# Culzean Floating Offshore Wind Turbine Pilot Project

# Appendix H

# Ornithology Displacement Analysis

# and

# Collision Risk Modelling

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# Introduction

This appendix to the Culzean Floating Wind Turbine EIA Report presents additional information on the analyses undertaken to quantify the potential for displacement and collision risk to seabird as part of the assessments presented in Chapter 11: Ornithology of the EIA Report.

The appendix presents displacement matrices for kittiwake, common guillemot and razorbill for the breeding and non-breeding periods. The matrices follow guidance on quantifying and assessing seabird displacement effects (SNCB,2017; NatureScot, 2023 (Guidance Note 8)) from offshore wind developments.

The appendix also provides details of the input parameters and model outputs for the collision risk modelling (CRM) undertaken to predict how many birds might be killed annually due to collision with the Project's single wind turbine. CRM was undertaken for gannet, kittiwake, great-black-backed gull and herring gull. CRM was undertaken using the Stochastic CRM shiny app v 0.1.1 (Caneco, 2022).) and using parameter vales according to NatureScot guidance (NatureScot, 2023 (Guidance Note 7)). The CRM shiny app is an online Graphical User Interface developed especially for seabird collision modelling. It is based on the stochastic model developed by Masden (2015), which in turn was developed from the non-stochastic model developed by Band (2012). The shiny app was used to predict the number of annual collisions for four collision-vulnerable seabird species, gannet, kittiwake, great black-backed gull and herring gull. Predictions were produced from the CRM run in both deterministic and stochastic modes, as recommended by NatureScot guidance (Guidance Note 7).

## Displacement Matrices

**Appendix H Table 1. Input parameters for displacement matrices**

| Species | Peak density (Breeding Season) | Peak density (Non-breeding Season) | Buffer applied | Area (+2 km buffer) |
|---|---|---|---|---|
| Kittiwake | 0.25 birds/km$^2$ | 0.13 birds/km$^2$ | 2 km | 12.6 km$^2$ |
| Guillemot | 1.26 birds/km$^2$ | 21.7 birds/km$^2$ | 2 km | 12.6 km$^2$ |
| Razorbill | 0.07 birds/km$^2$ | 1.11 birds/km$^2$ | 2 km | 12.6 km$^2$ |

**Appendix H Table 2. Displacement matrix for kittiwake during the breeding season. Values are the number of birds rounded to the nearest whole number predicted to be die for a given combination of assumed mortality and rate of displacement. The highlighted cells are the combinations recommended by NatureScot (Guidance Note 8) for the assessment of displacement impacts on kittiwake from offshore wind energy developments.**

| Scenario: kittiwake, peak estimated number inside 2-km buffer during breeding season | | % mortality of displaced birds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1% | 2% | 3% | 4% | 5% | 10% | 20% | 30% | 50% | 80% | 100% |
| % of birds displaced | 10% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 30% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 40% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 50% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| | 60% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 |
| | 70% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 |
| | 80% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 |
| | 90% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 |
| | 100% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |

**Appendix H Table 3. Displacement matrix for kittiwake during the non-breeding season. Values are the number of birds rounded to the nearest whole number predicted to be die for a given combination of assumed mortality and rate of displacement. The highlighted cells are the combinations recommended by NatureScot (Guidance Note 8) for the assessment of displacement impacts on kittiwake from offshore wind energy developments.**

| Scenario: kittiwake, Peak estimated number inside 2-km buffer during non-breeding season | | % mortality of displaced birds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1% | 2% | 3% | 4% | 5% | 10% | 20% | 30% | 50% | 80% | 100% |
| % of birds displaced | 10% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 30% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 40% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 50% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 60% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 70% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 80% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 90% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 100% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |

