

## **BERWICK BANK WIND FARM OFFSHORE ENVIRONMENTAL IMPACT ASSESSMENT**

**APPENDIX 11.1, ANNEX C:  
DESIGN-BASED ANALYSIS –  
POPULATION ESTIMATES FOR  
ALL BIRDS GROUPED BY  
SPECIES (BERWICK BANK  
DEVELOPMENT AREA PLUS  
16KM BUFFER)**

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## NOTE

This annex provides unapportioned (detections assigned to species only) density and population estimates for focal species within the Offshore Ornithology Study Area). Estimates presented for auk species do not account for availability bias. Further EIA/HRA assessments should rely on those that have this correction applied (see the Baseline Report and Annex F)

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**Table 1: Unapportioned density and population estimates of all common scoters in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Common scoter | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV      |
|-------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|---------|
| <b>Survey</b>     |   |                                       |                                       |                              |                       |                       |    |         |
| Mar-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jun-19            | 0   | 0                                     | 0.01                                  | 16                           | 0                     | 48                    | 16 | 100.26% |
| Jul-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Oct-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Nov-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Dec-19            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jan-20            | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 27                    | 9  | 94.56%  |
| Feb-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Mar-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May S01 20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May S02 20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jun-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jul-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Oct-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Nov-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Dec-20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jan-21            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Feb-21            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Apr S01 21        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Apr S02 21        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |

**Table 2: Unapportioned density and population estimates of all kittiwakes in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Kittiwake | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD    | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |       |        |
| Mar-19        | 11.81                                     | 7.09                                  | 17.24                                 | 46965                        | 28202                 | 68584                 | 10136 | 21.58% |
| May-19        | 2.52                                      | 1.93                                  | 3.14                                  | 10032                        | 7666                  | 12475                 | 1243  | 12.38% |
| Jun-19        | 2.05                                      | 1.58                                  | 2.63                                  | 8153                         | 6292                  | 10464                 | 1012  | 12.41% |
| Jul-19        | 3.69                                      | 3.16                                  | 4.48                                  | 14685                        | 12560                 | 17822                 | 1317  | 8.97%  |
| Aug-19        | 8.25                                      | 6.8                                   | 9.71                                  | 32806                        | 27033                 | 38625                 | 2915  | 8.89%  |
| Sep-19        | 1.62                                      | 1.17                                  | 2.05                                  | 6459                         | 4669                  | 8168                  | 930   | 14.39% |
| Oct-19        | 1.34                                      | 0.7                                   | 2.58                                  | 5341                         | 2799                  | 10258                 | 1925  | 36.04% |
| Nov-19        | 0.44                                      | 0.25                                  | 0.71                                  | 1759                         | 981                   | 2819                  | 490   | 27.82% |
| Dec-19        | 0.52                                      | 0.26                                  | 0.86                                  | 2080                         | 1025                  | 3428                  | 649   | 31.18% |
| Jan-20        | 2.09                                      | 1.34                                  | 2.92                                  | 8322                         | 5336                  | 11612                 | 1541  | 18.52% |
| Feb-20        | 1.31                                      | 0.97                                  | 1.77                                  | 5227                         | 3860                  | 7048                  | 837   | 16.01% |

| All Kittiwake | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD   | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |      |        |
| Mar-20        | 5.35                                      | 3.72                                  | 7.43                                  | 21272                        | 14776                 | 29570                 | 3823 | 17.97% |
| May S01 20    | 2.67                                      | 1.71                                  | 3.78                                  | 10623                        | 6807                  | 15045                 | 2137 | 20.11% |
| May S02 20    | 5.75                                      | 4.74                                  | 6.77                                  | 22876                        | 18853                 | 26924                 | 2102 | 9.19%  |
| Jun-20        | 5.04                                      | 4.27                                  | 5.8                                   | 20047                        | 16989                 | 23051                 | 1575 | 7.85%  |
| Jul-20        | 6.31                                      | 5.01                                  | 7.6                                   | 25101                        | 19924                 | 30245                 | 2636 | 10.5%  |
| Aug-20        | 9.24                                      | 7.41                                  | 11.33                                 | 36743                        | 29488                 | 45071                 | 4045 | 11.01% |
| Sep-20        | 13.89                                     | 10.39                                 | 17.53                                 | 55261                        | 41312                 | 69728                 | 7317 | 13.24% |
| Oct-20        | 1.72                                      | 1.13                                  | 2.5                                   | 6859                         | 4499                  | 9963                  | 1437 | 20.95% |
| Nov-20        | 3.55                                      | 2.68                                  | 4.42                                  | 14108                        | 10647                 | 17569                 | 1731 | 12.26% |
| Dec-20        | 2.38                                      | 1.25                                  | 4.03                                  | 9477                         | 4976                  | 16015                 | 3072 | 32.41% |
| Jan-21        | 4.26                                      | 2.04                                  | 7.22                                  | 16947                        | 8117                  | 28727                 | 5331 | 31.45% |
| Feb-21        | 1.02                                      | 0.39                                  | 1.85                                  | 4053                         | 1532                  | 7342                  | 1608 | 39.68% |
| Apr S01 21    | 6.88                                      | 5.68                                  | 8.11                                  | 27350                        | 22604                 | 32262                 | 2454 | 8.97%  |
| Apr S02 21    | 8.4                                       | 4.79                                  | 13.26                                 | 33429                        | 19042                 | 52758                 | 8797 | 26.31% |

**Table 3: Unapportioned density and population estimates of all black-headed gulls in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Black-headed gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV      |
|-----------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|---------|
| <b>Survey</b>         |   |                                       |                                       |                              |                       |                       |    |         |
| Mar-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jun-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jul-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Oct-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Nov-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Dec-19                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jan-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Feb-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Mar-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May S01 20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May S02 20            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jun-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jul-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-20                | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 8  | 98.71%  |
| Oct-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Nov-20                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Dec-20                | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8  | 101.19% |
| Jan-21                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Feb-21                | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Apr S01 21            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Apr S02 21            | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |

