

Supplementary Tables:

Meta-population Modeling of Narwhals, Monodon monoceros, in East Canada and West Greenland

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| Year | E_s | Q_s | Up_s | Um_f | D_w |
|------|-------|-------|--------|--------|-------|
| 1970 | 0 | 184 | 70 | 86 | 129 |
| 1971 | 0 | 176 | 45 | 60 | 134 |
| 1972 | 0 | 169 | 24 | 35 | 78 |
| 1973 | 0 | 162 | 53 | 83 | 120 |
| 1974 | 0 | 155 | 35 | 61 | 83 |
| 1975 | 0 | 147 | 62 | 14 | 66 |
| 1976 | 0 | 140 | 25 | 35 | 74 |
| 1977 | 0 | 133 | 71 | 147 | 40 |
| 1978 | 0 | 116 | 64 | 238 | 342 |
| 1979 | 0 | 126 | 25 | 172 | 134 |
| 1980 | 0 | 137 | 70 | 190 | 163 |
| 1981 | 0 | 168 | 95 | 182 | 348 |
| 1982 | 0 | 172 | 68 | 211 | 99 |
| 1983 | 0 | 142 | 83 | 213 | 88 |
| 1984 | 0 | 288 | 92 | 273 | 87 |
| 1985 | 0 | 121 | 39 | 51 | 88 |
| 1986 | 0 | 173 | 93 | 126 | 203 |
| 1987 | 0 | 163 | 167 | 434 | 203 |
| 1988 | 0 | 153 | 98 | 294 | 203 |
| 1989 | 0 | 142 | 43 | 374 | 203 |
| 1990 | 0 | 132 | 146 | 1325 | 203 |
| 1991 | 0 | 122 | 104 | 290 | 203 |
| 1992 | 0 | 111 | 43 | 374 | 203 |
| 1993 | 4 | 109 | 117 | 391 | 134 |
| 1994 | 2 | 95 | 173 | 386 | 203 |
| 1995 | 0 | 92 | 130 | 207 | 163 |
| 1996 | 0 | 39 | 89 | 527 | 224 |
| 1997 | 4 | 57 | 113 | 495 | 272 |
| 1998 | 3 | 71 | 147 | 447 | 295 |
| 1999 | 18 | 91 | 150 | 329 | 335 |
| 2000 | 21 | 89 | 177 | 138 | 255 |
| 2001 | 32 | 103 | 198 | 124 | 182 |
| 2002 | 24 | 61 | 204 | 234 | 163 |
| 2003 | 37 | 69 | 182 | 226 | 157 |
| 2004 | 55 | 117 | 78 | 87 | 99 |
| 2005 | 55 | 83 | 89 | 209 | 51 |
| 2006 | 20 | 58 | 92 | 94 | 73 |
| 2007 | 0 | 141 | 123 | 87 | 86 |
| 2008 | 7 | 140 | 120 | 113 | 61 |
| 2009 | 6 | 97 | 177 | 118 | 116 |
| 2010 | 10 | 114 | 52 | 55 | 59 |
| 2011 | 2 | 56 | 91 | 100 | 52 |
| 2012 | 3 | 134 | 96 | 55 | 72 |
| 2013 | 0 | 87 | 82 | 101 | 66 |
| 2014 | 0 | 107 | 130 | 90 | 65 |

Table S1: Estimated total removal per hunting region in Greenland per year. E_s :Etah (Spring). Q_s :Qaanaaq (Summer). Up_s :Upernavik (Summer). Um_f :Ummannaq (Fall). D_w :Disko Bay (Winter). From Garde and Heide-Jørgensen (2019).