**Appendix H Table 4. Displacement matrix for common guillemot during the breeding season. Values are the number of birds rounded to the nearest whole number predicted to be die for a given combination of assumed mortality and rate of displacement. The highlighted cells are the combinations recommended by NatureScot (Guidance Note 8) for the assessment of displacement impacts on common guillemot from offshore wind energy developments.**

| Scenario: Guillemot, peak monthly estimated number inside 2 km buffer during breeding season | | % mortality of displaced birds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1% | 2% | 3% | 4% | 5% | 10% | 20% | 30% | 50% | 80% | 100% |
| % of birds displaced | 10% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| | 20% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 3 |
| | 30% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 5 |
| | 40% | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 5 | 6 |
| | 50% | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 4 | 6 | 8 |
| | 60% | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 5 | 8 | 10 |
| | 70% | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 6 | 9 | 11 |
| | 80% | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 4 | 6 | 10 | 13 |
| | 90% | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 4 | 7 | 11 | 14 |
| | 100% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |

**Appendix H Table 5. Displacement matrix for common guillemot during the non-breeding season. Values are the number of birds rounded to the nearest whole number predicted to be die for a given combination of assumed mortality and rate of displacement. The highlighted cells are the combinations recommended by NatureScot (Guidance Note 8) for the assessment of displacement impacts on common guillemot from offshore wind energy developments.**

| Scenario: Guillemot, peak monthly estimated number inside 2 km buffer during non-breeding season | | % mortality of displaced birds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1% | 2% | 3% | 4% | 5% | 10% | 20% | 30% | 50% | 80% | 100% |
| % of birds displaced | 10% | 0 | 1 | 1 | 1 | 1 | 3 | 5 | 8 | 14 | 22 | 27 |
| | 20% | 1 | 1 | 2 | 2 | 3 | 5 | 11 | 16 | 27 | 44 | 55 |
| | 30% | 1 | 2 | 2 | 3 | 4 | 8 | 16 | 25 | 41 | 65 | 82 |
| | 40% | 1 | 2 | 3 | 4 | 5 | 11 | 22 | 33 | 55 | 87 | 109 |
| | 50% | 1 | 3 | 4 | 5 | 7 | 14 | 27 | 41 | 68 | 109 | 136 |
| | 60% | 2 | 3 | 5 | 7 | 8 | 16 | 33 | 49 | 82 | 131 | 164 |
| | 70% | 2 | 4 | 6 | 8 | 10 | 19 | 38 | 57 | 95 | 153 | 191 |
| | 80% | 2 | 4 | 7 | 9 | 11 | 22 | 44 | 65 | 109 | 174 | 218 |
| | 90% | 2 | 5 | 7 | 10 | 12 | 25 | 49 | 74 | 123 | 196 | 245 |
| | 100% | 3 | 5 | 8 | 11 | 14 | 27 | 55 | 82 | 136 | 218 | 273 |

**Appendix H Table 6. Displacement matrix for razorbill during the breeding season. Values are the number of birds rounded to the nearest whole number predicted to be die for a given combination of assumed mortality and rate of displacement. The highlighted cells are the combinations recommended by NatureScot (Guidance Note 8) for the assessment of displacement impacts on razorbill from offshore wind energy developments.**

| Scenario: Razorbill, peak monthly estimated number inside 2 km buffer during breeding season | | % mortality of displaced birds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1% | 2% | 3% | 4% | 5% | 10% | 20% | 30% | 50% | 80% | 100% |
| % of birds displaced | 10% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 30% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 40% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 50% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 60% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 70% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 80% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 90% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 100% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

**Appendix H Table 7. Displacement matrix for razorbill during the non-breeding season. Values are the number of birds rounded to the nearest whole number predicted to be die for a given combination of assumed mortality and rate of displacement. The highlighted cells are the combinations recommended by NatureScot (Guidance Note 8) for the assessment of displacement impacts on razorbill from offshore wind energy developments.**

| Scenario: Razorbill, peak monthly estimated number inside 2 km buffer during non-breeding season | | % mortality of displaced birds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1% | 2% | 3% | 4% | 5% | 10% | 20% | 30% | 50% | 80% | 100% |
| % of birds displaced | 10% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 20% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 |
| | 30% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 4 |
| | 40% | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 4 | 6 |
| | 50% | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 6 | 7 |
| | 60% | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 7 | 8 |
| | 70% | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 5 | 8 | 10 |
| | 80% | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 6 | 9 | 11 |
| | 90% | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 4 | 6 | 10 | 13 |
| | 100% | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 4 | 7 | 11 | 14 |