**Table 4: Unapportioned density and population estimates of all little gulls in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Little gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|-----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b>   |   |                                       |                                       |                              |                       |                       |    |        |
| Mar-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jun-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jul-19          | 0.01                                      | 0                                     | 0.02                                  | 41                           | 15                    | 71                    | 16 | 37.17% |
| Aug-19          | 0.02                                      | 0.01                                  | 0.03                                  | 66                           | 25                    | 114                   | 24 | 35.98% |
| Sep-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Oct-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Nov-19          | 0   | 0                                     | 0.01                                  | 16                           | 0                     | 45                    | 15 | 93.92% |
| Dec-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jan-20          | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 48                    | 15 | 87.76% |
| Feb-20          | 0.01                                      | 0                                     | 0.02                                  | 26                           | 0                     | 67                    | 18 | 67.37% |
| Mar-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S01 20      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S02 20      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jun-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jul-20          | 0.01                                      | 0                                     | 0.02                                  | 31                           | 0                     | 91                    | 26 | 81.05% |
| Aug-20          | 0.06                                      | 0.03                                  | 0.11                                  | 255                          | 112                   | 449                   | 85 | 33.19% |
| Sep-20          | 0.01                                      | 0                                     | 0.02                                  | 41                           | 0                     | 96                    | 26 | 62.05% |
| Oct-20          | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 8  | 92.97% |
| Nov-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Dec-20          | 0.01                                      | 0                                     | 0.02                                  | 42                           | 8                     | 80                    | 20 | 46.21% |
| Jan-21          | 0.01                                      | 0                                     | 0.02                                  | 25                           | 0                     | 72                    | 24 | 95.07% |
| Feb-21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S01 21      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S02 21      | 0.01                                      | 0                                     | 0.02                                  | 33                           | 8                     | 64                    | 16 | 46.75% |

**Table 5: Unapportioned density and population estimates of all common gulls in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Common gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV      |
|-----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|---------|
| <b>Survey</b>   |   |                                       |                                       |                              |                       |                       |     |         |
| Mar-19          | 0.01                                      | 0                                     | 0.02                                  | 31                           | 7                     | 63                    | 15  | 48.28%  |
| May-19          | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 9   | 101.82% |
| Jun-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Jul-19          | 0.01                                      | 0                                     | 0.02                                  | 33                           | 0                     | 75                    | 19  | 55.36%  |
| Aug-19          | 0.01                                      | 0                                     | 0.01                                  | 24                           | 0                     | 56                    | 14  | 56.18%  |
| Sep-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Oct-19          | 0.03                                      | 0.01                                  | 0.06                                  | 125                          | 41                    | 251                   | 55  | 44.06%  |
| Nov-19          | 0.09                                      | 0.03                                  | 0.16                                  | 373                          | 137                   | 631                   | 124 | 33.19%  |
| Dec-19          | 0.07                                      | 0.02                                  | 0.14                                  | 291                          | 74                    | 577                   | 135 | 46.17%  |
| Jan-20          | 0.01                                      | 0                                     | 0.02                                  | 51                           | 16                    | 94                    | 22  | 42.97%  |
| Feb-20          | 0.03                                      | 0.01                                  | 0.05                                  | 118                          | 55                    | 206                   | 39  | 32.91%  |

| All Common gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV      |
|-----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|---------|
| <b>Survey</b>   |   |                                       |                                       |                              |                       |                       |     |         |
| Mar-20          | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 25                    | 9   | 98.17%  |
| May S01 20      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| May S02 20      | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 9   | 100.33% |
| Jun-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Jul-20          | 0.01                                      | 0                                     | 0.01                                  | 24                           | 0                     | 48                    | 13  | 54.36%  |
| Aug-20          | 0.04                                      | 0.03                                  | 0.06                                  | 176                          | 104                   | 254                   | 38  | 21.2%   |
| Sep-20          | 0.01                                      | 0                                     | 0.01                                  | 25                           | 0                     | 55                    | 14  | 54.91%  |
| Oct-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Nov-20          | 0.01                                      | 0                                     | 0.01                                  | 24                           | 0                     | 56                    | 13  | 53.92%  |
| Dec-20          | 0.23                                      | 0.06                                  | 0.5                                   | 933                          | 234                   | 1980                  | 443 | 47.44%  |
| Jan-21          | 0.05                                      | 0.03                                  | 0.07                                  | 185                          | 118                   | 261                   | 38  | 20.57%  |
| Feb-21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Apr S01 21      | 0.01                                      | 0                                     | 0.01                                  | 24                           | 0                     | 52                    | 13  | 52.96%  |
| Apr S02 21      | 0.03                                      | 0.01                                  | 0.05                                  | 113                          | 55                    | 180                   | 34  | 29.58%  |

**Table 6: Unapportioned density and population estimates of all great black-backed gulls in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Great black-backed gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV      |
|-----------------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|---------|
| <b>Survey</b>               |   |                                       |                                       |                              |                       |                       |     |         |
| Mar-19                      | 0   | 0                                     | 0.01                                  | 13                           | 0                     | 30                    | 9   | 67.02%  |
| May-19                      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Jun-19                      | 0.03                                      | 0.01                                  | 0.06                                  | 117                          | 24                    | 256                   | 62  | 52.89%  |
| Jul-19                      | 0.01                                      | 0                                     | 0.02                                  | 32                           | 0                     | 65                    | 17  | 50.89%  |
| Aug-19                      | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 26                    | 8   | 91.4%   |
| Sep-19                      | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8   | 101.85% |
| Oct-19                      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Nov-19                      | 0.06                                      | 0.02                                  | 0.12                                  | 252                          | 78                    | 460                   | 102 | 40.47%  |
| Dec-19                      | 0.02                                      | 0                                     | 0.03                                  | 63                           | 15                    | 123                   | 31  | 48.43%  |
| Jan-20                      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Feb-20                      | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 11  | 68.32%  |
| Mar-20                      | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 25                    | 9   | 99.97%  |
| May S01 20                  | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| May S02 20                  | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Jun-20                      | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 8   | 95.28%  |
| Jul-20                      | 0.02                                      | 0.01                                  | 0.04                                  | 75                           | 24                    | 143                   | 31  | 40.46%  |
| Aug-20                      | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 12  | 68.65%  |
| Sep-20                      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Oct-20                      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Nov-20                      | 0.01                                      | 0                                     | 0.02                                  | 40                           | 12                    | 78                    | 17  | 40.91%  |
| Dec-20                      | 0.1                                       | 0.06                                  | 0.15                                  | 407                          | 228                   | 606                   | 98  | 23.99%  |
| Jan-21                      | 0.06                                      | 0.03                                  | 0.09                                  | 221                          | 107                   | 374                   | 70  | 31.34%  |
| Feb-21                      | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 9   | 100.19% |
| Apr S01 21                  | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |
| Apr S02 21                  | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0       |

