

The following supplement accompanies the article

Community-wide decline in the importance of lesser sandeels *Ammodytes marinus* in seabird chick diet at a North Sea colony

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Marine Ecology Progress Series 600: 193–206 (2018)

Table S1 Details of food samples collected from seabirds on the Isle of May. Dates of first and last food samples are given as Day of the Year (DOY) with Day 1 = 1st January

(a) Atlantic puffin *Fratercula arctica*

| Year | First date (DOY) | Last date (DOY) | No. of loads | No. of fish | Total mass (g) | Proportion of loads | Proportion of fish | | Proportion of biomass | | |
|------|------------------|-----------------|--------------|-------------|----------------|---------------------|--------------------|------------|-----------------------|------------|-----------|
| | | | | | | with sandeels | 0 sandeel | 1+ sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 1973 | 184 | 200 | 59 | 342 | 564 | 0.712 | 0.939 | 0.009 | 0.860 | 0.070 | 0.050 |
| 1974 | 154 | 216 | 101 | 601 | 1112 | 0.782 | 0.644 | 0.040 | 0.320 | 0.160 | 0.500 |
| 1975 | 151 | 198 | 129 | 464 | 1189 | 0.248 | 0.170 | 0.028 | 0.090 | 0.060 | 0.850 |
| 1976 | 155 | 216 | 167 | 694 | 1185 | 0.503 | 0.569 | 0.009 | 0.380 | 0.030 | 0.510 |
| 1977 | 151 | 215 | 119 | 577 | 1337 | 0.529 | 0.478 | 0.031 | 0.250 | 0.070 | 0.670 |
| 1978 | 156 | 207 | 109 | 514 | 1288 | 0.890 | 0.498 | 0.043 | 0.340 | 0.110 | 0.530 |
| 1979 | 175 | 213 | 99 | 445 | 1463 | 0.869 | 0.476 | 0.191 | 0.270 | 0.430 | 0.270 |
| 1980 | 170 | 214 | 56 | 331 | 981 | 0.980 | 0.647 | 0.139 | 0.560 | 0.260 | 0.170 |
| 1981 | 155 | 220 | 96 | 457 | 1152 | 0.510 | 0.573 | 0.083 | 0.480 | 0.220 | 0.290 |
| 1982 | 153 | 195 | 90 | 351 | 964 | 0.667 | 0.311 | 0.228 | 0.100 | 0.590 | 0.260 |
| 1983 | 153 | 214 | 142 | 619 | 1549 | 0.958 | 0.719 | 0.134 | 0.460 | 0.470 | 0.040 |

| Year | First date (DOY) | Last date (DOY) | No. of loads | No. of fish | Total mass (g) | Proportion of loads | Proportion of fish | | Proportion of biomass | | |
|------|---------------------|--------------------|--------------|-------------|----------------|---------------------|--------------------|------------|-----------------------|------------|-----------|
| | | | | | | with sandeels | 0 sandeel | 1+ sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 1984 | 149 | 211 | 214 | 948 | 2163 | 0.724 | 0.390 | 0.143 | 0.260 | 0.430 | 0.300 |
| 1985 | 147 | 213 | 143 | 1052 | 1277 | 0.951 | 0.764 | 0.105 | 0.420 | 0.470 | 0.110 |
| 1986 | 158 | 196 | 137 | 375 | 792 | 0.869 | 0.413 | 0.229 | 0.130 | 0.700 | 0.110 |
| 1987 | 166 | 194 | 137 | 390 | 1099 | 0.664 | 0.421 | 0.336 | 0.130 | 0.660 | 0.210 |
| 1988 | 165 | 186 | 119 | 859 | 1037 | 0.840 | 0.825 | 0.037 | 0.600 | 0.260 | 0.130 |
| 1989 | 165 | 191 | 101 | 630 | 947 | 0.990 | 0.902 | 0.005 | 0.880 | 0.010 | 0.100 |
| 1990 | 159 | 188 | 110 | 500 | 776 | 0.991 | 0.900 | 0.028 | 0.810 | 0.110 | 0.040 |
| 1991 | 157 | 188 | 130 | 963 | 1193 | 0.985 | 0.812 | 0.075 | 0.550 | 0.340 | 0.040 |
| 1992 | 146 | 197 | 125 | 822 | 1108 | 0.936 | 0.729 | 0.085 | 0.500 | 0.360 | 0.010 |
| 1993 | 160 | 193 | 211 | 1234 | 1882 | 0.602 | 0.590 | 0.044 | 0.230 | 0.160 | 0.610 |
| 1994 | 170 | 194 | 146 | 1102 | 1280 | 0.979 | 0.686 | 0.041 | 0.420 | 0.140 | 0.430 |
| 1995 | 169 | 194 | 95 | 577 | 985 | 0.737 | 0.596 | 0.120 | 0.250 | 0.310 | 0.440 |
| 1996 | 166 | 198 | 118 | 980 | 1134 | 0.992 | 0.869 | 0.028 | 0.740 | 0.140 | 0.070 |
| 1997 | 154 | 189 | 89 | 732 | 1056 | 0.933 | 0.873 | 0.034 | 0.720 | 0.160 | 0.120 |
| 1998 | 164 | 212 | 333 | 3112 | 2664 | 0.958 | 0.923 | 0.025 | 0.750 | 0.110 | 0.130 |
| 1999 | 151 | 191 | 212 | 1960 | 1759 | 0.708 | 0.735 | 0.016 | 0.430 | 0.090 | 0.420 |
| 2000 | 149 | 194 | 230 | 1984 | 2479 | 0.987 | 0.873 | 0.041 | 0.750 | 0.140 | 0.100 |
| 2001 | 153 | 195 | 219 | 2288 | 2193 | 0.881 | 0.809 | 0.035 | 0.550 | 0.130 | 0.310 |
| 2002 | 146 | 197 | 189 | 1805 | 1506 | 0.974 | 0.882 | 0.057 | 0.690 | 0.240 | 0.040 |
| 2003 | 151 | 193 | 223 | 2516 | 2034 | 0.951 | 0.906 | 0.024 | 0.730 | 0.080 | 0.160 |
| 2004 | 150 | 206 | 271 | 3843 | 1736 | 0.797 | 0.891 | 0.033 | 0.630 | 0.140 | 0.200 |
| 2005 | 157 | 216 | 226 | 3040 | 2004 | 0.885 | 0.913 | 0.006 | 0.680 | 0.030 | 0.260 |
| 2006 | 155 | 211 | 172 | 2289 | 1529 | 0.797 | 0.898 | 0.001 | 0.590 | 0.010 | 0.330 |
| 2007 | 147 | 204 | 132 | 1881 | 784 | 0.917 | 0.819 | 0.003 | 0.700 | 0.030 | 0.200 |
| 2008 | 155 | 217 | 106 | 1614 | 687 | 0.925 | 0.606 | 0.001 | 0.610 | 0.000 | 0.120 |
| 2009 | 145 | 208 | 114 | 1352 | 1462 | 0.982 | 0.907 | 0.007 | 0.890 | 0.030 | 0.040 |