## CRM Input Parameter Values

**Appendix H Table 8. Simulation options selected for CRM**

| Simulation choice | Selection |
|---|---|
| Number of iterations | 1000 |
| Random seed value | 10 |
| Large array correction | No |

**Appendix H Table 9. Wind farm parameters used in CRM**

| Number of turbines | Latitude (deg) | Windfarm width (km) | Tidal offset (m) | % upwind flights |
|---|---|---|---|---|
| 1 | 57 | 1 | 0 | 50 |

**Appendix H Table 10. Turbine parameters used in CRM**

| Turbine Model | Number of rotor blades | Rotor radius (m) | Surface clearance (m) | Blade Width (m) | Speed/ pitch simulation option | Rotation speed (rpm) | Rotation speed SD | Rotor pitch (deg) | Rotor pitch SD |
|---|---|---|---|---|---|---|---|---|---|
| 3 MW | 3 | 56 | 22 | 4 | probDist | 13 | 0.5 | 13 | 0.1 |

**Appendix H Table 11. Wind availability and turbine downtime parameters used in CRM**

| Metric | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind availability (%) | 96.28 | 96.53 | 95.83 | 92.78 | 90.86 | 92.22 | 89.11 | 89.92 | 93.71 | 96.14 | 97.14 | 96.41 |
| Mean downtime (%) | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 |
| SD Downtime (%) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

**Appendix H Table 12. Bird size and behaviour parameters used in CRM**

| Species | Avoidance rate Deterministic CRM Option 2 | Avoidance rate Stochastic CRM Option 2 | Avoidance rate SD | Body length (m) | Body length SD | Wingspan (m) | Wingspan SD | Flightt speed (m/s) | Flight speed SD | Nocturnal activity factor | Nocturnal activity SD | Flight type | Proportion flight activity at CRH | Proportion flight activity at CRH SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gannet | 0.992 | 0.993 | 0.0003 | 0.935 | 0.0325 | 1.73 | 0.0375 | 14.9 | 0 | 0.08 | 0.1 | Gliding | 0.102 | 0.01 |
| Kittiwake | 0.992 | 0.993 | 0.0003 | 0.390 | 0.0050 | 1.08 | 0.0625 | 13.1 | 0.4 | 0.5 | 0.005 | Flapping | 0.124 | 0.01 |
| Great black-backed gull | 0.994 | 0.994 | 0.0004 | 0.710 | 0.0350 | 1.58 | 0.0375 | 13.7 | 1.2 | 0.5 | 0.005 | Flapping | 0.291 | 0.01 |
| Herring gull | 0.994 | 0.994 | 0.0004 | 0.595 | 0.0225 | 1.44 | 0.03 | 12.8 | 1.8 | 0.5 | 0.005 | Flapping | 0.285 | 0.01 |

**Appendix H Table 13. Flying bird density (birds/km$^2$) parameters used in stochastic CRM**

| Species | Month | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gannet | Mean | 0 | 0 | 0 | 0 | 0 | 0.130 | 0 | 0.060 | 0 | 0 | 0 | 0 |
| | SD | 0 | 0 | 0 | 0 | 0 | 0.091 | 0 | 0.060 | 0 | 0 | 0 | 0 |
| Kittiwake | Mean | 0 | 0 | 0 | 0 | 0.190 | 0.060 | 0.130 | 0.060 | 0 | 0 | 0.130 | 0 |
| | SD | 0 | 0 | 0 | 0 | 0.108 | 0.060 | 0.091 | 0.060 | 0 | 0 | 0.091 | 0 |
| Great black-backed gull | Mean | 0.130 | 0.070 | 0 | 0.060 | 0.070 | 0 | 0 | 0.190 | 0 | 0.065 | 0.070 | 0.190 |
| | SD | 0.091 | 0.070 | 0 | 0.060 | 0.070 | 0 | 0 | 0.141 | 0 | 0.046 | 0.070 | 0.108 |
| Herring gull | Mean | 0.070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | SD | 0.070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## CRM Outputs for CRM Option2