**Table 7: Unapportioned density and population estimates of all herring gulls in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Herring gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD   | CV      |
|------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|------|---------|
| <b>Survey</b>    |   |                                       |                                       |                              |                       |                       |      |         |
| Mar-19           | 0   | 0                                     | 0.01                                  | 19                           | 0                     | 39                    | 10   | 52.53%  |
| May-19           | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 48                    | 17   | 98.9%   |
| Jun-19           | 0.47                                      | 0.27                                  | 0.68                                  | 1874                         | 1060                  | 2688                  | 405  | 21.59%  |
| Jul-19           | 0.21                                      | 0.14                                  | 0.28                                  | 822                          | 576                   | 1111                  | 138  | 16.74%  |
| Aug-19           | 0.2                                       | 0.1                                   | 0.32                                  | 788                          | 384                   | 1254                  | 228  | 28.94%  |
| Sep-19           | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8    | 99.32%  |
| Oct-19           | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 23                    | 7    | 92.96%  |
| Nov-19           | 0.36                                      | 0.05                                  | 0.76                                  | 1443                         | 205                   | 3039                  | 726  | 50.32%  |
| Dec-19           | 0.16                                      | 0.01                                  | 0.41                                  | 643                          | 46                    | 1628                  | 453  | 70.43%  |
| Jan-20           | 0.01                                      | 0                                     | 0.02                                  | 41                           | 8                     | 85                    | 21   | 49.95%  |
| Feb-20           | 0.01                                      | 0                                     | 0.01                                  | 25                           | 0                     | 55                    | 14   | 56.76%  |
| Mar-20           | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 25                    | 9    | 97.1%   |
| May S01 20       | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 23                    | 8    | 101.56% |
| May S02 20       | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8    | 96.19%  |
| Jun-20           | 0.05                                      | 0.01                                  | 0.1                                   | 195                          | 47                    | 410                   | 92   | 47.06%  |
| Jul-20           | 1.1                                       | 0.69                                  | 1.5                                   | 4364                         | 2763                  | 5984                  | 840  | 19.25%  |
| Aug-20           | 0.16                                      | 0.07                                  | 0.26                                  | 640                          | 273                   | 1052                  | 203  | 31.68%  |
| Sep-20           | 0.06                                      | 0.03                                  | 0.09                                  | 220                          | 110                   | 348                   | 64   | 28.77%  |
| Oct-20           | 0.01                                      | 0                                     | 0.01                                  | 26                           | 4                     | 48                    | 13   | 48.56%  |
| Nov-20           | 0.02                                      | 0                                     | 0.05                                  | 86                           | 20                    | 182                   | 43   | 49.74%  |
| Dec-20           | 1.25                                      | 0.38                                  | 2.17                                  | 4974                         | 1519                  | 8638                  | 1882 | 37.84%  |
| Jan-21           | 0.15                                      | 0.06                                  | 0.28                                  | 580                          | 238                   | 1126                  | 236  | 40.61%  |
| Feb-21           | 0.01                                      | 0                                     | 0.02                                  | 41                           | 0                     | 96                    | 25   | 60.84%  |
| Apr S01 21       | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 12   | 69.73%  |
| Apr S02 21       | 0.01                                      | 0                                     | 0.03                                  | 58                           | 8                     | 127                   | 31   | 53.45%  |

**Table 8: Unapportioned density and population estimates of all lesser black-backed gulls in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Lesser black-backed gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|------------------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b>                |   |                                       |                                       |                              |                       |                       |    |        |
| Mar-19                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May-19                       | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 11 | 67.49% |
| Jun-19                       | 0.04                                      | 0.02                                  | 0.06                                  | 144                          | 72                    | 233                   | 41 | 27.9%  |
| Jul-19                       | 0.06                                      | 0.04                                  | 0.08                                  | 248                          | 172                   | 338                   | 43 | 17.2%  |
| Aug-19                       | 0.03                                      | 0.02                                  | 0.05                                  | 129                          | 70                    | 199                   | 34 | 25.63% |
| Sep-19                       | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 48                    | 16 | 95.67% |
| Oct-19                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Nov-19                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Dec-19                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jan-20                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Feb-20                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |

| All Lesser black-backed gull | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV     |
|------------------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|--------|
| <b>Survey</b>                |   |                                       |                                       |                              |                       |                       |     |        |
| Mar-20                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May S01 20                   | 0.01                                      | 0                                     | 0.02                                  | 22                           | 0                     | 76                    | 22  | 99.61% |
| May S02 20                   | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jun-20                       | 0.01                                      | 0                                     | 0.03                                  | 49                           | 8                     | 104                   | 27  | 54.19% |
| Jul-20                       | 0.22                                      | 0.16                                  | 0.28                                  | 875                          | 638                   | 1111                  | 120 | 13.64% |
| Aug-20                       | 0.06                                      | 0.03                                  | 0.11                                  | 246                          | 103                   | 458                   | 91  | 36.87% |
| Sep-20                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Oct-20                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Nov-20                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Dec-20                       | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8   | 95.72% |
| Jan-21                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Feb-21                       | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Apr S01 21                   | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 8   | 95.14% |
| Apr S02 21                   | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |

**Table 9: Unapportioned density and population estimates of all common terns in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Common tern | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV     |
|-----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|--------|
| <b>Survey</b>   |   |                                       |                                       |                              |                       |                       |     |        |
| Mar-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jun-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jul-19          | 0.01                                      | 0                                     | 0.02                                  | 24                           | 0                     | 75                    | 24  | 98.65% |
| Aug-19          | 0.01                                      | 0                                     | 0.02                                  | 32                           | 8                     | 61                    | 14  | 43.74% |
| Sep-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Oct-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Nov-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Dec-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jan-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Feb-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Mar-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May S01 20      | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 22                    | 7   | 98.49% |
| May S02 20      | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 8   | 90.67% |
| Jun-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jul-20          | 0.01                                      | 0                                     | 0.04                                  | 55                           | 0                     | 157                   | 47  | 86.61% |
| Aug-20          | 0.07                                      | 0.02                                  | 0.13                                  | 272                          | 80                    | 529                   | 117 | 42.93% |
| Sep-20          | 0.05                                      | 0.01                                  | 0.09                                  | 180                          | 59                    | 351                   | 75  | 41.24% |
| Oct-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Nov-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Dec-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jan-21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Feb-21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Apr S01 21      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Apr S02 21      | 0.01                                      | 0                                     | 0.02                                  | 33                           | 0                     | 78                    | 19  | 57%    |



**Table 10: Unapportioned density and population estimates of all Arctic terns in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Arctic tern | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV     |
|-----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|--------|
| <b>Survey</b>   |   |                                       |                                       |                              |                       |                       |     |        |
| Mar-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May-19          | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8   | 95.99% |
| Jun-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jul-19          | 0.08                                      | 0.05                                  | 0.13                                  | 327                          | 184                   | 517                   | 85  | 25.86% |
| Aug-19          | 0.07                                      | 0.04                                  | 0.1                                   | 271                          | 155                   | 410                   | 66  | 24.16% |
| Sep-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Oct-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Nov-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Dec-19          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jan-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Feb-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Mar-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May S01 20      | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 22                    | 7   | 90.98% |
| May S02 20      | 0.02                                      | 0                                     | 0.04                                  | 64                           | 8                     | 145                   | 36  | 55.44% |
| Jun-20          | 0.01                                      | 0                                     | 0.02                                  | 47                           | 16                    | 91                    | 21  | 44.2%  |
| Jul-20          | 0.02                                      | 0.01                                  | 0.04                                  | 90                           | 24                    | 167                   | 40  | 44.51% |
| Aug-20          | 0.05                                      | 0.01                                  | 0.11                                  | 184                          | 40                    | 425                   | 111 | 60.27% |
| Sep-20          | 0.02                                      | 0                                     | 0.05                                  | 96                           | 8                     | 207                   | 51  | 53.28% |
| Oct-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Nov-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Dec-20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jan-21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Feb-21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Apr S01 21      | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Apr S02 21      | 0.02                                      | 0                                     | 0.05                                  | 60                           | 0                     | 191                   | 59  | 97.12% |

**Table 11: Unapportioned density and population estimates of all great skuas in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Great skua | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b>  |   |                                       |                                       |                              |                       |                       |    |        |
| Mar-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May-19         | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8  | 99.44% |
| Jun-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jul-19         | 0.01                                      | 0                                     | 0.01                                  | 32                           | 9                     | 57                    | 14 | 41.96% |
| Aug-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Sep-19         | 0   | 0                                     | 0.01                                  | 16                           | 0                     | 40                    | 11 | 68.21% |
| Oct-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Nov-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Dec-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jan-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Feb-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Mar-20         | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 25                    | 8  | 99.28% |
| May S01 20     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S02 20     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |

| All Great skua | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b>  |   |                                       |                                       |                              |                       |                       |    |        |
| Jun-20         | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 8  | 94.86% |
| Jul-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Aug-20         | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 11 | 64.79% |
| Sep-20         | 0.01                                      | 0                                     | 0.01                                  | 24                           | 0                     | 55                    | 13 | 54.02% |
| Oct-20         | 0.01                                      | 0                                     | 0.02                                  | 40                           | 8                     | 87                    | 21 | 50.53% |
| Nov-20         | 0.01                                      | 0.01                                  | 0.02                                  | 57                           | 24                    | 88                    | 18 | 30.8%  |
| Dec-20         | 0.01                                      | 0                                     | 0.02                                  | 32                           | 8                     | 64                    | 17 | 51.07% |
| Jan-21         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Feb-21         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S01 21     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S02 21     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |

**Table 12: Unapportioned density and population estimates of all little auks in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Little auk | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV     |
|----------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|--------|
| <b>Survey</b>  |   |                                       |                                       |                              |                       |                       |     |        |
| Mar-19         | 0   | 0                                     | 0.01                                  | 13                           | 0                     | 31                    | 9   | 66.62% |
| May-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jun-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jul-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Aug-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Sep-19         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Oct-19         | 0.01                                      | 0                                     | 0.01                                  | 23                           | 0                     | 58                    | 16  | 70.47% |
| Nov-19         | 0.02                                      | 0                                     | 0.04                                  | 66                           | 8                     | 147                   | 37  | 55.76% |
| Dec-19         | 0   | 0                                     | 0.01                                  | 15                           | 0                     | 38                    | 11  | 70.17% |
| Jan-20         | 0.03                                      | 0.01                                  | 0.06                                  | 135                          | 59                    | 231                   | 43  | 31.81% |
| Feb-20         | 0.03                                      | 0.01                                  | 0.05                                  | 113                          | 32                    | 210                   | 45  | 39.74% |
| Mar-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May S01 20     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| May S02 20     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jun-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Jul-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Aug-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Sep-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Oct-20         | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Nov-20         | 0.03                                      | 0.01                                  | 0.05                                  | 119                          | 48                    | 192                   | 37  | 30.9%  |
| Dec-20         | 0.15                                      | 0.09                                  | 0.21                                  | 579                          | 347                   | 845                   | 136 | 23.37% |
| Jan-21         | 0.09                                      | 0.05                                  | 0.13                                  | 356                          | 210                   | 521                   | 78  | 21.92% |
| Feb-21         | 0.01                                      | 0                                     | 0.03                                  | 49                           | 0                     | 104                   | 28  | 57.29% |
| Apr S01 21     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Apr S02 21     | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |

**Table 13: Unapportioned density and population estimates of all guillemots in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Guillemot | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD    | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |       |        |
| Mar-19        | 5.72                                      | 4.44                                  | 7.11                                  | 22761                        | 17673                 | 28289                 | 2766  | 12.15% |
| May-19        | 19.38                                     | 16.18                                 | 22.68                                 | 77091                        | 64367                 | 90192                 | 6733  | 8.73%  |
| Jun-19        | 4.2                                       | 3.23                                  | 5.18                                  | 16704                        | 12830                 | 20607                 | 2024  | 12.12% |
| Jul-19        | 17.21                                     | 12.88                                 | 21.55                                 | 68441                        | 51216                 | 85717                 | 8983  | 13.12% |
| Aug-19        | 28.86                                     | 19.86                                 | 38.97                                 | 114798                       | 78987                 | 155001                | 19209 | 16.73% |
| Sep-19        | 3.63                                      | 3.12                                  | 4.21                                  | 14450                        | 12408                 | 16748                 | 1111  | 7.69%  |
| Oct-19        | 4.33                                      | 2.24                                  | 7.33                                  | 17217                        | 8920                  | 29136                 | 5134  | 29.82% |
| Nov-19        | 1.39                                      | 0.95                                  | 2.03                                  | 5534                         | 3797                  | 8079                  | 1071  | 19.34% |
| Dec-19        | 2.58                                      | 1.52                                  | 3.97                                  | 10264                        | 6065                  | 15770                 | 2524  | 24.59% |
| Jan-20        | 8.6                                       | 6.6                                   | 10.79                                 | 34194                        | 26257                 | 42930                 | 4554  | 13.32% |
| Feb-20        | 4.86                                      | 3.91                                  | 5.94                                  | 19321                        | 15562                 | 23622                 | 2087  | 10.8%  |
| Mar-20        | 16.22                                     | 12.53                                 | 20                                    | 64525                        | 49827                 | 79544                 | 7555  | 11.71% |
| May S01 20    | 22.48                                     | 18.36                                 | 26.41                                 | 89407                        | 73006                 | 105044                | 8233  | 9.21%  |
| May S02 20    | 17.75                                     | 14.53                                 | 21.28                                 | 70583                        | 57777                 | 84638                 | 7364  | 10.43% |
| Jun-20        | 20.99                                     | 17.97                                 | 24.07                                 | 83464                        | 71485                 | 95746                 | 6132  | 7.35%  |
| Jul-20        | 7.26                                      | 5.92                                  | 8.71                                  | 28862                        | 23543                 | 34652                 | 2866  | 9.93%  |
| Aug-20        | 23.79                                     | 20.24                                 | 27.94                                 | 94631                        | 80517                 | 111134                | 7715  | 8.15%  |
| Sep-20        | 34.18                                     | 26.37                                 | 42.82                                 | 135956                       | 104879                | 170306                | 16704 | 12.29% |
| Oct-20        | 7.85                                      | 4.77                                  | 10.99                                 | 31241                        | 18960                 | 43720                 | 6552  | 20.97% |
| Nov-20        | 5.78                                      | 3.72                                  | 8.25                                  | 23003                        | 14790                 | 32804                 | 4497  | 19.55% |
| Dec-20        | 13.94                                     | 10.4                                  | 17.82                                 | 55441                        | 41360                 | 70889                 | 7344  | 13.25% |
| Jan-21        | 6.81                                      | 5.96                                  | 7.61                                  | 27068                        | 23709                 | 30261                 | 1702  | 6.29%  |
| Feb-21        | 3.23                                      | 2.45                                  | 3.98                                  | 12837                        | 9729                  | 15842                 | 1516  | 11.8%  |
| Apr S01 21    | 18.45                                     | 14.84                                 | 22.34                                 | 73382                        | 59039                 | 88855                 | 7661  | 10.44% |
| Apr S02 21    | 45.43                                     | 36.31                                 | 56.63                                 | 180697                       | 144416                | 225223                | 20660 | 11.43% |

**Table 14: Unapportioned density and population estimates of all razorbills in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Razorbill | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD   | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |      |        |
| Mar-19        | 0.93                                      | 0.68                                  | 1.24                                  | 3705                         | 2686                  | 4932                  | 581  | 15.68% |
| May-19        | 1.02                                      | 0.84                                  | 1.23                                  | 4072                         | 3360                  | 4895                  | 398  | 9.77%  |
| Jun-19        | 0.27                                      | 0.16                                  | 0.38                                  | 1074                         | 626                   | 1509                  | 228  | 21.19% |
| Jul-19        | 1.6                                       | 0.84                                  | 2.34                                  | 6350                         | 3336                  | 9308                  | 1539 | 24.22% |
| Aug-19        | 1.85                                      | 1.26                                  | 2.5                                   | 7378                         | 5022                  | 9942                  | 1300 | 17.62% |
| Sep-19        | 1.04                                      | 0.83                                  | 1.22                                  | 4130                         | 3317                  | 4871                  | 403  | 9.75%  |
| Oct-19        | 2.17                                      | 0.93                                  | 3.52                                  | 8622                         | 3716                  | 14016                 | 2828 | 32.8%  |
| Nov-19        | 0.32                                      | 0.07                                  | 0.67                                  | 1289                         | 263                   | 2652                  | 629  | 48.76% |
| Dec-19        | 0.56                                      | 0.29                                  | 0.88                                  | 2242                         | 1154                  | 3512                  | 636  | 28.36% |
| Jan-20        | 0.95                                      | 0.64                                  | 1.29                                  | 3784                         | 2564                  | 5144                  | 684  | 18.07% |
| Feb-20        | 0.58                                      | 0.42                                  | 0.75                                  | 2308                         | 1672                  | 2991                  | 337  | 14.58% |