| Year | First date (DOY) | Last date (DOY) | No. of loads | No. of fish | Total mass (g) | Proportion of loads | Proportion of fish | | Proportion of biomass | | |
|------|---------------------|--------------------|--------------|-------------|----------------|---------------------|--------------------|------------|-----------------------|------------|-----------|
| | | | | | | with sandeels | 0 sandeel | 1+ sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 2010 | 144 | 201 | 172 | 1915 | 1664 | 0.738 | 0.661 | 0.016 | 0.440 | 0.110 | 0.400 |
| 2011 | 143 | 195 | 196 | 2506 | 1560 | 0.714 | 0.690 | 0.002 | 0.539 | 0.010 | 0.396 |
| 2012 | 145 | 199 | 178 | 2489 | 1325 | 0.921 | 0.895 | 0.008 | 0.732 | 0.086 | 0.141 |
| 2013 | 168 | 218 | 157 | 2015 | 1250 | 0.809 | 0.755 | 0.000 | 0.552 | 0.000 | 0.388 |
| 2014 | 149 | 197 | 140 | 1704 | 1428 | 0.871 | 0.808 | 0.003 | 0.678 | 0.002 | 0.264 |
| 2015 | 155 | 199 | 177 | 2333 | 1662 | 0.876 | 0.870 | 0.003 | 0.745 | 0.023 | 0.220 |

