | 0 | 0 | 0.33 | 0.67 |
| 124+ | 0 | 0 | 0 | 0 | 0 | 1.00 |

Table 9. The number of male Norton Sound red king crab released and recovered in the summer commercial fishery during the 1980-1992 and 1993-2013 periods. Data are summarized by length class (see footnote) and years at liberty ranging from one (1Y) to six years (6Y).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Release  Length  Class | Recap  Length  Class | 1980-1992 | | | | | |  | | 1993-2013 | | | | | |
| Y1 | Y2 | Y3 | Y4 | Y5 | Y6 |  | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | | 0 | 0 | 0 | 0 | 0 |
| 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |  | 8 | | 0 | 0 | 0 | 0 | 0 |
| 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |  | 13 | | 1 | 0 | 0 | 0 | 0 |
| 1 | 4 | 0 | 2 | 0 | 0 | 0 | 0 |  | 3 | | 29 | 3 | 0 | 0 | 0 |
| 1 | 5 | 0 | 0 | 1 | 0 | 2 | 0 |  | 0 | | 2 | 0 | 1 | 0 | 0 |
| 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | | 0 | 0 | 1 | 0 | 0 |
| 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | | 0 | 0 | 0 | 0 | 0 |
| 2 | 3 | 5 | 0 | 0 | 0 | 0 | 0 |  | 22 | | 2 | 0 | 0 | 0 | 0 |
| 2 | 4 | 10 | 2 | 0 | 1 | 0 | 0 |  | 39 | | 13 | 3 | 0 | 0 | 0 |
| 2 | 5 | 0 | 1 | 1 | 1 | 0 | 0 |  | 3 | | 23 | 38 | 2 | 2 | 0 |
| 2 | 6 | 0 | 0 | 0 | 1 | 1 | 0 |  | 0 | | 1 | 1 | 2 | 1 | 1 |
| 3 | 3 | 2 | 0 | 0 | 0 | 0 | 0 |  | 0 | | 0 | 0 | 0 | 0 | 0 |
| 3 | 4 | 32 | 1 | 1 | 0 | 0 | 0 |  | 77 | | 10 | 1 | 0 | 0 | 0 |
| 3 | 5 | 26 | 3 | 3 | 0 | 0 | 0 |  | 24 | | 3 | 7 | 0 | 0 | 0 |
| 3 | 6 | 1 | 0 | 2 | 1 | 1 | 0 |  | 0 | | 6 | 2 | 0 | 1 | 0 |
| 4 | 4 | 15 | 0 | 0 | 0 | 0 | 0 |  | 8 | | 0 | 0 | 0 | 0 | 0 |
| 4 | 5 | 34 | 14 | 0 | 0 | 0 | 0 |  | 25 | | 0 | 3 | 0 | 1 | 0 |
| 4 | 6 | 8 | 6 | 3 | 2 | 0 | 0 |  | 4 | | 1 | 1 | 0 | 0 | 1 |
| 5 | 5 | 15 | 2 | 0 | 0 | 0 | 0 |  | 19 | | 0 | 0 | 0 | 0 | 0 |
| 5 | 6 | 31 | 10 | 2 | 1 | 0 | 0 |  | 20 | | 1 | 0 | 0 | 0 | 0 |
| 6 | 6 | 41 | 10 | 3 | 0 | 0 | 0 |  | 14 | | 0 | 0 | 1 | 0 | 0 |

Length class: 1: 74-83mm, 2:84-93mm, 3:94-103mm, 4:104-113mm, 5:114-123mm, and 6: 124mm+

Table 10. Summary of parameter estimates for a length-based stock synthesis population model of Norton Sound red king crab.

|  |  |  |
| --- | --- | --- |
| Parameter | Lower | Upper |
| log\_q1 | -10.5 | 20.0 |
| log\_q2 | -10.5 | 20.0 |
| log\_N76 | 2.0 | 15.0 |
| R0 | 2.0 | 12.0 |
| log\_σR2 | -40.0 | 40.0 |
| a1 | -5.0 | 5.0 |
| a2 | -5.0 | 5.0 |
| a3 | -5.0 | 5.0 |
| a4 | -5.0 | 5.0 |
| a5 | -5.0 | 5.0 |
| r | 0.5 | 0.9 |
| log\_*α* | -10.5 | -1.0 |
| log\_*φ*t1 | -20.0 | 1.0 |
| log\_*φ*t2 | -15.0 | 1.0 |
| log\_*φ*w | 0.1 | 1.0 |
| Sw6 | 0.1 | 1.0 |
| log\_*φ1* | -15.0 | 1.0 |
| log\_*φ2* | -15.0 | 1.0 |
| log\_*w2t* | 0.0 | 6.0 |
| q | 0.1 | 1.0 |
| *β0* | 0.0 | 20.0 |
| *β1* | 0.0 | 20.0 |
| *σ* | 0.0 | 30.0 |