**Appendix H Table 14. Stochastic CRM Option 2 outputs for gannet (number of collisions per season / year after adjustment for avoidance rate)**

| Season | Time Period | CRM Option | Mean | Median | SD | CV | 2.5% | 97.5% |
|---|---|---|---|---|---|---|---|---|
| Breeding | April - September | Option 1 | 0.029 | 0.028 | 0.012 | 42.781 | 0.007 | 0.054 |
| | | Option 2 | 0.030 | 0.027 | 0.017 | 57.021 | 0.006 | 0.070 |
| Non-breeding | October - March | Option 1 | | | | | | |
| | | Option 2 | | | | | | |
| Year | January - December | Option 1 | 0.029 | 0.028 | 0.012 | 42.781 | 0.007 | 0.054 |
| | | Option 2 | 0.030 | 0.027 | 0.017 | 57.021 | 0.006 | 0.070 |

**Appendix H Table 15. Stochastic CRM Option 2 outputs for kittiwake (number of collisions per year / season after adjustment for avoidance rate)**

| Season | Time Period | CRM Option | Mean | Median | SD | CV | 2.5% | 97.5% |
|---|---|---|---|---|---|---|---|---|
| Breeding | April - August | Option 1 | 0.063 | 0.063 | 0.019 | 30.114 | 0.030 | 0.103 |
| | | Option 2 | 0.060 | 0.059 | | 32.162 | 0.025 | 0.101 |
| Non-breeding | September - March | Option 1 | 0.015 | 0.015 | 0.008 | 54.351 | 0.002 | 0.032 |
| | | Option 2 | | 0.014 | | 55.846 | | |
| Year | January - December | Option 1 | 0.078 | 0.078 | 0.021 | 26.845 | 0.042 | 0.122 |
| | | Option 2 | 0.075 | 0.073 | 0.022 | 29.186 | 0.037 | 0.121 |

**Appendix H Table 16. Stochastic CRM Option 2 outputs for great black-backed gull (number of collisions per year / season after adjustment for avoidance rate)**

| Season | Time Period | CRM Option | Mean | Median | SD | CV | 2.5% | 97.5% |
|---|---|---|---|---|---|---|---|---|
| Breeding | April - August | Option 1 | 0.121 | 0.119 | 0.046 | 37.714 | 0.043 | 0.223 |
| | | Option 2 | 0.129 | 0.124 | 0.052 | 40.021 | 0.045 | 0.249 |
| Non-breeding | September - March | Option 1 | 0.161 | 0.158 | 0.044 | 27.406 | 0.086 | 0.260 |
| | | Option 2 | 0.172 | 0.166 | 0.052 | 30.424 | | 0.286 |
| Year | January - December | Option 1 | 0.283 | 0.278 | 0.067 | 23.857 | 0.167 | 0.432 |
| | | Option 2 | 0.300 | 0.292 | 0.081 | 27.070 | 0.165 | 0.482 |

**Appendix H Table 17. Stochastic CRM Option 2 outputs for herring gull (number of collisions per year / season after adjustment for avoidance rate)**

| Season | Time Period | CRM Option | Mean | Median | SD | CV | 2.5% | 97.5% |
|---|---|---|---|---|---|---|---|---|
| Breeding | April - August | Option 1 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 |
| | | Option 2 | | | | | | |
| Non-breeding | September - March | Option 1 | 0.022 | 0.020 | 0.014 | 62.023 | 0.002 | 0.053 |
| | | Option 2 | | | | 63.638 | | |
| Year | January - December | Option 1 | 0.022 | 0.020 | 0.014 | 62.023 | 0.002 | 0.053 |
| | | Option 2 | | | | 63.638 | | |

**Appendix H Table 18. Deterministic CRM Option 2 outputs for gannet (number of collisions per year / season after adjustment for avoidance rate)**

| Season | Time Period | CRM Option | No. Collisions |
|---|---|---|---|
| Breeding | April - September | Option 1 | 0.028 |
| | | Option 2 | 0.027 |
| Non-breeding | October - March | Option 1 | |
| | | Option 2 | |
| Year | January - December | Option 1 | 0.028 |
| | | Option 2 | 0.027 |

**Appendix H Table 19. Deterministic CRM Option 2 outputs for kittiwake (number of collisions per year / season after adjustment for avoidance rate)**