(b) Razorbill *Alca torda*

| Year | First date (DOY) | Last date (DOY) | No. of loads | No. of fish | Total mass (g) | Proportion of loads with | | | Proportion of fish | | Proportion of biomass | | |
|------|------------------|-----------------|--------------|-------------|----------------|--------------------------|------------|-------------|--------------------|------------|-----------------------|------------|-----------|
| | | | | | | 0 sandeel | 1+ sandeel | Any sandeel | 0 sandeel | 1+ sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 1982 | 150 | 173 | 42 | 79 | 357 | 0.071 | 0.881 | 0.952 | 0.437 | 0.543 | 0.160 | 0.820 | 0.020 |
| 1983 | 156 | 179 | 124 | 427 | 893 | 0.218 | 0.742 | 0.960 | 0.684 | 0.276 | 0.400 | 0.590 | 0.008 |
| 1984 | 147 | 200 | 62 | 337 | 391 | 0.500 | 0.371 | 0.871 | 0.741 | 0.109 | 0.730 | 0.230 | 0.000 |
| 1985 | 152 | 176 | 107 | 366 | 189 | 0.701 | 0.262 | 0.963 | 0.891 | 0.087 | 0.703 | 0.246 | 0.043 |
| 1986 | 164 | 197 | 49 | 113 | 118 | 0.245 | 0.592 | 0.837 | 0.469 | 0.292 | 0.182 | 0.407 | 0.398 |
| 1987 | 164 | 189 | 46 | 155 | 120 | 0.522 | 0.283 | 0.804 | 0.729 | 0.097 | 0.396 | 0.182 | 0.418 |
| 1988 | 156 | 203 | 143 | 592 | 343 | 0.769 | 0.154 | 0.923 | 0.889 | 0.047 | 0.609 | 0.119 | 0.268 |
| 1989 | 155 | 189 | 68 | 432 | 127 | 0.897 | 0.074 | 0.971 | 0.984 | 0.012 | 0.885 | 0.057 | 0.058 |
| 1990 | 155 | 190 | 65 | 343 | 135 | 0.938 | 0.031 | 0.969 | 0.988 | 0.006 | 0.924 | 0.022 | 0.055 |
| 1991 | 159 | 182 | 45 | 159 | 76 | 0.756 | 0.200 | 0.956 | 0.931 | 0.057 | 0.815 | 0.172 | 0.000 |
| 1992 | 150 | 202 | 92 | 204 | 182 | 0.359 | 0.500 | 0.859 | 0.593 | 0.343 | 0.335 | 0.560 | 0.081 |
| 1993 | 160 | 193 | 38 | 65 | 101 | 0.289 | 0.211 | 0.500 | 0.538 | 0.169 | 0.210 | 0.159 | 0.621 |
| 1994 | 164 | 201 | 51 | 126 | 117 | 0.412 | 0.098 | 0.510 | 0.746 | 0.056 | 0.291 | 0.087 | 0.596 |
| 1995 | 156 | 197 | 33 | 79 | 61 | 0.394 | 0.364 | 0.758 | 0.747 | 0.152 | 0.386 | 0.287 | 0.302 |
| 1996 | 166 | 174 | 48 | 137 | 91 | 0.479 | 0.438 | 0.917 | 0.796 | 0.175 | 0.492 | 0.382 | 0.121 |
| 1997 | 154 | 180 | 188 | 1155 | 373 | 0.910 | 0.027 | 0.936 | 0.984 | 0.005 | 0.858 | 0.023 | 0.118 |
| 1998 | 165 | 201 | 88 | 321 | 193 | 0.625 | 0.193 | 0.818 | 0.888 | 0.062 | 0.543 | 0.151 | 0.305 |
| 1999 | 160 | 183 | 56 | 184 | 130 | 0.571 | 0.143 | 0.714 | 0.864 | 0.049 | 0.491 | 0.100 | 0.395 |
| 2000 | 156 | 183 | 116 | 505 | 246 | 0.793 | 0.052 | 0.845 | 0.950 | 0.014 | 0.690 | 0.041 | 0.269 |
| 2001 | 154 | 182 | 272 | 906 | 656 | 0.559 | 0.129 | 0.688 | 0.853 | 0.053 | 0.417 | 0.106 | 0.476 |
| 2002 | 155 | 186 | 215 | 1134 | 364 | 0.795 | 0.116 | 0.912 | 0.961 | 0.022 | 0.708 | 0.100 | 0.192 |
| 2003 | 157 | 196 | 214 | 1192 | 459 | 0.832 | 0.037 | 0.869 | 0.967 | 0.009 | 0.741 | 0.035 | 0.224 |
| 2004 | 153 | 196 | 249 | 747 | 1602 | 0.281 | 0.008 | 0.289 | 0.482 | 0.003 | 0.088 | 0.002 | 0.910 |
| 2005 | 165 | 203 | 515 | 2934 | 1000 | 0.996 | 0.004 | 1.000 | 0.999 | 0.001 | 0.996 | 0.004 | 0.000 |
| 2006 | 167 | 197 | 703 | 3780 | 1339 | 0.959 | 0.041 | 1.000 | 0.990 | 0.010 | 0.958 | 0.042 | 0.000 |