| Year | G _s | G _s | G _f | C _s | C _s | C _f | A _s | A _s | A _f | P _s | P _s | P _f | B _s | B _s | B _f | S _s | S _s | S _f | S _w |
|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1970 | 11 | 37 | 34 | 4 | 30 | 18 | 112 | 22 | 21 | 145 | 75 | 30 | 7 | 12 | 30 | 8 | 2 | 1 | 0 |
| 1971 | 6 | 19 | 17 | 4 | 32 | 21 | 112 | 23 | 21 | 141 | 74 | 30 | 10 | 20 | 43 | 26 | 4 | 3 | 0 |
| 1972 | 2 | 7 | 5 | 4 | 35 | 20 | 121 | 26 | 23 | 44 | 22 | 8 | 6 | 14 | 28 | 27 | 5 | 4 | 0 |
| 1973 | 3 | 18 | 12 | 4 | 62 | 30 | 183 | 37 | 33 | 264 | 136 | 60 | 3 | 6 | 11 | 0 | 1 | 0 | 0 |
| 1974 | 2 | 6 | 3 | 3 | 32 | 18 | 66 | 12 | 10 | 139 | 63 | 29 | 13 | 26 | 56 | 34 | 5 | 4 | 0 |
| 1975 | 2 | 6 | 3 | 6 | 36 | 19 | 220 | 35 | 30 | 107 | 46 | 25 | 4 | 12 | 17 | 34 | 4 | 4 | 0 |
| 1976 | 4 | 9 | 5 | 7 | 33 | 17 | 147 | 27 | 22 | 171 | 78 | 40 | 5 | 12 | 18 | 16 | 2 | 2 | 0 |
| 1977 | 0 | 0 | 0 | 0 | 13 | 36 | 23 | 22 | 19 | 144 | 69 | 34 | 0 | 14 | 111 | 6 | 0 | 0 | 0 |
| 1978 | 0 | 0 | 0 | 5 | 14 | 5 | 83 | 16 | 12 | 198 | 100 | 48 | 6 | 15 | 29 | 3 | 0 | 1 | 0 |
| 1979 | 0 | 2 | 19 | 0 | 4 | 15 | 42 | 6 | 8 | 118 | 97 | 0 | 25 | 6 | 23 | 23 | 27 | 3 | 0 |
| 1980 | 0 | 0 | 0 | 1 | 44 | 1 | 160 | 0 | 18 | 121 | 66 | 34 | 14 | 50 | 75 | 40 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 20 | 86 | 113 | 34 | 20 | 101 | 58 | 29 | 15 | 52 | 77 | 53 | 8 | 23 | 0 |
| 1982 | 0 | 45 | 0 | 4 | 73 | 0 | 99 | 31 | 19 | 188 | 52 | 0 | 0 | 9 | 103 | 56 | 11 | 27 | 0 |
| 1983 | 0 | 3 | 2 | 0 | 64 | 29 | 141 | 18 | 14 | 81 | 71 | 78 | 38 | 42 | 36 | 4 | 2 | 0 | 0 |
| 1984 | 2 | 2 | 0 | 0 | 0 | 0 | 164 | 5 | 0 | 94 | 8 | 8 | 15 | 60 | 66 | 68 | 0 | 0 | 0 |
| 1985 | 7 | 6 | 2 | 11 | 18 | 8 | 183 | 0 | 0 | 141 | 27 | 62 | 8 | 78 | 5 | 36 | 2 | 0 | 0 |
| 1986 | 2 | 2 | 0 | 4 | 10 | 5 | 87 | 45 | 29 | 113 | 83 | 31 | 2 | 7 | 11 | 22 | 8 | 26 | 0 |
| 1987 | 2 | 2 | 0 | 4 | 11 | 6 | 22 | 11 | 7 | 57 | 44 | 17 | 9 | 35 | 65 | 0 | 0 | 0 | 0 |
| 1988 | 6 | 6 | 1 | 4 | 12 | 8 | 75 | 39 | 24 | 55 | 49 | 16 | 17 | 44 | 56 | 1 | 0 | 2 | 0 |
| 1989 | 4 | 4 | 1 | 7 | 21 | 11 | 86 | 46 | 27 | 74 | 74 | 25 | 15 | 47 | 74 | 28 | 9 | 34 | 0 |
| 1990 | 9 | 12 | 3 | 4 | 17 | 8 | 39 | 28 | 16 | 32 | 39 | 14 | 8 | 35 | 61 | 3 | 1 | 2 | 0 |