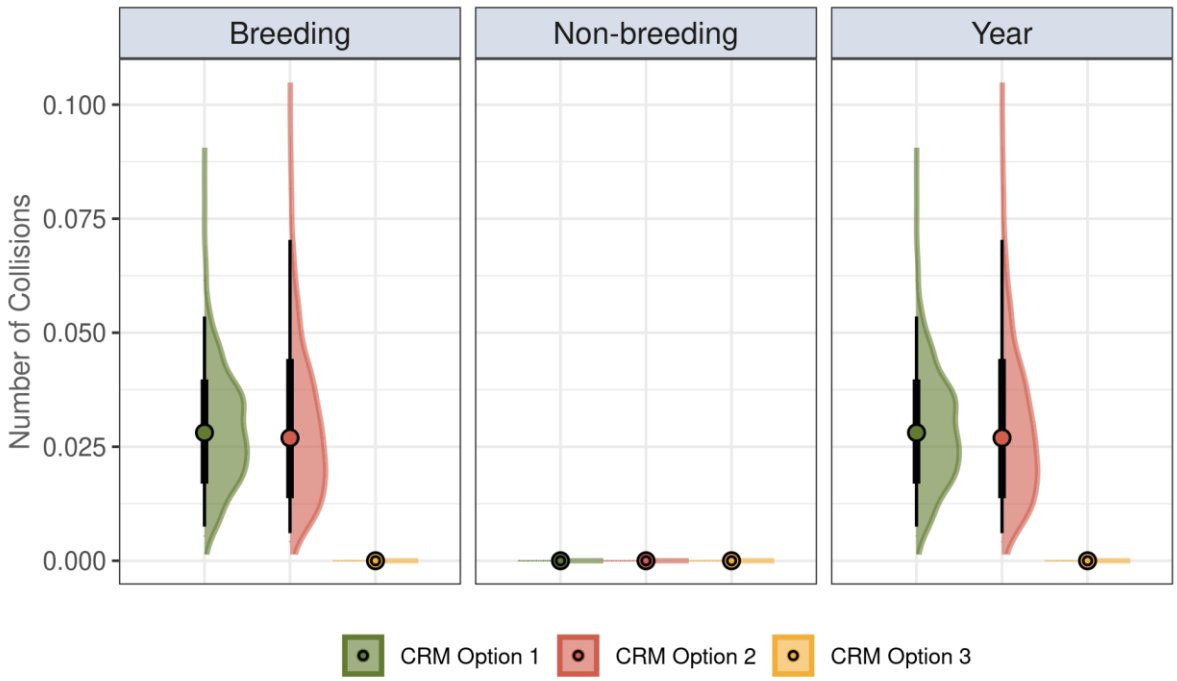
| Season | Time Period | CRM Option | No. Collisions |
|---|---|---|---|
| Breeding | April - August | Option 1 | 0.064 |
| | | Option 2 | 0.061 |
| Non-breeding | September - March | Option 1 | 0.016 |
| | | Option 2 | 0.015 |
| Year | January - December | Option 1 | 0.080 |
| | | Option 2 | 0.076 |

**Appendix H Table 20. Deterministic CRM Option 2 outputs for great black-backed gull (number of collisions per year / season after adjustment for avoidance rate)**