| Year | First date (DOY) | Last date (DOY) | No. of loads | No. of fish | Total mass (g) | Proportion of loads with | | | Proportion of fish | | Proportion of biomass | | |
|------|------------------|-----------------|--------------|-------------|----------------|--------------------------|------------|-------------|--------------------|------------|-----------------------|------------|-----------|
| | | | | | | 0 sandeel | 1+ sandeel | Any sandeel | 0 sandeel | 1+ sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 2007 | 156 | 185 | 258 | 1246 | 817 | 0.713 | 0.031 | 0.744 | 0.820 | 0.011 | 0.449 | 0.025 | 0.524 |
| 2008 | 167 | 188 | 160 | 680 | 532 | 0.638 | 0.156 | 0.794 | 0.813 | 0.057 | 0.384 | 0.107 | 0.508 |
| 2009 | 164 | 188 | 139 | 687 | 286 | 0.878 | 0.079 | 0.957 | 0.964 | 0.022 | 0.835 | 0.076 | 0.088 |
| 2010 | 152 | 180 | 148 | 323 | 737 | 0.203 | 0.122 | 0.324 | 0.418 | 0.087 | 0.079 | 0.055 | 0.865 |
| 2011 | 152 | 172 | 46 | 108 | 125 | 0.326 | 0.196 | 0.522 | 0.676 | 0.083 | 0.248 | 0.105 | 0.645 |
| 2012 | 154 | 184 | 165 | 850 | 437 | 0.794 | 0.115 | 0.909 | 0.909 | 0.033 | 0.598 | 0.093 | 0.309 |
| 2013 | 172 | 190 | 109 | 391 | 445 | 0.450 | 0.101 | 0.550 | 0.696 | 0.028 | 0.219 | 0.036 | 0.742 |
| 2014 | 161 | 187 | 62 | 174 | 260 | 0.290 | 0.032 | 0.323 | 0.563 | 0.023 | 0.127 | 0.022 | 0.845 |
| 2015 | 163 | 180 | 138 | 564 | 547 | 0.529 | 0.065 | 0.594 | 0.777 | 0.032 | 0.284 | 0.008 | 0.708 |

(c) Common Guillemot *Uria aalge*

| | First date (DOY) | Last date (DOY) | No. of fish | Proportion | | Biomass (g) | Proportion of biomass | | |
|------|---------------------|--------------------|-------------|------------|------------|-------------|-----------------------|---------|-----------|
| | | | | 0 sandeel | 1+ sandeel | | Prop 0 | Prop 1+ | Clupeidae |
| 1982 | 150 | 173 | 515 | 0.000 | 0.915 | 5270 | 0.000 | 0.902 | 0.098 |
| 1983 | 156 | 179 | 1067 | 0.000 | 0.753 | 8876 | 0.000 | 0.652 | 0.347 |
| 1984 | 147 | 200 | 708 | 0.010 | 0.912 | 6375 | 0.001 | 0.893 | 0.107 |
| 1985 | 143 | 198 | 2111 | 0.009 | 0.798 | 16300 | 0.001 | 0.714 | 0.286 |
| 1986 | 154 | 204 | 1066 | 0.001 | 0.910 | 8592 | 0.000 | 0.863 | 0.137 |
| 1987 | 158 | 206 | 530 | 0.000 | 0.815 | 5202 | 0.000 | 0.739 | 0.261 |
| 1988 | 151 | 203 | 590 | 0.034 | 0.537 | 5480 | 0.002 | 0.470 | 0.524 |
| 1989 | 144 | 195 | 818 | 0.061 | 0.824 | 3597 | 0.008 | 0.748 | 0.221 |
| 1990 | 146 | 190 | 496 | 0.173 | 0.433 | 2215 | 0.023 | 0.276 | 0.697 |
| 1991 | 142 | 182 | 587 | 0.022 | 0.733 | 2658 | 0.003 | 0.653 | 0.344 |
| 1992 | 133 | 202 | 637 | 0.014 | 0.568 | 3719 | 0.001 | 0.461 | 0.534 |
| 1993 | 152 | 190 | 673 | 0.000 | 0.227 | 4356 | 0.000 | 0.175 | 0.825 |
| 1994 | 158 | 211 | 595 | 0.012 | 0.171 | 3218 | 0.001 | 0.138 | 0.861 |
| 1995 | 152 | 188 | 478 | 0.010 | 0.674 | 3273 | 0.001 | 0.777 | 0.206 |
| 1996 | 157 | 197 | 589 | 0.019 | 0.424 | 3520 | 0.002 | 0.436 | 0.562 |
| 1997 | 149 | 187 | 1682 | 0.004 | 0.859 | 10317 | 0.000 | 0.784 | 0.216 |
| 1998 | 154 | 208 | 1349 | 0.007 | 0.254 | 6014 | 0.001 | 0.204 | 0.795 |
| 1999 | 152 | 192 | 1035 | 0.011 | 0.246 | 5871 | 0.001 | 0.211 | 0.759 |
| 2000 | 151 | 190 | 936 | 0.002 | 0.581 | 3898 | 0.000 | 0.440 | 0.560 |
| 2001 | 154 | 183 | 1300 | 0.007 | 0.300 | 7709 | 0.001 | 0.183 | 0.815 |
| 2002 | 150 | 182 | 1093 | 0.013 | 0.379 | 7049 | 0.001 | 0.222 | 0.776 |
| 2003 | 150 | 184 | 1301 | 0.008 | 0.165 | 8453 | 0.001 | 0.072 | 0.925 |
| 2004 | 154 | 194 | 1341 | 0.000 | 0.016 | 8449 | 0.000 | 0.014 | 0.982 |
| 2005 | 162 | 203 | 2898 | 0.000 | 0.041 | 21129 | 0.000 | 0.012 | 0.975 |
| 2006 | 159 | 198 | 1474 | 0.005 | 0.147 | 10682 | 0.000 | 0.040 | 0.884 |
| 2007 | 159 | 186 | 745 | 0.012 | 0.052 | 4792 | 0.001 | 0.016 | 0.977 |