| 1991 | 10 | 13 | 3 | 4 | 18 | 15 | 65 | 49 | 26 | 46 | 55 | 21 | 10 | 40 | 66 | 3 | 2 | 5 | 0 |
| 1992 | 1 | 1 | 0 | 3 | 23 | 7 | 56 | 41 | 29 | 48 | 54 | 19 | 8 | 38 | 53 | 2 | 1 | 3 | 0 |
| 1993 | 5 | 6 | 1 | 5 | 30 | 10 | 46 | 36 | 22 | 38 | 43 | 15 | 9 | 43 | 65 | 12 | 5 | 15 | 0 |
| 1994 | 6 | 7 | 3 | 4 | 28 | 12 | 54 | 42 | 25 | 44 | 47 | 21 | 8 | 36 | 58 | 16 | 6 | 21 | 0 |
| 1995 | 5 | 5 | 2 | 3 | 26 | 12 | 33 | 9 | 16 | 90 | 0 | 0 | 8 | 34 | 61 | 3 | 1 | 4 | 0 |
| 1996 | 0 | 1 | 0 | 1 | 13 | 7 | 59 | 43 | 20 | 40 | 57 | 26 | 3 | 14 | 28 | 8 | 3 | 14 | 0 |
| 1997 | 0 | 1 | 0 | 2 | 21 | 12 | 40 | 29 | 13 | 28 | 43 | 21 | 5 | 26 | 57 | 1 | 0 | 1 | 0 |
| 1998 | 4 | 7 | 2 | 4 | 47 | 17 | 54 | 41 | 18 | 21 | 106 | 2 | 5 | 29 | 57 | 2 | 1 | 2 | 0 |
| 1999 | 8 | 11 | 2 | 3 | 12 | 8 | 49 | 45 | 16 | 17 | 106 | 39 | 1 | 29 | 79 | 14 | 4 | 25 | 0 |
| 2000 | 8 | 11 | 2 | 2 | 38 | 12 | 66 | 64 | 23 | 69 | 79 | 58 | 18 | 79 | 153 | 9 | 44 | 0 | 0 |
| 2001 | 12 | 16 | 3 | 6 | 54 | 37 | 67 | 71 | 24 | 27 | 32 | 21 | 13 | 53 | 108 | 11 | 1 | 14 | 0 |
| 2002 | 3 | 0 | 0 | 0 | 37 | 21 | 22 | 11 | 63 | 48 | 29 | 0 | 0 | 98 | 73 | 9 | 0 | 30 | 0 |
| 2003 | 0 | 10 | 0 | 4 | 32 | 2 | 60 | 84 | 15 | 32 | 40 | 10 | 12 | 73 | 105 | 36 | 0 | 1 | 0 |
| 2004 | 0 | 3 | 9 | 0 | 13 | 59 | 81 | 50 | 21 | 27 | 14 | 39 | 34 | 71 | 94 | 12 | 0 | 21 | 0 |
| 2005 | 1 | 0 | 0 | 0 | 43 | 26 | 83 | 93 | 1 | 26 | 25 | 20 | 14 | 10 | 133 | 0 | 0 | 6 | 0 |
| 2006 | 0 | 26 | 0 | 1 | 73 | 74 | 170 | 3 | 3 | 25 | 56 | 20 | 5 | 45 | 111 | 0 | 0 | 1 | 0 |
| 2007 | 4 | 21 | 0 | 0 | 44 | 12 | 90 | 72 | 5 | 8 | 35 | 32 | 10 | 31 | 120 | 4 | 1 | 0 | 0 |
| 2008 | 0 | 23 | 5 | 0 | 45 | 8 | 65 | 78 | 35 | 16 | 58 | 9 | 2 | 52 | 65 | 0 | 4 | 22 | 0 |
| 2009 | 5 | 1 | 0 | 3 | 22 | 46 | 23 | 150 | 1 | 24 | 6 | 21 | 9 | 25 | 93 | 10 | 0 | 40 | 0 |
| 2010 | 10 | 16 | 0 | 2 | 48 | 14 | 51 | 89 | 32 | 20 | 15 | 37 | 17 | 77 | 76 | 14 | 1 | 20 | 0 |
| 2011 | 14 | 10 | 2 | 8 | 51 | 4 | 38 | 112 | 26 | 45 | 81 | 3 | 7 | 23 | 125 | 2 | 0 | 4 | 0 |
| 2012 | 2 | 17 | 0 | 0 | 47 | 23 | 4 | 65 | 100 | 25 | 63 | 23 | 9 | 31 | 98 | 0 | 1 | 10 | 0 |
| 2013 | 5 | 0 | 4 | 1 | 33 | 23 | 43 | 167 | 4 | 30 | 82 | 58 | 11 | 9 | 143 | 3 | 1 | 18 | 0 |
| 2014 | 1 | 0 | 9 | 0 | 45 | 32 | 63 | 46 | 81 | 33 | 63 | 59 | 16 | 22 | 140 | 1 | 0 | 11 | 0 |