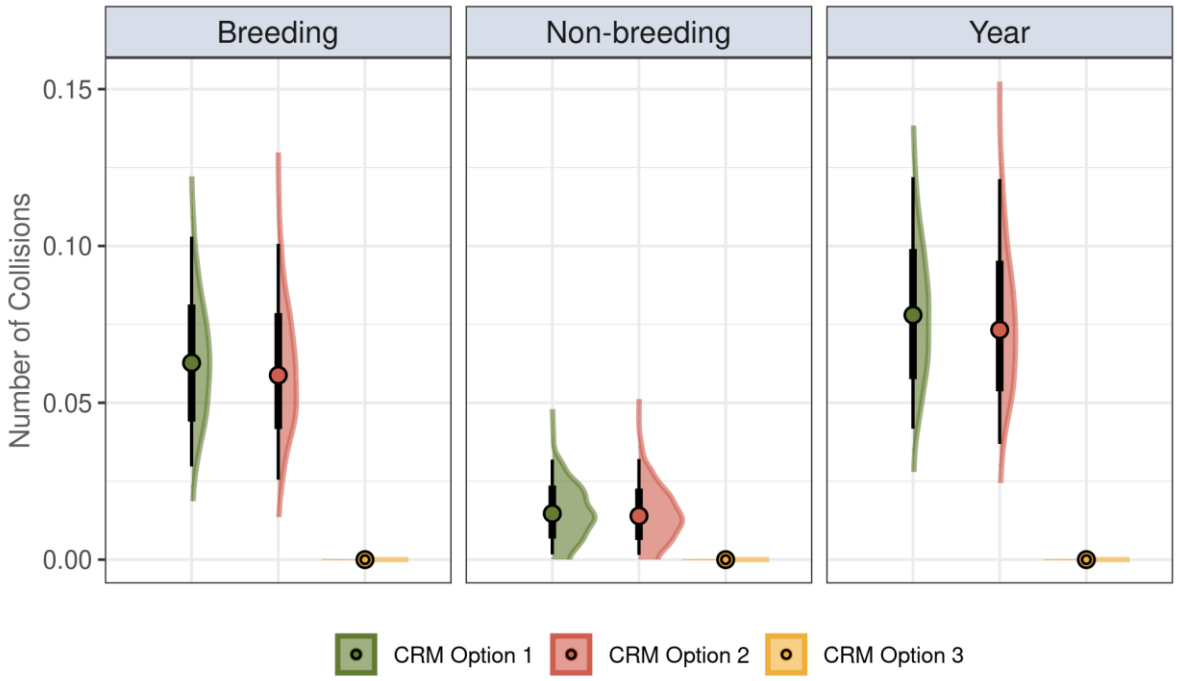
| Season | Time Period | CRM Option | No. Collisions |
|---|---|---|---|
| Breeding | April - August | Option 1 | 0.101 |
| | | Option 2 | 0.099 |
| Non-breeding | September - March | Option 1 | 0.143 |
| | | Option 2 | 0.139 |
| Year | January - December | Option 1 | 0.244 |
| | | Option 2 | 0.237 |

**Appendix H Table 19. Deterministic CRM Option 2 outputs for herring gull (number of collisions per year / season after adjustment for avoidance rate)**

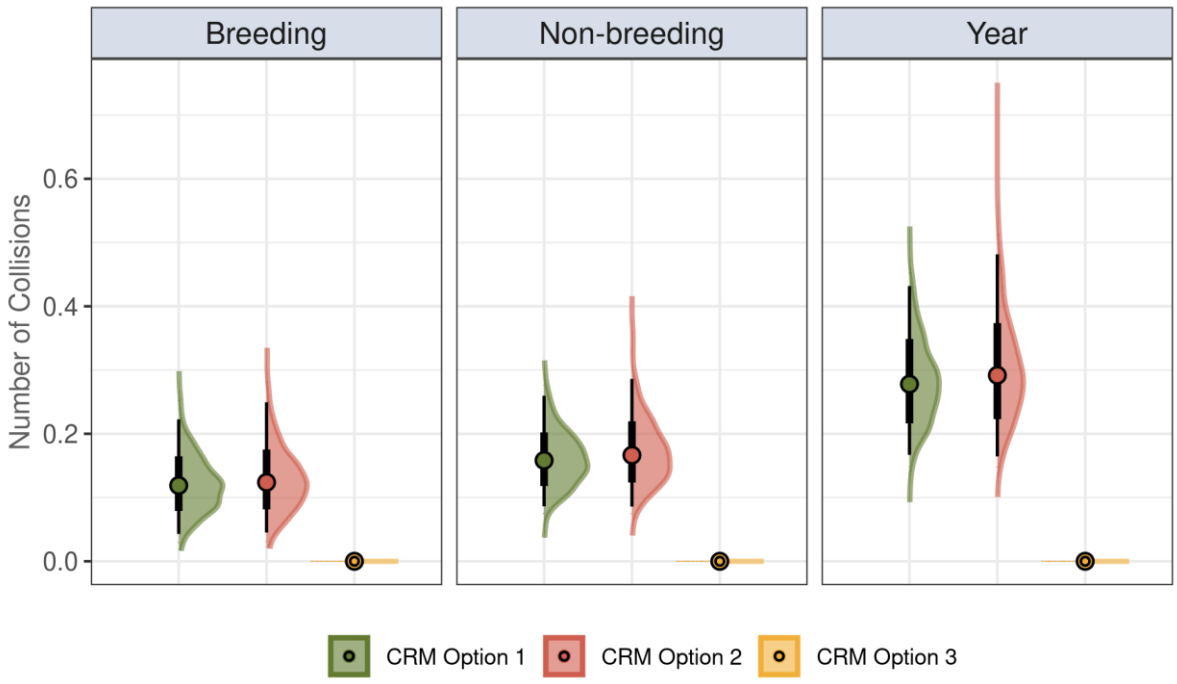
| Season | Time Period | CRM Option | No. Collisions |
|---|---|---|---|
| Breeding | April - August | Option 1 | 0.000 |
| | | Option 2 | |
| Non-breeding | September - March | Option 1 | 0.017 |
| | | Option 2 | 0.016 |
| Year | January - December | Option 1 | 0.017 |
| | | Option 2 | 0.016 |