| | First date (DOY) | Last date (DOY) | No. of fish | Proportion | | Biomass (g) | Proportion of biomass | | |
|------|---------------------|--------------------|-------------|------------|------------|-------------|-----------------------|---------|-----------|
| | | | | 0 sandeel | 1+ sandeel | | Prop 0 | Prop 1+ | Clupeidae |
| 2008 | 155 | 199 | 817 | 0.000 | 0.203 | 9324 | 0.000 | 0.064 | 0.928 |
| 2009 | 153 | 187 | 1211 | 0.016 | 0.259 | 7248 | 0.003 | 0.230 | 0.741 |
| 2010 | 142 | 181 | 1089 | 0.000 | 0.147 | 8230 | 0.000 | 0.070 | 0.930 |
| 2011 | 145 | 185 | 767 | 0.000 | 0.196 | 6574 | 0.000 | 0.134 | 0.865 |
| 2012 | 149 | 184 | 771 | 0.003 | 0.130 | 3844 | 0.000 | 0.106 | 0.888 |
| 2013 | 158 | 188 | 658 | 0.002 | 0.129 | 5221 | 0.000 | 0.078 | 0.920 |
| 2014 | 153 | 192 | 759 | 0.001 | 0.050 | 4334 | 0.000 | 0.041 | 0.957 |
| 2015 | 149 | 195 | 770 | 0.000 | 0.088 | 6890 | 0.000 | 0.050 | 0.948 |

(d) European shag *Phalacrocorax aristotelis*

| | First date (DOY) | Last Date (DOY) | No. of regurgitates | Mass (g) | Frequency in sample | | | Proportion biomass ¹ | | |
|------|------------------|-----------------|---------------------|----------|---------------------|------------|-------------|---------------------------------|------------|-----------|
| | | | | | 0 sandeel | 1+ sandeel | Any sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 1985 | 205 | 228 | 19 | 926 | 0.789 | 0.632 | 1.000 | 0.538 | 0.453 | 0.000 |
| 1986 | 194 | 226 | 38 | 1639 | 0.395 | 0.921 | 1.000 | 0.129 | 0.868 | 0.000 |
| 1987 | 149 | 203 | 22 | 1074 | 0.045 | 1.000 | 1.000 | 0.006 | 0.994 | 0.000 |
| 1988 | 167 | 200 | 17 | 686 | 0.118 | 1.000 | 1.000 | 0.016 | 0.974 | 0.000 |
| 1989 | 171 | 208 | 30 | 1027 | 1.000 | 0.200 | 1.000 | 0.800 | 0.200 | 0.000 |
| 1990 | 187 | 192 | 20 | 570 | 1.000 | 0.100 | 1.000 | 0.985 | 0.013 | 0.000 |
| 1991 | 185 | 199 | 20 | 693 | 0.700 | 0.550 | 1.000 | 0.575 | 0.425 | 0.000 |
| 1992 | 173 | 204 | 35 | 1592 | 0.257 | 0.857 | 0.914 | 0.172 | 0.776 | 0.001 |
| 1993 | 132 | 210 | 4 | 202 | 0.250 | 0.750 | 1.000 | 0.285 | 0.668 | 0.000 |
| 1994 | 189 | 207 | 23 | 847 | 0.696 | 0.348 | 0.913 | 0.566 | 0.267 | 0.117 |
| 1995 | 151 | 191 | 16 | 537 | 0.063 | 0.813 | 0.813 | 0.038 | 0.826 | 0.054 |
| 1996 | 169 | 208 | 29 | 1342 | 0.000 | 1.000 | 1.000 | 0.000 | 0.993 | 0.000 |
| 1997 | 128 | 197 | 54 | 1569 | 0.037 | 1.000 | 1.000 | 0.001 | 0.999 | 0.000 |
| 1998 | 133 | 205 | 38 | 1442 | 0.132 | 0.974 | 0.974 | 0.008 | 0.948 | 0.003 |
| 1999 | 189 | 215 | 5 | 166 | 0.600 | 0.600 | 0.800 | 0.511 | 0.239 | 0.077 |
| 2000 | 154 | 196 | 37 | 1647 | 0.108 | 0.919 | 0.919 | 0.004 | 0.870 | 0.040 |
| 2001 | 129 | 210 | 68 | 2524 | 0.412 | 0.971 | 0.985 | 0.049 | 0.854 | 0.000 |
| 2002 | 155 | 202 | 48 | 1430 | 0.146 | 1.000 | 1.000 | 0.025 | 0.919 | 0.001 |
| 2003 | 149 | 186 | 38 | 1591 | 0.184 | 0.974 | 0.974 | 0.027 | 0.931 | 0.003 |
| 2004 | 184 | 198 | 9 | 365 | 0.222 | 0.667 | 0.778 | 0.014 | 0.334 | 0.000 |
| 2005 | 140 | 216 | 17 | 639 | 0.412 | 0.118 | 0.529 | 0.379 | 0.046 | 0.004 |
| 2006 | 135 | 200 | 46 | 1668 | 0.413 | 0.391 | 0.609 | 0.294 | 0.228 | 0.004 |
| 2007 | 163 | 203 | 15 | 750 | 0.000 | 0.400 | 0.400 | 0.000 | 0.174 | 0.000 |
| 2008 | 172 | 196 | 35 | 999 | 0.371 | 0.400 | 0.600 | 0.142 | 0.339 | 0.027 |