Table 11 . Summary of parameter estimates for a length-based stock synthesis population model of Norton Sound red king crab.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Model 0 | | Model 2.i | | Model 2.io | |
| name | Estimate | std.err | Estimate | std.err | Estimate | std.err |
| log\_q1 | -7.206 | 0.175 | -7.206 | 0.175 | -7.163 | 0.175 |
| log\_q2 | -7.004 | 0.098 | -7.051 | 0.097 | -7.037 | 0.096 |
| log\_N76 | 8.978 | 0.161 | 8.918 | 0.163 | 8.803 | 0.174 |
| R0 | 6.543 | 0.072 | 6.511 | 0.070 | 6.501 | 0.070 |
| log\_σR2 | 0.449 | 0.459 | 0.436 | 0.467 | 0.606 | 0.454 |
| log\_R77 | -0.304 | 0.384 | -0.237 | 0.389 | -0.228 | 0.391 |
| log\_R78 | -0.769 | 0.351 | -0.777 | 0.349 | -0.775 | 0.348 |
| log\_R79 | -0.254 | 0.378 | -0.385 | 0.384 | -0.378 | 0.378 |
| log\_R80 | 0.564 | 0.271 | 0.556 | 0.262 | 0.562 | 0.256 |
| log\_R81 | 0.298 | 0.285 | 0.315 | 0.271 | 0.295 | 0.269 |
| log\_R82 | 0.309 | 0.322 | 0.276 | 0.318 | 0.272 | 0.316 |
| log\_R83 | 0.631 | 0.277 | 0.592 | 0.273 | 0.689 | 0.262 |
| log\_R84 | 0.334 | 0.299 | 0.368 | 0.282 | 0.331 | 0.284 |
| log\_R85 | 0.431 | 0.309 | 0.364 | 0.305 | 0.315 | 0.300 |
| log\_R86 | 0.309 | 0.274 | 0.319 | 0.263 | 0.330 | 0.259 |
| log\_R87 | -0.038 | 0.275 | 0.002 | 0.267 | -0.043 | 0.268 |
| log\_R88 | 0.180 | 0.267 | 0.135 | 0.263 | 0.141 | 0.261 |
| log\_R89 | 0.027 | 0.269 | 0.074 | 0.262 | 0.126 | 0.254 |
| log\_R90 | -0.378 | 0.284 | -0.378 | 0.279 | -0.411 | 0.279 |
| log\_R91 | -0.448 | 0.304 | -0.408 | 0.302 | -0.322 | 0.280 |
| log\_R92 | -0.622 | 0.312 | -0.616 | 0.307 | -0.853 | 0.324 |
| log\_R93 | -0.555 | 0.296 | -0.576 | 0.301 | -0.566 | 0.293 |
| log\_R94 | -0.370 | 0.273 | -0.369 | 0.271 | -0.402 | 0.269 |
| log\_R95 | -0.184 | 0.241 | -0.145 | 0.234 | -0.166 | 0.231 |
| log\_R96 | 0.111 | 0.267 | 0.014 | 0.276 | -0.031 | 0.275 |
| log\_R97 | 0.342 | 0.224 | 0.418 | 0.214 | 0.431 | 0.208 |
| log\_R98 | -0.739 | 0.321 | -0.683 | 0.314 | -0.677 | 0.312 |
| log\_R99 | -0.443 | 0.320 | -0.531 | 0.324 | -0.508 | 0.320 |
| log\_R00 | 0.050 | 0.267 | 0.077 | 0.262 | 0.081 | 0.258 |
| log\_R01 | 0.166 | 0.223 | 0.189 | 0.217 | 0.209 | 0.214 |
| log\_R02 | 0.212 | 0.290 | 0.243 | 0.286 | 0.254 | 0.279 |
| log\_R03 | -0.286 | 0.333 | -0.283 | 0.332 | -0.291 | 0.327 |
| log\_R04 | -0.110 | 0.286 | -0.129 | 0.284 | -0.117 | 0.281 |
| log\_R05 | 0.427 | 0.208 | 0.439 | 0.204 | 0.454 | 0.200 |
| log\_R06 | 0.094 | 0.287 | 0.092 | 0.280 | 0.040 | 0.281 |
| log\_R07 | 0.492 | 0.216 | 0.500 | 0.211 | 0.530 | 0.205 |
| log\_R08 | 0.443 | 0.246 | 0.445 | 0.248 | 0.419 | 0.248 |
| log\_R09 | -0.016 | 0.270 | 0.083 | 0.260 | 0.089 | 0.257 |
| log\_R10 | -0.186 | 0.276 | -0.126 | 0.267 | -0.134 | 0.267 |
| log\_R11 | -0.366 | 0.335 | -0.388 | 0.321 | -0.382 | 0.321 |
| log\_R12 | 0.200 | 0.444 | 0.095 | 0.433 | 0.114 | 0.436 |
| a1 | 0.297 | 1.709 | -0.050 | 1.716 | 0.443 | 1.688 |
| a2 | 1.563 | 1.218 | 1.344 | 1.196 | 1.728 | 1.184 |
| a3 | 1.957 | 1.150 | 1.805 | 1.126 | 2.061 | 1.120 |
| a4 | 2.289 | 1.136 | 2.132 | 1.107 | 2.344 | 1.093 |
| a5 | 1.630 | 1.194 | 1.536 | 1.184 | 1.667 | 1.144 |
| r1 | 0.585 | 0.053 | 0.511 | 0.042 | 0.510 | 0.043 |
| log\_*α* | -1.978 | 0.099 | -10.496 | 12.107 | -1.866 | 0.025 |
| log\_*φ*t1 | -9.979 | 68.707 | -14.904 | 2732.600 | -17.803 | 8588.900 |
| log\_*φ*t2 | -8.976 | 4357.000 | -8.993 | 21223.000 | -8.998 | 21217.000 |
| log\_*φ*w | -1.788 | 0.074 | -14.132 | 2327.100 | -13.787 | 2080.000 |
| Sw6 | 0.310 | 0.086 | 0.365 | 0.099 | 0.370 | 0.102 |
| log\_*φ1* | -1.853 | 0.088 | -1.847 | 0.091 | -1.847 | 0.092 |
| log\_*φ2* | -1.805 | 0.129 | -1.853 | 0.132 | -1.840 | 0.135 |
| log\_*w2t* | 0.063 | 0.023 | 0.062 | 0.023 | 0.058 | 0.021 |
| q | 0.719 | 0.123 | 0.746 | 0.129 | 0.769 | 0.133 |
| *β0* | NA | NA | 11.960 | 0.593 | 10.533 | 0.654 |
| *β1* | NA | NA | 6.656 | 0.161 | 7.359 | 0.207 |
| *σ* | NA | NA | 4.547 | 0.205 | 4.127 | 0.232 |

Table 12. Estimated selectivities, molting probabilities, and proportions of legal crabs by length (mm CL) class for Norton Sound male red king crab derived from alternative models.

Model 0

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Selectivity | | | | |  |  |
| Length  Class | Legal  Proportion | Mean  weight (lb) | NMFS | ADFG | Winter  Pot | Summer Fishery | | | Molting  Probability | |
| 77-92 | 93-13 |  |
| 74 - 83 | 0.00 | 0.854 | 1.00 | 1.00 | 0.55 | 0.28 | 0.21 |  | 1.00 | |
| 84 - 93 | 0.00 | 1.210 | 1.00 | 1.00 | 0.87 | 0.65 | 0.58 |  | 1.00 | |
| 94 - 103 | 0.26 | 1.652 | 1.00 | 1.00 | 0.97 | 0.90 | 0.88 |  | 0.98 | |
| 104 - 113 | 0.97 | 2.187 | 1.00 | 1.00 | 0.99 | 0.98 | 0.97 |  | 0.94 | |
| 114 - 123 | 0.99 | 2.825 | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 |  | 0.80 | |
| 124+ | 1.00 | 3.697 | 1.00 | 1.00 | 0.31 | 1.00 | 1.00 |  | 0.50 | |

Model 2.i

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Selectivity | | | | |  |  |
| Length  Class | Legal  Proportion | Mean  weight (lb) | NMFS | ADFG | Winter  Pot | Summer Fishery | | | Molting  Probability | |
| 77-92 | 93-13 |  |
| 74 - 83 | 0.00 | 0.854 | 1.00 | 1.00 | 1.00 | 0.27 | 0.28 |  | 1.00 | |
| 84 - 93 | 0.00 | 1.210 | 1.00 | 1.00 | 1.00 | 0.65 | 0.65 |  | 1.00 | |
| 94 - 103 | 0.26 | 1.652 | 1.00 | 1.00 | 1.00 | 0.90 | 0.90 |  | 1.00 | |
| 104 - 113 | 0.97 | 2.187 | 1.00 | 1.00 | 1.00 | 0.98 | 0.98 |  | 1.00 | |
| 114 - 123 | 0.99 | 2.825 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |  | 1.00 | |
| 124+ | 1.00 | 3.697 | 1.00 | 1.00 | 0.37 | 1.00 | 1.00 |  | 1.00 | |