Table S2: Estimated total removal per hunting region in Canada per year. G_s:Grise Fjord (Spring). G_s:Grise Fjord (Summer). G_f:Grise Fjord (Fall). C_s:CCA (Spring). C_s:CCA (Summer). C_f:CCA (Fall). A_s:Arctic Bay (Spring). A_s:Arctic Bay (Summer). A_f:Arctic Bay (Fall). P_s:Pond Inlet (Spring). P_s:Pond Inlet (Summer). P_f:Pond Inlet (Fall). B_s:BIC (Spring). B_s:BIC (Summer). B_f:BIC (Fall). S_s:BIS (Spring). S_s:BIS (Summer). S_f:BIS (Fall). S_w:BIS (Winter). From Watt and Hall (2018).

| M | n_S | n_R | Unique | Max |
|------------|-------|-------|--------|-----|
| Smith | 500 | 5 | 4964 | 2 |
| Jones | 500 | 5 | 4926 | 2 |
| Inglefield | 2000 | 5 | 3672 | 11 |
| Melville | 500 | 5 | 4794 | 3 |
| Somerset | 500 | 5 | 4747 | 4 |
| Admiralty | 500 | 5 | 4915 | 3 |
| Eclipse | 500 | 5 | 4907 | 2 |
| Baffin | 500 | 5 | 4899 | 3 |

Table S3: Sampling statistics for the different models (M). The number of parameter sets in the sample (n_S) and the resample (n_R), the number of unique parameter sets in the resample, and the maximum number of occurrences of a unique parameter set in the resample. n_S and n_R are given in thousands.

| P | smith | jones | ingle | melvi | somer | admir | eclip | baffi |
|------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.50 | 284 | 231 | 147 | 108 | 914 | 394 | 398 | 192 |
| 0.55 | 259 | 215 | 135 | 102 | 871 | 371 | 377 | 180 |
| 0.60 | 231 | 200 | 123 | 97 | 828 | 347 | 354 | 169 |
| 0.65 | 206 | 186 | 111 | 90 | 780 | 325 | 332 | 158 |
| 0.70 | 185 | 171 | 98 | 82 | 732 | 301 | 310 | 147 |
| 0.75 | 165 | 156 | 83 | 72 | 684 | 273 | 287 | 135 |
| 0.80 | 144 | 141 | 68 | 63 | 635 | 243 | 262 | 123 |
| 0.85 | 123 | 126 | 52 | 53 | 580 | 213 | 234 | 110 |
| 0.90 | 100 | 106 | 33 | 40 | 512 | 177 | 198 | 94 |
| 0.95 | 67 | 78 | 5 | 21 | 403 | 124 | 151 | 72 |

Table S4: Catch objective trade-off per stock. The total annual removals per stock that meet given probabilities (P) of meeting the management objective. From Witting (2015), with a projection period from 2015 to 2020.