| | First date (DOY) | Last Date (DOY) | No. of regurgitates | Mass (g) | Frequency in sample | | | Proportion biomass ¹ | | |
|------|------------------|-----------------|---------------------|----------|---------------------|------------|-------------|---------------------------------|------------|-----------|
| | | | | | 0 sandeel | 1+ sandeel | Any sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 2009 | 154 | 182 | 33 | 968 | 0.273 | 0.242 | 0.455 | 0.183 | 0.188 | 0.023 |
| 2010 | 127 | 205 | 65 | 2617 | 0.000 | 0.923 | 0.923 | 0.000 | 0.935 | 0.000 |
| 2011 | 136 | 188 | 42 | 1636 | 0.190 | 0.976 | 0.976 | 0.022 | 0.914 | 0.000 |
| 2012 | 148 | 206 | 26 | 1053 | 0.308 | 0.731 | 0.769 | 0.022 | 0.659 | 0.001 |
| 2013 | 181 | 204 | 13 | 423 | 0.077 | 0.308 | 0.308 | 0.002 | 0.259 | 0.000 |
| 2014 | 151 | 203 | 21 | 677 | 0.381 | 0.810 | 0.857 | 0.209 | 0.694 | 0.002 |
| 2015 | 120 | 191 | 52 | 1991 | 0.173 | 0.923 | 0.923 | 0.023 | 0.706 | 0.000 |

¹Values differ from Howells et al. (2017; Fig 1a) which presents mean proportion across samples in each year, not proportion after pooling all the samples for the year which was used here (see Methods).

(e) Black-legged kittiwake *Risaa tridactyla*

| | First date (DOY) | Last date (DOY) | No. Of regurgitates | Mass (g) | Proportion with | | | Proportion of mass | | |
|------|---------------------|--------------------|------------------------|----------|-----------------|------------|-------------|--------------------|------------|-----------|
| | | | | | 0 sandeel | 1+ sandeel | Any sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 1986 | 160 | 195 | 35 | 317 | 0.829 | 0.486 | 0.971 | 0.606 | 0.373 | 0.000 |
| 1987 | 160 | 187 | 17 | 165 | 0.941 | 0.059 | 0.941 | 0.904 | 0.046 | 0.032 |
| 1988 | 178 | 191 | 32 | 354 | 0.790 | 0.150 | 0.940 | 0.350 | 0.590 | 0.060 |
| 1989 | 160 | 181 | 25 | 293 | 0.600 | 0.880 | 1.000 | 0.207 | 0.728 | 0.000 |
| 1990 | 152 | 207 | 9 | 210 | 0.778 | 0.222 | 1.000 | 0.564 | 0.214 | 0.071 |
| 1991 | 170 | 192 | 10 | 91 | 0.400 | 0.100 | 0.500 | 0.400 | 0.088 | 0.026 |
| 1992 | 158 | 193 | 26 | 319 | 0.615 | 0.231 | 0.808 | 0.555 | 0.140 | 0.092 |
| 1993 | 159 | 188 | 57 | 1089 | 0.404 | 0.439 | 0.789 | 0.256 | 0.403 | 0.115 |
| 1994 | 186 | 202 | 56 | 911 | 0.839 | 0.054 | 0.875 | 0.653 | 0.062 | 0.135 |
| 1995 | 171 | 193 | 45 | 731 | 0.911 | 0.133 | 0.956 | 0.836 | 0.061 | 0.057 |
| 1996 | 184 | 200 | 43 | 671 | 0.907 | 0.140 | 0.907 | 0.714 | 0.098 | 0.172 |
| 1997 | 162 | 197 | 137 | 2223 | 0.810 | 0.358 | 0.978 | 0.617 | 0.263 | 0.048 |
| 1998 | 162 | 195 | 110 | 2299 | 0.782 | 0.309 | 0.891 | 0.602 | 0.205 | 0.145 |
| 1999 | 165 | 195 | 180 | 3057 | 0.867 | 0.144 | 0.900 | 0.749 | 0.097 | 0.109 |
| 2000 | 156 | 208 | 138 | 2658 | 0.935 | 0.203 | 1.000 | 0.818 | 0.099 | 0.040 |
| 2001 | 164 | 219 | 86 | 2956 | 0.826 | 0.140 | 0.872 | 0.707 | 0.064 | 0.187 |
| 2002 | 157 | 199 | 76 | 1333 | 0.895 | 0.224 | 0.974 | 0.837 | 0.104 | 0.009 |
| 2003 | 157 | 216 | 135 | 2167 | 0.978 | 0.037 | 0.985 | 0.909 | 0.010 | 0.069 |
| 2004 | 170 | 209 | 120 | 1458 | 0.892 | 0.192 | 0.917 | 0.589 | 0.207 | 0.158 |
| 2005 | 177 | 213 | 116 | 1417 | 1.000 | 0.034 | 1.000 | 0.886 | 0.004 | 0.078 |
| 2006 | 158 | 211 | 54 | 1008 | 0.815 | 0.037 | 0.815 | 0.638 | 0.013 | 0.286 |
| 2007 | 170 | 205 | 61 | 1224 | 0.672 | 0.016 | 0.689 | 0.485 | 0.002 | 0.275 |
| 2008 | 163 | 198 | 46 | 714 | 0.761 | 0.022 | 0.761 | 0.408 | 0.001 | 0.337 |
| 2009 | 167 | 204 | 80 | 1112 | 0.963 | 0.038 | 0.963 | 0.898 | 0.017 | 0.048 |
| 2010 | 152 | 189 | 65 | 1065 | 0.492 | 0.200 | 0.569 | 0.312 | 0.059 | 0.622 |