Model 2.io

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Selectivity | | | | |  |  |
| Length  Class | Legal  Proportion | Mean  weight (lb) | NMFS | ADFG | Winter  Pot | Summer Fishery | | | Molting  Probability | |
| 77-92 | 93-13 |  |
| 74 - 83 | 0.00 | 0.854 | 1.00 | 1.00 | 1.00 | 0.27 | 0.26 |  | 1.00 | |
| 84 - 93 | 0.00 | 1.210 | 1.00 | 1.00 | 1.00 | 0.65 | 0.64 |  | 1.00 | |
| 94 - 103 | 0.26 | 1.652 | 1.00 | 1.00 | 1.00 | 0.90 | 0.90 |  | 0.98 | |
| 104 - 113 | 0.97 | 2.187 | 1.00 | 1.00 | 1.00 | 0.98 | 0.98 |  | 0.91 | |
| 114 - 123 | 0.99 | 2.825 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |  | 0.67 | |
| 124+ | 1.00 | 3.697 | 1.00 | 1.00 | 0.37 | 1.00 | 1.00 |  | 0.30 | |

Table 13: Estimated molting probability incorporated growth transition matrix by alterative model for male Norton Sound red king crab.

Model 0

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-molt  Length  Class | Post-molt Length Class | | | | | |
| 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 74-83 | 0 | 0.33 | 0.67 | 0 | 0 | 0 |
| 84-93 | 0 | 0 | 0.56 | 0.44 | 0 | 0 |
| 94-103 | 0 | 0 | 0.02 | 0.74 | 0.24 | 0 |
| 104-113 | 0 | 0 | 0 | 0.23 | 0.57 | 0.20 |
| 114-123 | 0 | 0 | 0 | 0 | 0.46 | 0.54 |
| 124+ | 0 | 0 | 0 | 0 | 0 | 1 |

Model 2.i

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-molt  Length  Class | Post-molt Length Class | | | | | |
| 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 74-83 | 0.002 | 0.204 | 0.714 | 0.080 | 0.000 | 0.000 |
| 84-93 | 0 | 0.013 | 0.461 | 0.507 | 0.018 | 0.000 |
| 94-103 | 0 | 0 | 0.064 | 0.694 | 0.239 | 0.003 |
| 104-113 | 0 | 0 | 0 | 0.206 | 0.715 | 0.079 |
| 114-123 | 0 | 0 | 0 | 0 | 0.479 | 0.521 |
| 124+ | 0 | 0 | 0 | 0 | 0 | 1 |

Model 2.io: without molting probability

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-molt  Length  Class | Post-molt Length Class | | | | | |
| 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 74-83 | 0.001 | 0.229 | 0.724 | 0.045 | 0.000 | 0.000 |
| 84-93 | 0 | 0.008 | 0.466 | 0.515 | 0.001 | 0.000 |
| 94-103 | 0 | 0 | 0.036 | 0.694 | 0.268 | 0.002 |
| 104-113 | 0 | 0 | 0 | 0.111 | 0.781 | 0.108 |
| 114-123 | 0 | 0 | 0 | 0 | 0.283 | 0.717 |
| 124+ | 0 | 0 | 0 | 0 | 0 | 1 |

Model 2.io: with molting probability

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-molt  Length  Class | Post-molt Length Class | | | | | |
| 74-83 | 84-93 | 94-103 | 104-113 | 114-123 | 124+ |
| 74-83 | 0.002 | 0.229 | 0.724 | 0.045 | 0.000 | 0.000 |
| 84-93 | 0 | 0.013 | 0.463 | 0.513 | 0.001 | 0.000 |
| 94-103 | 0 | 0 | 0.056 | 0.679 | 0.262 | 0.002 |
| 104-113 | 0 | 0 | 0 | 0.194 | 0.708 | 0.098 |
| 114-123 | 0 | 0 | 0 | 0 | 0.518 | 0.482 |
| 124+ | 0 | 0 | 0 | 0 | 0 | 1 |