| All Razorbill | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD   | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |      |        |
| Mar-20        | 3.11                                      | 2.23                                  | 3.98                                  | 12386                        | 8854                  | 15844                 | 1741 | 14.05% |
| May S01 20    | 0.92                                      | 0.69                                  | 1.18                                  | 3673                         | 2732                  | 4696                  | 521  | 14.18% |
| May S02 20    | 0.66                                      | 0.43                                  | 0.9                                   | 2613                         | 1728                  | 3590                  | 488  | 18.66% |
| Jun-20        | 0.58                                      | 0.45                                  | 0.72                                  | 2320                         | 1809                  | 2849                  | 263  | 11.33% |
| Jul-20        | 1.41                                      | 0.97                                  | 1.86                                  | 5621                         | 3840                  | 7385                  | 898  | 15.96% |
| Aug-20        | 2.41                                      | 1.79                                  | 3.12                                  | 9594                         | 7135                  | 12416                 | 1349 | 14.06% |
| Sep-20        | 10.9                                      | 7.31                                  | 14.57                                 | 43364                        | 29069                 | 57936                 | 7292 | 16.81% |
| Oct-20        | 0.92                                      | 0.53                                  | 1.36                                  | 3667                         | 2103                  | 5416                  | 840  | 22.89% |
| Nov-20        | 0.3                                       | 0.2                                   | 0.41                                  | 1177                         | 797                   | 1640                  | 226  | 19.16% |
| Dec-20        | 0.96                                      | 0.6                                   | 1.34                                  | 3803                         | 2372                  | 5322                  | 761  | 19.99% |
| Jan-21        | 1.94                                      | 1.43                                  | 2.47                                  | 7702                         | 5694                  | 9832                  | 1060 | 13.76% |
| Feb-21        | 0.65                                      | 0.47                                  | 0.87                                  | 2598                         | 1887                  | 3470                  | 427  | 16.42% |
| Apr S01 21    | 2.65                                      | 2.03                                  | 3.42                                  | 10559                        | 8079                  | 13586                 | 1479 | 14.01% |
| Apr S02 21    | 1.2                                       | 1                                     | 1.4                                   | 4761                         | 3971                  | 5556                  | 402  | 8.44%  |

**Table 15: Unapportioned density and population estimates of all puffins in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Puffin    | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD   | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |      |        |
| Mar-19        | 1.02                                      | 0.78                                  | 1.26                                  | 4070                         | 3103                  | 5023                  | 514  | 12.62% |
| May-19        | 1.43                                      | 1.22                                  | 1.61                                  | 5680                         | 4853                  | 6398                  | 392  | 6.9%   |
| Jun-19        | 1.11                                      | 0.55                                  | 1.8                                   | 4422                         | 2200                  | 7158                  | 1320 | 29.84% |
| Jul-19        | 2.22                                      | 1.64                                  | 3.04                                  | 8822                         | 6520                  | 12077                 | 1456 | 16.49% |
| Aug-19        | 1.76                                      | 1.26                                  | 2.33                                  | 6999                         | 5029                  | 9252                  | 1068 | 15.26% |
| Sep-19        | 0.79                                      | 0.52                                  | 1.11                                  | 3130                         | 2061                  | 4415                  | 629  | 20.08% |
| Oct-19        | 0.19                                      | 0.11                                  | 0.28                                  | 738                          | 456                   | 1101                  | 167  | 22.54% |
| Nov-19        | 0.02                                      | 0                                     | 0.03                                  | 70                           | 16                    | 137                   | 32   | 45.49% |
| Dec-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0    | 0      |
| Jan-20        | 0.01                                      | 0                                     | 0.03                                  | 58                           | 16                    | 105                   | 25   | 43.1%  |
| Feb-20        | 0.04                                      | 0.02                                  | 0.06                                  | 168                          | 95                    | 255                   | 41   | 24.01% |
| Mar-20        | 0.39                                      | 0.24                                  | 0.55                                  | 1562                         | 960                   | 2199                  | 318  | 20.33% |
| May S01 20    | 0.76                                      | 0.52                                  | 1.05                                  | 3026                         | 2071                  | 4180                  | 533  | 17.61% |
| May S02 20    | 0.27                                      | 0.21                                  | 0.33                                  | 1076                         | 839                   | 1324                  | 129  | 11.91% |
| Jun-20        | 0.45                                      | 0.32                                  | 0.61                                  | 1803                         | 1272                  | 2414                  | 284  | 15.72% |
| Jul-20        | 1.04                                      | 0.71                                  | 1.46                                  | 4138                         | 2836                  | 5825                  | 792  | 19.13% |
| Aug-20        | 1.26                                      | 1                                     | 1.52                                  | 4996                         | 3997                  | 6029                  | 523  | 10.47% |
| Sep-20        | 6.63                                      | 5.51                                  | 7.77                                  | 26355                        | 21927                 | 30889                 | 2245 | 8.52%  |
| Oct-20        | 0.08                                      | 0.06                                  | 0.12                                  | 336                          | 224                   | 462                   | 62   | 18.39% |
| Nov-20        | 0.11                                      | 0.06                                  | 0.16                                  | 420                          | 240                   | 628                   | 98   | 23.24% |
| Dec-20        | 0.01                                      | 0.01                                  | 0.03                                  | 57                           | 24                    | 103                   | 21   | 35.52% |
| Jan-21        | 0.02                                      | 0.01                                  | 0.03                                  | 65                           | 24                    | 112                   | 24   | 36.58% |
| Feb-21        | 0.19                                      | 0.11                                  | 0.29                                  | 755                          | 454                   | 1163                  | 187  | 24.69% |
| Apr S01 21    | 0.89                                      | 0.58                                  | 1.26                                  | 3553                         | 2317                  | 5022                  | 728  | 20.48% |
| Apr S02 21    | 2.53                                      | 1.92                                  | 3.15                                  | 10076                        | 7647                  | 12511                 | 1207 | 11.98% |