| | First date (DOY) | Last date (DOY) | No. Of regurgitates | Mass (g) | Proportion with | | | Proportion of mass | | |
|------|---------------------|--------------------|------------------------|----------|-----------------|------------|-------------|--------------------|------------|-----------|
| | | | | | 0 sandeel | 1+ sandeel | Any sandeel | 0 sandeel | 1+ sandeel | Clupeidae |
| 2011 | 145 | 196 | 43 | 924 | 0.721 | 0.186 | 0.860 | 0.358 | 0.152 | 0.367 |
| 2012 | 152 | 185 | 59 | 775 | 0.915 | 0.169 | 0.983 | 0.671 | 0.143 | 0.150 |
| 2013 | 170 | 203 | 38 | 440 | 0.895 | 0.053 | 0.921 | 0.508 | 0.003 | 0.429 |
| 2014 | 172 | 199 | 67 | 848 | 0.940 | 0.060 | 0.940 | 0.682 | 0.023 | 0.242 |
| 2015 | 160 | 211 | 61 | 1038 | 0.787 | 0.016 | 0.787 | 0.593 | 0.010 | 0.254 |

Table S2 Modelled annual mean lengths, standard errors and sample sizes of 0 group sandeels (standardised to 1 July) and 1+ group sandeels (standardised to 1 June) resulting from fitting linear mixed models using residual maximum likelihood (REML) to fish collected from Atlantic puffins *Fratercula arctica* and common guillemots *Uria aalge* on the Isle of May. Year and date (June 1st = 1) were fitted as covariates, and categorical sampling day, categorical year, and date by categorical year as random effects.