Table 14. Annual model abundance estimates (million crabs) and mature male biomass (MMB, million lbs) estimated by alternative length-based analysis models for Norton Sound red king crab from 1976-2014 (Model 0)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Abundance | | | Legal (≥ 104 mm) | | | | MMB | |
| Year | Recruits | Total  (≥ 74 mm) | Mature  (≥ 94 mm) | Abundance | S.D | Biomass | S.D | Biomass | S.D. |
| 1976 | 1.663 | 7.925 | 6.262 | 4.764 | 1.068 | 11.429 | 2.705 | 13.962 | 2.934 |
| 1977 | 1.115 | 7.148 | 6.033 | 5.336 | 0.902 | 14.160 | 2.491 | 15.372 | 2.545 |
| 1978 | 0.638 | 5.537 | 4.899 | 4.421 | 0.632 | 12.694 | 1.909 | 13.523 | 1.856 |
| 1979 | 0.376 | 3.691 | 3.315 | 3.046 | 0.399 | 9.074 | 1.268 | 9.544 | 1.278 |
| 1980 | 0.548 | 2.340 | 1.793 | 1.638 | 0.271 | 4.950 | 0.857 | 5.217 | 0.877 |
| 1981 | 1.214 | 2.535 | 1.322 | 1.107 | 0.196 | 3.268 | 0.604 | 3.632 | 0.649 |
| 1982 | 1.049 | 2.484 | 1.435 | 0.975 | 0.201 | 2.530 | 0.548 | 3.298 | 0.678 |
| 1983 | 1.018 | 2.758 | 1.741 | 1.326 | 0.252 | 3.369 | 0.655 | 4.069 | 0.755 |
| 1984 | 1.352 | 3.234 | 1.882 | 1.478 | 0.269 | 3.856 | 0.716 | 4.538 | 0.820 |
| 1985 | 1.095 | 3.284 | 2.189 | 1.658 | 0.297 | 4.333 | 0.786 | 5.227 | 0.923 |
| 1986 | 1.137 | 3.391 | 2.254 | 1.816 | 0.327 | 4.808 | 0.872 | 5.550 | 0.979 |
| 1987 | 1.038 | 3.331 | 2.293 | 1.840 | 0.324 | 4.955 | 0.888 | 5.721 | 0.996 |
| 1988 | 0.763 | 3.058 | 2.294 | 1.877 | 0.320 | 5.108 | 0.880 | 5.815 | 0.967 |
| 1989 | 0.873 | 2.986 | 2.113 | 1.802 | 0.294 | 5.010 | 0.826 | 5.542 | 0.890 |
| 1990 | 0.787 | 2.798 | 2.012 | 1.663 | 0.259 | 4.664 | 0.737 | 5.255 | 0.805 |
| 1991 | 0.549 | 2.455 | 1.906 | 1.590 | 0.237 | 4.446 | 0.667 | 4.983 | 0.723 |
| 1992 | 0.483 | 2.181 | 1.698 | 1.473 | 0.205 | 4.175 | 0.584 | 4.560 | 0.617 |
| 1993 | 0.413 | 1.903 | 1.490 | 1.292 | 0.166 | 3.724 | 0.484 | 4.062 | 0.511 |
| 1994 | 0.426 | 1.641 | 1.215 | 1.049 | 0.137 | 3.030 | 0.397 | 3.314 | 0.421 |
| 1995 | 0.504 | 1.538 | 1.034 | 0.865 | 0.116 | 2.470 | 0.331 | 2.756 | 0.359 |
| 1996 | 0.608 | 1.590 | 0.982 | 0.783 | 0.106 | 2.167 | 0.296 | 2.502 | 0.329 |
| 1997 | 0.807 | 1.866 | 1.060 | 0.819 | 0.109 | 2.195 | 0.293 | 2.600 | 0.337 |
| 1998 | 1.022 | 2.313 | 1.290 | 0.973 | 0.123 | 2.550 | 0.319 | 3.084 | 0.388 |
| 1999 | 0.455 | 2.091 | 1.637 | 1.232 | 0.142 | 3.197 | 0.368 | 3.878 | 0.420 |
| 2000 | 0.463 | 1.987 | 1.524 | 1.333 | 0.144 | 3.612 | 0.386 | 3.942 | 0.409 |
| 2001 | 0.744 | 2.060 | 1.316 | 1.127 | 0.122 | 3.191 | 0.346 | 3.513 | 0.376 |
| 2002 | 0.870 | 2.216 | 1.346 | 1.053 | 0.114 | 2.914 | 0.312 | 3.407 | 0.356 |
| 2003 | 0.919 | 2.402 | 1.483 | 1.141 | 0.118 | 3.040 | 0.312 | 3.616 | 0.343 |
| 2004 | 0.613 | 2.253 | 1.640 | 1.275 | 0.128 | 3.359 | 0.330 | 3.975 | 0.414 |
| 2005 | 0.656 | 2.185 | 1.529 | 1.281 | 0.157 | 3.452 | 0.405 | 3.876 | 0.447 |
| 2006 | 1.081 | 2.520 | 1.439 | 1.177 | 0.148 | 3.229 | 0.403 | 3.674 | 0.444 |
| 2007 | 0.866 | 2.500 | 1.634 | 1.215 | 0.145 | 3.221 | 0.393 | 3.926 | 0.450 |
| 2008 | 1.166 | 2.867 | 1.701 | 1.356 | 0.152 | 3.573 | 0.404 | 4.156 | 0.456 |
| 2009 | 1.173 | 3.089 | 1.916 | 1.457 | 0.151 | 3.830 | 0.404 | 4.603 | 0.452 |
| 2010 | 0.797 | 2.892 | 2.095 | 1.631 | 0.156 | 4.277 | 0.412 | 5.060 | 0.478 |
| 2011 | 0.638 | 2.607 | 1.969 | 1.646 | 0.167 | 4.434 | 0.442 | 4.985 | 0.480 |
| 2012 | 0.533 | 2.261 | 1.728 | 1.470 | 0.149 | 4.086 | 0.412 | 4.526 | 0.440 |
| 2013 | 0.855 | 2.292 | 1.437 | 1.224 | 0.143 | 3.458 | 0.388 | 3.821 | 0.444 |
| 2014 | 0.804 | 2.263 | 1.459 | 1.127 | 0.195 | 3.098 | 0.477 | 3.656 | 0.655 |