**Table 16: Unapportioned density and population estimates of all red-throated divers in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Red-throated diver | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV      |
|------------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|---------|
| <b>Survey</b>          |   |                                       |                                       |                              |                       |                       |    |         |
| Mar-19                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May-19                 | 0.01                                      | 0                                     | 0.02                                  | 41                           | 8                     | 87                    | 20 | 49.26%  |
| Jun-19                 | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 12 | 67.73%  |
| Jul-19                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-19                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-19                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Oct-19                 | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 25                    | 8  | 96.78%  |
| Nov-19                 | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 25                    | 8  | 96.38%  |
| Dec-19                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jan-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Feb-20                 | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8  | 95.37%  |
| Mar-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May S01 20             | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May S02 20             | 0.01                                      | 0                                     | 0.02                                  | 33                           | 0                     | 79                    | 20 | 60.9%   |
| Jun-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jul-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Oct-20                 | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Nov-20                 | 0.02                                      | 0                                     | 0.06                                  | 98                           | 16                    | 221                   | 52 | 52.91%  |
| Dec-20                 | 0.01                                      | 0                                     | 0.02                                  | 33                           | 0                     | 78                    | 19 | 58.34%  |
| Jan-21                 | 0.01                                      | 0                                     | 0.02                                  | 32                           | 0                     | 88                    | 25 | 79.18%  |
| Feb-21                 | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 32                    | 9  | 100.36% |
| Apr S01 21             | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Apr S02 21             | 0   | 0                                     | 0.01                                  | 8                            | 0                     | 24                    | 8  | 92.23%  |

**Table 17: Unapportioned density and population estimates of all fulmars in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Fulmar    | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |    |        |
| Mar-19        | 0.16                                      | 0.12                                  | 0.21                                  | 634                          | 461                   | 828                   | 92 | 14.46% |
| May-19        | 0.07                                      | 0.05                                  | 0.1                                   | 289                          | 180                   | 414                   | 62 | 21.23% |
| Jun-19        | 0.04                                      | 0.01                                  | 0.09                                  | 177                          | 48                    | 359                   | 84 | 47.53% |
| Jul-19        | 0.05                                      | 0.04                                  | 0.07                                  | 211                          | 142                   | 284                   | 39 | 18.12% |
| Aug-19        | 0.06                                      | 0.04                                  | 0.08                                  | 225                          | 152                   | 303                   | 40 | 17.62% |
| Sep-19        | 0.05                                      | 0.03                                  | 0.07                                  | 183                          | 103                   | 264                   | 42 | 22.92% |
| Oct-19        | 0.01                                      | 0                                     | 0.02                                  | 53                           | 20                    | 87                    | 18 | 32.72% |
| Nov-19        | 0.13                                      | 0.09                                  | 0.18                                  | 528                          | 367                   | 706                   | 92 | 17.3%  |
| Dec-19        | 0.13                                      | 0.09                                  | 0.17                                  | 507                          | 358                   | 682                   | 86 | 16.8%  |
| Jan-20        | 0.12                                      | 0.09                                  | 0.16                                  | 494                          | 344                   | 634                   | 75 | 15.15% |
| Feb-20        | 0.04                                      | 0.02                                  | 0.06                                  | 167                          | 91                    | 247                   | 41 | 24.57% |
| Mar-20        | 0.08                                      | 0.05                                  | 0.12                                  | 321                          | 199                   | 462                   | 71 | 21.96% |

| All Fulmar    | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD  | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|-----|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |     |        |
| May S01 20    | 0.05                                      | 0.02                                  | 0.07                                  | 180                          | 93                    | 290                   | 50  | 27.41% |
| May S02 20    | 0.03                                      | 0.02                                  | 0.05                                  | 131                          | 63                    | 210                   | 38  | 28.42% |
| Jun-20        | 0.07                                      | 0.05                                  | 0.09                                  | 273                          | 183                   | 364                   | 47  | 16.94% |
| Jul-20        | 0.05                                      | 0.03                                  | 0.07                                  | 185                          | 112                   | 265                   | 41  | 21.87% |
| Aug-20        | 0.09                                      | 0.06                                  | 0.12                                  | 354                          | 229                   | 487                   | 64  | 17.95% |
| Sep-20        | 0.68                                      | 0.58                                  | 0.79                                  | 2720                         | 2289                  | 3161                  | 220 | 8.09%  |
| Oct-20        | 0.24                                      | 0.17                                  | 0.33                                  | 974                          | 662                   | 1299                  | 157 | 16.03% |
| Nov-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0   | 0      |
| Dec-20        | 0.36                                      | 0.28                                  | 0.47                                  | 1444                         | 1114                  | 1881                  | 190 | 13.15% |
| Jan-21        | 0.11                                      | 0.07                                  | 0.15                                  | 432                          | 290                   | 582                   | 75  | 17.35% |
| Feb-21        | 0.12                                      | 0.08                                  | 0.17                                  | 489                          | 321                   | 679                   | 97  | 19.79% |
| Apr S01 21    | 0.03                                      | 0.02                                  | 0.05                                  | 128                          | 64                    | 202                   | 37  | 28.75% |
| Apr S02 21    | 0.11                                      | 0.07                                  | 0.14                                  | 422                          | 295                   | 560                   | 69  | 16.18% |