| | 0 group sandeels | | | 1+ sandeel | | |
|------|------------------|-----------|------|------------|-----------|------|
| | No. | Mean (mm) | SE | No. | Mean (mm) | SE |
| 1973 | 321 | 77.92 | 0.19 | 3 | 126.32 | 0.13 |
| 1974 | 387 | 71.02 | 0.10 | 24 | 120.68 | 0.10 |
| 1975 | 79 | 68.42 | 0.19 | 13 | 118.10 | 0.11 |
| 1976 | 395 | 70.12 | 0.10 | 6 | 113.99 | 0.13 |
| 1977 | 276 | 75.23 | 0.11 | 18 | 114.73 | 0.10 |
| 1978 | 256 | 82.56 | 0.11 | 22 | 117.20 | 0.10 |
| 1979 | 212 | 73.89 | 0.13 | 85 | 117.49 | 0.06 |
| 1981 | 262 | 85.81 | 0.12 | 38 | 117.86 | 0.07 |
| 1982 | 109 | 71.18 | 0.14 | 80 | 120.02 | 0.07 |
| 1983 | 445 | 76.35 | 0.09 | 83 | 124.36 | 0.06 |
| 1984 | 370 | 78.16 | 0.11 | 136 | 117.82 | 0.06 |
| 1985 | 804 | 76.08 | 0.14 | 110 | 113.60 | 0.07 |
| 1986 | 155 | 68.95 | 0.17 | 86 | 116.80 | 0.08 |
| 1987 | 164 | 72.18 | 0.19 | 131 | 114.39 | 0.07 |
| 1988 | 709 | 66.38 | 0.23 | 32 | 123.94 | 0.09 |
| 1989 | 568 | 77.30 | 0.17 | 3 | 110.63 | 0.14 |
| 1990 | 450 | 78.54 | 0.20 | 14 | 112.46 | 0.09 |
| 1991 | 782 | 66.38 | 0.17 | 72 | 111.63 | 0.07 |
| 1992 | 599 | 66.37 | 0.15 | 70 | 114.87 | 0.08 |
| 1993 | 728 | 62.05 | 0.19 | 54 | 111.43 | 0.07 |
| 1994 | 756 | 63.89 | 0.19 | 45 | 106.29 | 0.07 |
| 1995 | 344 | 61.63 | 0.20 | 69 | 106.64 | 0.08 |
| 1996 | 852 | 68.52 | 0.17 | 27 | 113.38 | 0.09 |
| 1997 | 639 | 74.73 | 0.15 | 25 | 115.86 | 0.09 |
| 1998 | 2871 | 62.84 | 0.11 | 77 | 103.84 | 0.06 |
| 1999 | 1441 | 64.62 | 0.13 | 32 | 106.03 | 0.08 |
| 2000 | 1732 | 72.75 | 0.14 | 81 | 104.91 | 0.07 |
| 2001 | 1852 | 61.62 | 0.15 | 80 | 101.91 | 0.09 |
| 2002 | 1592 | 65.46 | 0.10 | 103 | 105.31 | 0.09 |
| 2003 | 2280 | 60.00 | 0.11 | 60 | 97.75 | 0.08 |
| 2004 | 3425 | 50.75 | 0.09 | 127 | 90.76 | 0.07 |
| 2005 | 2777 | 54.07 | 0.08 | 19 | 97.68 | 0.10 |
| 2006 | 2055 | 54.61 | 0.09 | 2 | 112.76 | 0.13 |
| 2007 | 1541 | 49.99 | 0.11 | 6 | 101.52 | 0.12 |
| 2008 | 976 | 55.14 | 0.10 | 1 | 102.47 | 0.18 |
| 2009 | 1226 | 72.35 | 0.09 | 10 | 106.85 | 0.13 |
| 2010 | 1269 | 53.97 | 0.10 | 27 | 109.72 | 0.09 |
| 2011 | 1729 | 54.35 | 0.10 | 5 | 118.46 | 0.15 |
| 2012 | 2228 | 55.81 | 0.10 | 19 | 113.38 | 0.11 |
| 2013 | 1522 | 55.90 | 0.11 | 0 | 103.26 | 0.21 |
| 2014 | 1376 | 61.85 | 0.12 | 4 | 108.06 | 0.17 |
| 2015 | 2029 | 60.54 | 0.11 | 8 | 105.86 | 0.14 |

Table S3 Energy density (kJ g dry weight⁻¹) of sandeels dropped by Atlantic puffins *Fratercula arctica* and Common guillemots *Uria aalge* on the Isle of May.

| Year | 0 group sandeel | | | 1+ group sandeel | | |
|------|-----------------|-------|------|------------------|-------|------|
| | No. | Mean | SE | No. | Mean | SE |
| 1975 | 18 | 22.38 | 0.20 | 11 | 20.96 | 0.89 |
| 1985 | 0 | | | 1 | 22.00 | |
| 1986 | 0 | | | 7 | 22.36 | 0.72 |
| 1988 | 1 | 17.60 | | 9 | 22.16 | 0.65 |
| 1995 | 0 | | | 1 | 25.70 | |
| 1996 | 1 | 24.13 | | 2 | 25.15 | 1.19 |
| 1999 | 2 | 23.27 | 1.63 | 1 | 23.58 | |
| 2004 | 11 | 4.19 | 0.17 | 9 | 7.91 | 0.62 |
| 2005 | 0 | | | 10 | 23.99 | 0.42 |
| 2006 | 50 | 21.53 | 0.10 | 3 | 25.73 | 0.46 |
| 2007 | 89 | 23.07 | 0.13 | 4 | 23.37 | 0.91 |
| 2008 | 103 | 22.88 | 0.08 | 1 | 25.36 | |
| 2009 | 115 | 23.04 | 0.14 | 14 | 23.86 | 0.49 |
| 2010 | 89 | 22.13 | 0.07 | 23 | 24.15 | 0.33 |
| 2011 | 90 | 22.86 | 0.12 | 5 | 25.11 | 0.89 |
| 2012 | 117 | 21.17 | 0.16 | 19 | 23.02 | 0.37 |
| 2013 | 101 | 22.27 | 0.12 | 0 | | |
| 2014 | 115 | 22.45 | 0.22 | 5 | 23.03 | 0.75 |
| 2015 | 96 | 22.90 | 0.10 | 8 | 25.89 | 0.36 |