Model 2.i

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Abundance | | | Legal (≥ 104 mm) | | | | MMB | |
| Year | Recruits | Total  (≥ 74 mm) | Mature  (≥ 94 mm) | Abundance | S.D | Biomass | S.D | Biomass | S.D. |
| 1976 | 1.433 | 7.466 | 6.033 | 4.616 | 1.002 | 11.161 | 2.578 | 13.560 | 2.789 |
| 1977 | 1.028 | 6.818 | 5.790 | 5.187 | 0.858 | 13.752 | 2.359 | 14.809 | 2.444 |
| 1978 | 0.582 | 5.381 | 4.800 | 4.358 | 0.603 | 12.444 | 1.821 | 13.216 | 1.783 |
| 1979 | 0.334 | 3.610 | 3.277 | 3.026 | 0.393 | 8.976 | 1.238 | 9.416 | 1.251 |
| 1980 | 0.452 | 2.227 | 1.775 | 1.636 | 0.270 | 4.926 | 0.851 | 5.169 | 0.871 |
| 1981 | 1.127 | 2.410 | 1.283 | 1.109 | 0.197 | 3.275 | 0.604 | 3.573 | 0.644 |
| 1982 | 0.955 | 2.376 | 1.421 | 1.008 | 0.207 | 2.616 | 0.560 | 3.307 | 0.686 |
| 1983 | 0.902 | 2.625 | 1.722 | 1.347 | 0.253 | 3.437 | 0.660 | 4.073 | 0.759 |
| 1984 | 1.204 | 3.057 | 1.853 | 1.497 | 0.272 | 3.915 | 0.722 | 4.519 | 0.821 |
| 1985 | 1.007 | 3.158 | 2.151 | 1.686 | 0.300 | 4.416 | 0.794 | 5.202 | 0.922 |
| 1986 | 0.982 | 3.210 | 2.228 | 1.827 | 0.325 | 4.852 | 0.871 | 5.534 | 0.976 |
| 1987 | 0.942 | 3.183 | 2.241 | 1.852 | 0.325 | 4.996 | 0.889 | 5.657 | 0.988 |
| 1988 | 0.706 | 2.960 | 2.254 | 1.878 | 0.317 | 5.122 | 0.875 | 5.762 | 0.959 |
| 1989 | 0.773 | 2.870 | 2.097 | 1.808 | 0.292 | 5.024 | 0.821 | 5.519 | 0.883 |
| 1990 | 0.738 | 2.732 | 1.994 | 1.688 | 0.261 | 4.726 | 0.740 | 5.247 | 0.805 |
| 1991 | 0.490 | 2.404 | 1.913 | 1.619 | 0.238 | 4.523 | 0.670 | 5.024 | 0.727 |
| 1992 | 0.455 | 2.157 | 1.702 | 1.499 | 0.207 | 4.249 | 0.589 | 4.600 | 0.621 |
| 1993 | 0.376 | 1.887 | 1.511 | 1.325 | 0.168 | 3.813 | 0.489 | 4.131 | 0.517 |
| 1994 | 0.382 | 1.617 | 1.235 | 1.083 | 0.139 | 3.127 | 0.404 | 3.387 | 0.427 |
| 1995 | 0.463 | 1.510 | 1.046 | 0.896 | 0.118 | 2.561 | 0.338 | 2.817 | 0.366 |
| 1996 | 0.580 | 1.573 | 0.993 | 0.814 | 0.109 | 2.256 | 0.303 | 2.561 | 0.336 |
| 1997 | 0.683 | 1.769 | 1.085 | 0.860 | 0.113 | 2.307 | 0.302 | 2.687 | 0.346 |
| 1998 | 1.005 | 2.277 | 1.272 | 1.006 | 0.128 | 2.656 | 0.331 | 3.106 | 0.395 |
| 1999 | 0.404 | 2.077 | 1.673 | 1.285 | 0.143 | 3.337 | 0.372 | 3.991 | 0.429 |
| 2000 | 0.397 | 1.941 | 1.544 | 1.366 | 0.145 | 3.713 | 0.391 | 4.022 | 0.414 |
| 2001 | 0.708 | 2.030 | 1.322 | 1.160 | 0.126 | 3.286 | 0.355 | 3.564 | 0.384 |
| 2002 | 0.816 | 2.189 | 1.373 | 1.102 | 0.117 | 3.046 | 0.319 | 3.504 | 0.365 |
| 2003 | 0.864 | 2.383 | 1.519 | 1.202 | 0.120 | 3.208 | 0.318 | 3.742 | 0.353 |
| 2004 | 0.545 | 2.230 | 1.685 | 1.346 | 0.138 | 3.555 | 0.350 | 4.130 | 0.437 |
| 2005 | 0.592 | 2.145 | 1.553 | 1.329 | 0.161 | 3.602 | 0.419 | 3.986 | 0.460 |
| 2006 | 1.019 | 2.474 | 1.455 | 1.221 | 0.151 | 3.361 | 0.413 | 3.761 | 0.453 |
| 2007 | 0.772 | 2.442 | 1.670 | 1.285 | 0.151 | 3.410 | 0.406 | 4.059 | 0.465 |
| 2008 | 1.090 | 2.800 | 1.710 | 1.402 | 0.155 | 3.719 | 0.414 | 4.242 | 0.464 |
| 2009 | 1.068 | 3.012 | 1.944 | 1.524 | 0.154 | 4.013 | 0.411 | 4.723 | 0.463 |
| 2010 | 0.769 | 2.881 | 2.112 | 1.693 | 0.162 | 4.460 | 0.426 | 5.170 | 0.497 |
| 2011 | 0.613 | 2.625 | 2.012 | 1.700 | 0.171 | 4.589 | 0.454 | 5.122 | 0.495 |
| 2012 | 0.474 | 2.265 | 1.791 | 1.543 | 0.155 | 4.278 | 0.427 | 4.704 | 0.458 |
| 2013 | 0.721 | 2.202 | 1.481 | 1.290 | 0.151 | 3.647 | 0.411 | 3.975 | 0.461 |
| 2014 | 0.721 | 2.171 | 1.450 | 1.175 | 0.200 | 3.256 | 0.496 | 3.721 | 0.641 |

Model 2.io

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Abundance | | | Legal (≥ 104 mm) | | | | MMB | |
| Year | Recruits | Total  (≥ 74 mm) | Mature  (≥ 94 mm) | Abundance | S.D | Biomass | S.D | Biomass | S.D. |
| 1976 | 1.505 | 6.653 | 5.148 | 3.870 | 0.868 | 9.242 | 2.186 | 11.401 | 2.433 |
| 1977 | 1.207 | 6.389 | 5.181 | 4.572 | 0.797 | 12.006 | 2.154 | 13.067 | 2.266 |
| 1978 | 0.608 | 5.130 | 4.522 | 4.018 | 0.568 | 11.305 | 1.705 | 12.178 | 1.646 |
| 1979 | 0.336 | 3.490 | 3.153 | 2.893 | 0.371 | 8.436 | 1.157 | 8.893 | 1.171 |
| 1980 | 0.452 | 2.173 | 1.721 | 1.581 | 0.260 | 4.698 | 0.811 | 4.943 | 0.831 |
| 1981 | 1.126 | 2.385 | 1.258 | 1.083 | 0.192 | 3.173 | 0.588 | 3.472 | 0.627 |
| 1982 | 0.940 | 2.339 | 1.399 | 0.985 | 0.203 | 2.544 | 0.549 | 3.238 | 0.673 |
| 1983 | 0.896 | 2.587 | 1.691 | 1.321 | 0.249 | 3.375 | 0.650 | 3.999 | 0.746 |
| 1984 | 1.313 | 3.131 | 1.818 | 1.466 | 0.266 | 3.839 | 0.710 | 4.437 | 0.808 |
| 1985 | 0.987 | 3.182 | 2.195 | 1.690 | 0.299 | 4.406 | 0.790 | 5.258 | 0.927 |
| 1986 | 0.936 | 3.185 | 2.249 | 1.855 | 0.329 | 4.920 | 0.880 | 5.592 | 0.979 |
| 1987 | 0.947 | 3.166 | 2.219 | 1.847 | 0.323 | 5.010 | 0.890 | 5.644 | 0.982 |
| 1988 | 0.681 | 2.914 | 2.233 | 1.857 | 0.311 | 5.082 | 0.864 | 5.722 | 0.945 |
| 1989 | 0.773 | 2.832 | 2.059 | 1.781 | 0.285 | 4.964 | 0.805 | 5.441 | 0.863 |
| 1990 | 0.774 | 2.737 | 1.963 | 1.658 | 0.254 | 4.648 | 0.721 | 5.168 | 0.784 |
| 1991 | 0.482 | 2.397 | 1.915 | 1.608 | 0.232 | 4.483 | 0.654 | 5.005 | 0.710 |
| 1992 | 0.490 | 2.192 | 1.703 | 1.502 | 0.203 | 4.254 | 0.579 | 4.598 | 0.610 |
| 1993 | 0.310 | 1.848 | 1.538 | 1.340 | 0.165 | 3.846 | 0.482 | 4.185 | 0.508 |
| 1994 | 0.378 | 1.588 | 1.210 | 1.082 | 0.137 | 3.139 | 0.398 | 3.360 | 0.417 |
| 1995 | 0.448 | 1.469 | 1.021 | 0.873 | 0.112 | 2.513 | 0.325 | 2.765 | 0.351 |
| 1996 | 0.565 | 1.526 | 0.960 | 0.786 | 0.103 | 2.187 | 0.288 | 2.482 | 0.320 |
| 1997 | 0.653 | 1.699 | 1.047 | 0.827 | 0.107 | 2.221 | 0.287 | 2.591 | 0.328 |
| 1998 | 1.010 | 2.227 | 1.217 | 0.962 | 0.121 | 2.546 | 0.314 | 2.976 | 0.375 |
| 1999 | 0.412 | 2.039 | 1.627 | 1.237 | 0.137 | 3.211 | 0.356 | 3.868 | 0.412 |
| 2000 | 0.404 | 1.922 | 1.518 | 1.339 | 0.141 | 3.633 | 0.379 | 3.942 | 0.401 |
| 2001 | 0.708 | 2.018 | 1.310 | 1.146 | 0.123 | 3.238 | 0.346 | 3.520 | 0.375 |
| 2002 | 0.830 | 2.194 | 1.365 | 1.092 | 0.115 | 3.014 | 0.315 | 3.474 | 0.359 |
| 2003 | 0.873 | 2.393 | 1.520 | 1.198 | 0.118 | 3.194 | 0.315 | 3.737 | 0.349 |
| 2004 | 0.544 | 2.233 | 1.689 | 1.346 | 0.135 | 3.557 | 0.344 | 4.137 | 0.427 |
| 2005 | 0.598 | 2.152 | 1.554 | 1.331 | 0.157 | 3.613 | 0.411 | 3.995 | 0.449 |
| 2006 | 1.029 | 2.487 | 1.457 | 1.221 | 0.147 | 3.367 | 0.404 | 3.769 | 0.443 |
| 2007 | 0.741 | 2.414 | 1.673 | 1.283 | 0.147 | 3.407 | 0.397 | 4.065 | 0.454 |
| 2008 | 1.114 | 2.801 | 1.687 | 1.391 | 0.152 | 3.702 | 0.407 | 4.205 | 0.454 |
| 2009 | 1.047 | 2.981 | 1.935 | 1.506 | 0.150 | 3.971 | 0.403 | 4.695 | 0.455 |
| 2010 | 0.772 | 2.857 | 2.084 | 1.674 | 0.159 | 4.415 | 0.420 | 5.111 | 0.487 |
| 2011 | 0.610 | 2.600 | 1.990 | 1.678 | 0.167 | 4.538 | 0.446 | 5.070 | 0.486 |
| 2012 | 0.477 | 2.249 | 1.772 | 1.526 | 0.152 | 4.233 | 0.421 | 4.655 | 0.451 |
| 2013 | 0.731 | 2.201 | 1.469 | 1.278 | 0.149 | 3.614 | 0.405 | 3.942 | 0.455 |
| 2014 | 0.720 | 2.167 | 1.447 | 1.168 | 0.197 | 3.233 | 0.490 | 3.705 | 0.637 |