**Table 18: Unapportioned density and population estimates of all Manx shearwaters in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Manx shearwater | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|---------------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b>       |   |                                       |                                       |                              |                       |                       |    |        |
| Mar-19              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May-19              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jun-19              | 0.02                                      | 0                                     | 0.04                                  | 73                           | 16                    | 146                   | 35 | 47.41% |
| Jul-19              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Aug-19              | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 25                    | 8  | 95.01% |
| Sep-19              | 0.01                                      | 0                                     | 0.02                                  | 22                           | 0                     | 71                    | 22 | 99.63% |
| Oct-19              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Nov-19              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Dec-19              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jan-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Feb-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Mar-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S01 20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S02 20          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jun-20              | 0.01                                      | 0.01                                  | 0.02                                  | 56                           | 24                    | 95                    | 19 | 32.33% |
| Jul-20              | 0.01                                      | 0                                     | 0.03                                  | 40                           | 0                     | 110                   | 32 | 80.93% |
| Aug-20              | 0.02                                      | 0                                     | 0.06                                  | 68                           | 0                     | 221                   | 62 | 90.65% |
| Sep-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Oct-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Nov-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Dec-20              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jan-21              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Feb-21              | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S01 21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S02 21          | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |

**Table 19: Unapportioned density and population estimates of all gannets in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Gannet    | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD   | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|------|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |      |        |
| Mar-19        | 0.25                                      | 0.17                                  | 0.34                                  | 982                          | 657                   | 1359                  | 178  | 18.04% |
| May-19        | 0.69                                      | 0.53                                  | 0.89                                  | 2743                         | 2092                  | 3546                  | 366  | 13.31% |
| Jun-19        | 1.19                                      | 0.99                                  | 1.4                                   | 4738                         | 3929                  | 5574                  | 435  | 9.18%  |
| Jul-19        | 3.14                                      | 2.8                                   | 3.5                                   | 12499                        | 11138                 | 13929                 | 693  | 5.54%  |
| Aug-19        | 4.08                                      | 3.43                                  | 4.77                                  | 16223                        | 13624                 | 18981                 | 1402 | 8.64%  |
| Sep-19        | 2.3                                       | 2.02                                  | 2.58                                  | 9160                         | 8029                  | 10264                 | 595  | 6.49%  |
| Oct-19        | 1.33                                      | 0.85                                  | 2.02                                  | 5291                         | 3379                  | 8015                  | 1224 | 23.13% |
| Nov-19        | 0.26                                      | 0.13                                  | 0.41                                  | 1030                         | 507                   | 1650                  | 297  | 28.84% |
| Dec-19        | 0.03                                      | 0                                     | 0.08                                  | 105                          | 8                     | 306                   | 80   | 76.43% |
| Jan-20        | 0.01                                      | 0                                     | 0.02                                  | 35                           | 8                     | 72                    | 18   | 50.23% |
| Feb-20        | 0   | 0                                     | 0.01                                  | 17                           | 0                     | 40                    | 11   | 61.96% |
| Mar-20        | 0.2                                       | 0.13                                  | 0.27                                  | 788                          | 535                   | 1067                  | 131  | 16.53% |
| May S01 20    | 0.6                                       | 0.46                                  | 0.75                                  | 2380                         | 1849                  | 2991                  | 291  | 12.2%  |
| May S02 20    | 1.1                                       | 0.89                                  | 1.31                                  | 4380                         | 3552                  | 5218                  | 427  | 9.74%  |
| Jun-20        | 1.33                                      | 1.05                                  | 1.69                                  | 5272                         | 4174                  | 6708                  | 644  | 12.22% |
| Jul-20        | 3.24                                      | 2.85                                  | 3.68                                  | 12901                        | 11318                 | 14644                 | 843  | 6.53%  |
| Aug-20        | 1.83                                      | 1.48                                  | 2.22                                  | 7296                         | 5898                  | 8844                  | 750  | 10.27% |
| Sep-20        | 1.84                                      | 1.57                                  | 2.11                                  | 7301                         | 6228                  | 8391                  | 585  | 8.01%  |
| Oct-20        | 0.84                                      | 0.66                                  | 1.06                                  | 3328                         | 2622                  | 4231                  | 434  | 13.02% |
| Nov-20        | 1.11                                      | 0.85                                  | 1.38                                  | 4421                         | 3381                  | 5502                  | 561  | 12.67% |
| Dec-20        | 0.36                                      | 0.18                                  | 0.58                                  | 1415                         | 729                   | 2300                  | 400  | 28.23% |
| Jan-21        | 0.09                                      | 0.06                                  | 0.13                                  | 352                          | 230                   | 511                   | 73   | 20.69% |
| Feb-21        | 0.05                                      | 0.02                                  | 0.09                                  | 202                          | 72                    | 370                   | 78   | 38.61% |
| Apr S01 21    | 0.51                                      | 0.42                                  | 0.62                                  | 2041                         | 1674                  | 2461                  | 202  | 9.87%  |
| Apr S02 21    | 1.38                                      | 0.81                                  | 2.2                                   | 5485                         | 3213                  | 8769                  | 1494 | 27.24% |

| All Shag      | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV     |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|--------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |    |        |
| Mar-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S01 20    | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| May S02 20    | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jun-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Jul-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Aug-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Sep-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Oct-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Nov-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Dec-20        | 0   | 0                                     | 0.01                                  | 9                            | 0                     | 24                    | 9  | 93.91% |
| Jan-21        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Feb-21        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S01 21    | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |
| Apr S02 21    | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0      |

**Table 20: Unapportioned density and population estimates of all shags in the Offshore Ornithology Study Area, calculated using design-based analysis**

| All Shag      | Density Estimate (birds/km <sup>2</sup> ) | Lower 95% CI (birds/km <sup>2</sup> ) | Upper 95% CI (birds/km <sup>2</sup> ) | Population Estimate (number) | Lower 95% CI (number) | Upper 95% CI (number) | SD | CV      |
|---------------|---|---------------------------------------|---------------------------------------|------------------------------|-----------------------|-----------------------|----|---------|
| <b>Survey</b> |   |                                       |                                       |                              |                       |                       |    |         |
| Mar-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| May-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jun-19        | 0.01                                      | 0                                     | 0.02                                  | 24                           | 0                     | 72                    | 25 | 103.39% |
| Jul-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Aug-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Sep-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Oct-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Nov-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Dec-19        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Jan-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |
| Feb-20        | 0   | 0                                     | 0                                     | 0                            | 0                     | 0                     | 0  | 0       |