Table 15. Summary of catch and model 0 estimated discards (million lb) for male Norton Sound red king crab from 1977 to 2013. Assumed average crab weight is 2.5 lb for the winter commercial catch and 2.0 lb for the subsistence catch.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Year* | *Summer*  *com* | *Winter*  *com* | *Winter*  *Sub* | *discards*  *Summer* | *discards Winter*  *Sub* | *discards Winter*  *com* | *Total* | *Catch/*  *MMB* |
| 1977 | 0.52 | 0.024 | 0.025 | 0.0122 | 0.0153 | 0.0010 | 0.5975 | 0.0389 |
| 1978 | 2.09 | 0.001 | 0.000 | 0.0332 | 0.0003 | 0.0000 | 2.1245 | 0.1571 |
| 1979 | 2.93 | 0.000 | 0.000 | 0.0402 | 0.0003 | 0.0000 | 2.9705 | 0.3112 |
| 1980 | 1.19 | 0.000 | 0.001 | 0.0208 | 0.0004 | 0.0000 | 1.2122 | 0.2324 |
| 1981 | 1.38 | 0.000 | 0.003 | 0.0630 | 0.0016 | 0.0000 | 1.4476 | 0.3986 |
| 1982 | 0.23 | 0.001 | 0.021 | 0.0163 | 0.0128 | 0.0002 | 0.2813 | 0.0853 |
| 1983 | 0.37 | 0.002 | 0.022 | 0.0231 | 0.0094 | 0.0004 | 0.4269 | 0.1049 |
| 1984 | 0.39 | 0.003 | 0.017 | 0.0246 | 0.0048 | 0.0004 | 0.4398 | 0.0969 |
| 1985 | 0.43 | 0.005 | 0.014 | 0.0246 | 0.0074 | 0.0007 | 0.4817 | 0.0922 |
| 1986 | 0.48 | 0.003 | 0.012 | 0.0225 | 0.0033 | 0.0003 | 0.5211 | 0.0939 |
| 1987 | 0.33 | 0.001 | 0.005 | 0.0139 | 0.0017 | 0.0001 | 0.3517 | 0.0615 |
| 1988 | 0.24 | 0.001 | 0.012 | 0.0085 | 0.0036 | 0.0001 | 0.2652 | 0.0456 |
| 1989 | 0.25 | 0.009 | 0.024 | 0.0081 | 0.0090 | 0.0009 | 0.3010 | 0.0543 |
| 1990 | 0.19 | 0.010 | 0.015 | 0.0067 | 0.0039 | 0.0008 | 0.2264 | 0.0431 |
| 1991 | 0 | 0.019 | 0.023 | 0.0000 | 0.0066 | 0.0013 | 0.0499 | 0.0100 |
| 1992 | 0.07 | 0.004 | 0.002 | 0.0020 | 0.0002 | 0.0003 | 0.0785 | 0.0172 |
| 1993 | 0.33 | 0.014 | 0.008 | 0.0087 | 0.0016 | 0.0012 | 0.3635 | 0.0895 |
| 1994 | 0.32 | 0.019 | 0.011 | 0.0091 | 0.0047 | 0.0021 | 0.3659 | 0.1104 |
| 1995 | 0.32 | 0.004 | 0.003 | 0.0116 | 0.0025 | 0.0007 | 0.3418 | 0.1240 |
| 1996 | 0.22 | 0.000 | 0.001 | 0.0107 | 0.0017 | 0.0000 | 0.2334 | 0.0933 |
| 1997 | 0.09 | 0.002 | 0.017 | 0.0056 | 0.0234 | 0.0005 | 0.1385 | 0.0533 |
| 1998 | 0.03 | 0.007 | 0.015 | 0.0020 | 0.0062 | 0.0008 | 0.0610 | 0.0198 |
| 1999 | 0.02 | 0.008 | 0.011 | 0.0012 | 0.0082 | 0.0006 | 0.0490 | 0.0126 |
| 2000 | 0.3 | 0.003 | 0.001 | 0.0083 | 0.0002 | 0.0003 | 0.3128 | 0.0793 |
| 2001 | 0.28 | 0.006 | 0.004 | 0.0105 | 0.0059 | 0.0010 | 0.3074 | 0.0875 |
| 2002 | 0.25 | 0.017 | 0.008 | 0.0134 | 0.0098 | 0.0028 | 0.3010 | 0.0884 |
| 2003 | 0.26 | 0.001 | 0.002 | 0.0150 | 0.0012 | 0.0002 | 0.2794 | 0.0773 |
| 2004 | 0.34 | 0.005 | 0.008 | 0.0156 | 0.0050 | 0.0006 | 0.3742 | 0.0941 |
| 2005 | 0.4 | 0.000 | 0.002 | 0.0144 | 0.0017 | 0.0000 | 0.4181 | 0.1079 |
| 2006 | 0.45 | 0.008 | 0.021 | 0.0218 | 0.0215 | 0.0013 | 0.5236 | 0.1425 |
| 2007 | 0.31 | 0.014 | 0.019 | 0.0185 | 0.0183 | 0.0024 | 0.3822 | 0.0974 |
| 2008 | 0.39 | 0.012 | 0.010 | 0.0214 | 0.0044 | 0.0021 | 0.4399 | 0.1059 |
| 2009 | 0.4 | 0.012 | 0.014 | 0.0237 | 0.0039 | 0.0015 | 0.4551 | 0.0989 |
| 2010 | 0.42 | 0.008 | 0.013 | 0.0195 | 0.0051 | 0.0008 | 0.4664 | 0.0922 |
| 2011 | 0.4 | 0.023 | 0.018 | 0.0133 | 0.0081 | 0.0019 | 0.4643 | 0.0931 |
| 2012 | 0.47 | 0.057 | 0.018 | 0.0138 | 0.0278 | 0.0069 | 0.5935 | 0.1311 |
| 2013 | 0.35 | 0.057 | 0.018 | 0.0146 | 0.0278 | 0.0084 | 0.4758 | 0.1245 |

Model 2.i

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Year* | *Summer*  *com* | *Winter*  *com* | *Winter*  *Sub* | *discards*  *Summer* | *discards Winter*  *Sub* | *discards Winter*  *com* | *Total* | *Catch/*  *MMB* |
| 1977 | 0.52 | 0.000 | 0.025 | 0.0113 | 0.0153 | 0.0011 | 0.5727 | 0.0387 |
| 1978 | 2.09 | 0.024 | 0.000 | 0.0310 | 0.0003 | 0.0000 | 2.1453 | 0.1623 |
| 1979 | 2.93 | 0.001 | 0.000 | 0.0374 | 0.0003 | 0.0000 | 2.9687 | 0.3153 |
| 1980 | 1.19 | 0.000 | 0.001 | 0.0184 | 0.0004 | 0.0000 | 1.2098 | 0.2340 |
| 1981 | 1.38 | 0.000 | 0.003 | 0.0574 | 0.0016 | 0.0000 | 1.4420 | 0.4036 |
| 1982 | 0.23 | 0.000 | 0.021 | 0.0143 | 0.0128 | 0.0003 | 0.2784 | 0.0842 |
| 1983 | 0.37 | 0.001 | 0.022 | 0.0206 | 0.0094 | 0.0004 | 0.4234 | 0.1040 |
| 1984 | 0.39 | 0.002 | 0.017 | 0.0219 | 0.0048 | 0.0005 | 0.4362 | 0.0965 |
| 1985 | 0.43 | 0.003 | 0.014 | 0.0217 | 0.0074 | 0.0008 | 0.4769 | 0.0917 |
| 1986 | 0.48 | 0.005 | 0.012 | 0.0201 | 0.0033 | 0.0004 | 0.5208 | 0.0941 |
| 1987 | 0.33 | 0.003 | 0.005 | 0.0122 | 0.0017 | 0.0001 | 0.3520 | 0.0622 |
| 1988 | 0.24 | 0.001 | 0.012 | 0.0078 | 0.0036 | 0.0001 | 0.2645 | 0.0459 |
| 1989 | 0.25 | 0.001 | 0.024 | 0.0075 | 0.0090 | 0.0011 | 0.2926 | 0.0530 |
| 1990 | 0.19 | 0.009 | 0.015 | 0.0060 | 0.0039 | 0.0009 | 0.2248 | 0.0428 |
| 1991 | 0 | 0.010 | 0.023 | 0.0000 | 0.0066 | 0.0015 | 0.0411 | 0.0082 |
| 1992 | 0.07 | 0.019 | 0.002 | 0.0019 | 0.0002 | 0.0004 | 0.0935 | 0.0203 |
| 1993 | 0.33 | 0.004 | 0.008 | 0.0086 | 0.0016 | 0.0013 | 0.3535 | 0.0856 |
| 1994 | 0.32 | 0.014 | 0.011 | 0.0089 | 0.0047 | 0.0024 | 0.3610 | 0.1066 |
| 1995 | 0.32 | 0.019 | 0.003 | 0.0113 | 0.0025 | 0.0008 | 0.3566 | 0.1266 |
| 1996 | 0.22 | 0.004 | 0.001 | 0.0107 | 0.0017 | 0.0000 | 0.2374 | 0.0927 |
| 1997 | 0.09 | 0.000 | 0.017 | 0.0054 | 0.0234 | 0.0006 | 0.1364 | 0.0508 |
| 1998 | 0.03 | 0.002 | 0.015 | 0.0020 | 0.0062 | 0.0008 | 0.0560 | 0.0180 |
| 1999 | 0.02 | 0.007 | 0.011 | 0.0011 | 0.0082 | 0.0006 | 0.0479 | 0.0120 |
| 2000 | 0.3 | 0.008 | 0.001 | 0.0081 | 0.0002 | 0.0004 | 0.3177 | 0.0790 |
| 2001 | 0.28 | 0.003 | 0.004 | 0.0106 | 0.0059 | 0.0012 | 0.3047 | 0.0855 |
| 2002 | 0.25 | 0.006 | 0.008 | 0.0134 | 0.0098 | 0.0032 | 0.2904 | 0.0829 |
| 2003 | 0.26 | 0.017 | 0.002 | 0.0147 | 0.0012 | 0.0002 | 0.2951 | 0.0789 |
| 2004 | 0.34 | 0.001 | 0.008 | 0.0147 | 0.0050 | 0.0006 | 0.3693 | 0.0894 |
| 2005 | 0.4 | 0.005 | 0.002 | 0.0139 | 0.0017 | 0.0000 | 0.4226 | 0.1060 |
| 2006 | 0.45 | 0.000 | 0.021 | 0.0221 | 0.0215 | 0.0014 | 0.5160 | 0.1372 |
| 2007 | 0.31 | 0.008 | 0.019 | 0.0173 | 0.0183 | 0.0028 | 0.3754 | 0.0925 |
| 2008 | 0.39 | 0.014 | 0.010 | 0.0214 | 0.0044 | 0.0023 | 0.4421 | 0.1042 |
| 2009 | 0.4 | 0.012 | 0.014 | 0.0229 | 0.0039 | 0.0016 | 0.4544 | 0.0962 |
| 2010 | 0.42 | 0.012 | 0.013 | 0.0188 | 0.0051 | 0.0009 | 0.4698 | 0.0909 |
| 2011 | 0.4 | 0.008 | 0.018 | 0.0136 | 0.0081 | 0.0020 | 0.4497 | 0.0878 |
| 2012 | 0.47 | 0.023 | 0.025 | 0.0134 | 0.0278 | 0.0075 | 0.5667 | 0.1205 |
| 2013 | 0.35 | 0.057 | 0.018 | 0.0137 | 0.0278 | 0.0090 | 0.4755 | 0.1196 |

Model 2.io

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Year* | *Summer*  *com* | *Winter*  *com* | *Winter*  *Sub* | *discards*  *Summer* | *discards Winter*  *Sub* | *discards Winter*  *com* | *Total* | *Catch/*  *MMB* |
| 1977 | 0.52 | 0.000 | 0.025 | 0.0137 | 0.0153 | 0.0005 | 0.5745 | 0.0440 |
| 1978 | 2.09 | 0.024 | 0.000 | 0.0372 | 0.0003 | 0.0000 | 2.1515 | 0.1767 |
| 1979 | 2.93 | 0.001 | 0.000 | 0.0403 | 0.0003 | 0.0000 | 2.9716 | 0.3342 |
| 1980 | 1.19 | 0.000 | 0.001 | 0.0191 | 0.0004 | 0.0000 | 1.2105 | 0.2449 |
| 1981 | 1.38 | 0.000 | 0.003 | 0.0589 | 0.0016 | 0.0000 | 1.4435 | 0.4158 |
| 1982 | 0.23 | 0.000 | 0.021 | 0.0146 | 0.0128 | 0.0001 | 0.2785 | 0.0860 |
| 1983 | 0.37 | 0.001 | 0.022 | 0.0208 | 0.0094 | 0.0002 | 0.4234 | 0.1059 |
| 1984 | 0.39 | 0.002 | 0.017 | 0.0233 | 0.0048 | 0.0002 | 0.4373 | 0.0986 |
| 1985 | 0.43 | 0.003 | 0.014 | 0.0226 | 0.0074 | 0.0003 | 0.4773 | 0.0908 |
| 1986 | 0.48 | 0.005 | 0.012 | 0.0193 | 0.0033 | 0.0001 | 0.5197 | 0.0929 |
| 1987 | 0.33 | 0.003 | 0.005 | 0.0120 | 0.0017 | 0.0000 | 0.3517 | 0.0623 |
| 1988 | 0.24 | 0.001 | 0.012 | 0.0078 | 0.0036 | 0.0000 | 0.2644 | 0.0462 |
| 1989 | 0.25 | 0.001 | 0.024 | 0.0074 | 0.0090 | 0.0004 | 0.2918 | 0.0536 |
| 1990 | 0.19 | 0.009 | 0.015 | 0.0063 | 0.0039 | 0.0004 | 0.2246 | 0.0435 |
| 1991 | 0 | 0.010 | 0.023 | 0.0000 | 0.0066 | 0.0006 | 0.0402 | 0.0080 |
| 1992 | 0.07 | 0.019 | 0.002 | 0.0019 | 0.0002 | 0.0001 | 0.0932 | 0.0203 |
| 1993 | 0.33 | 0.004 | 0.008 | 0.0082 | 0.0016 | 0.0005 | 0.3523 | 0.0842 |
| 1994 | 0.32 | 0.014 | 0.011 | 0.0079 | 0.0047 | 0.0010 | 0.3586 | 0.1067 |
| 1995 | 0.32 | 0.019 | 0.003 | 0.0111 | 0.0025 | 0.0003 | 0.3559 | 0.1287 |
| 1996 | 0.22 | 0.004 | 0.001 | 0.0106 | 0.0017 | 0.0000 | 0.2373 | 0.0956 |
| 1997 | 0.09 | 0.000 | 0.017 | 0.0053 | 0.0234 | 0.0002 | 0.1359 | 0.0525 |
| 1998 | 0.03 | 0.002 | 0.015 | 0.0020 | 0.0062 | 0.0003 | 0.0555 | 0.0186 |
| 1999 | 0.02 | 0.007 | 0.011 | 0.0012 | 0.0082 | 0.0003 | 0.0477 | 0.0123 |
| 2000 | 0.3 | 0.008 | 0.001 | 0.0082 | 0.0002 | 0.0002 | 0.3176 | 0.0806 |
| 2001 | 0.28 | 0.003 | 0.004 | 0.0105 | 0.0059 | 0.0005 | 0.3039 | 0.0863 |
| 2002 | 0.25 | 0.006 | 0.008 | 0.0133 | 0.0098 | 0.0013 | 0.2884 | 0.0830 |
| 2003 | 0.26 | 0.017 | 0.002 | 0.0147 | 0.0012 | 0.0001 | 0.2950 | 0.0789 |
| 2004 | 0.34 | 0.001 | 0.008 | 0.0145 | 0.0050 | 0.0003 | 0.3688 | 0.0891 |
| 2005 | 0.4 | 0.005 | 0.002 | 0.0136 | 0.0017 | 0.0000 | 0.4223 | 0.1057 |
| 2006 | 0.45 | 0.000 | 0.021 | 0.0218 | 0.0215 | 0.0006 | 0.5149 | 0.1366 |
| 2007 | 0.31 | 0.008 | 0.019 | 0.0169 | 0.0183 | 0.0011 | 0.3733 | 0.0918 |
| 2008 | 0.39 | 0.014 | 0.010 | 0.0210 | 0.0044 | 0.0009 | 0.4403 | 0.1047 |
| 2009 | 0.4 | 0.012 | 0.014 | 0.0228 | 0.0039 | 0.0007 | 0.4534 | 0.0966 |
| 2010 | 0.42 | 0.012 | 0.013 | 0.0185 | 0.0051 | 0.0004 | 0.4690 | 0.0918 |
| 2011 | 0.4 | 0.008 | 0.018 | 0.0135 | 0.0081 | 0.0008 | 0.4484 | 0.0884 |
| 2012 | 0.47 | 0.023 | 0.025 | 0.0133 | 0.0278 | 0.0031 | 0.5622 | 0.1208 |
| 2013 | 0.35 | 0.057 | 0.018 | 0.0136 | 0.0278 | 0.0036 | 0.4700 | 0.1192 |