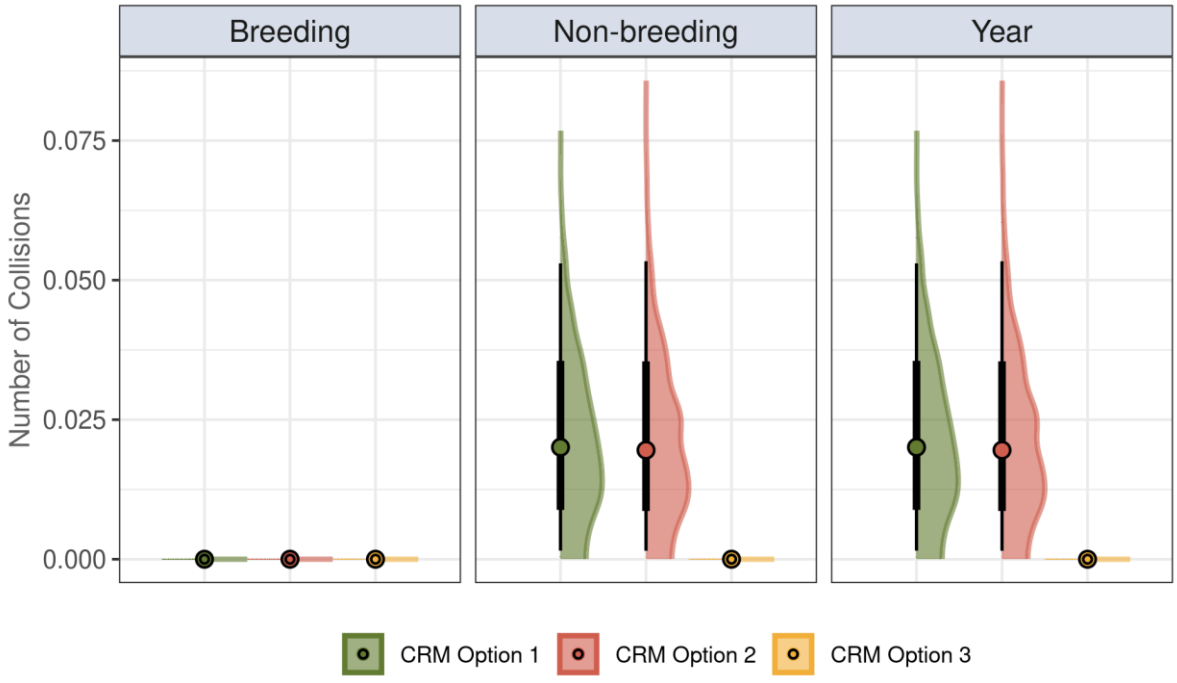

**Appendix H Figure 1. Collision risk estimates for gannet by season and for a whole year. Density distribution, median, 66% and 95% quantile intervals and quantile dotplots (each dot represents ~2% chance outcome) of simulated values. Note CRM Option 3 was disabled.**




**Appendix H Figure 2. Collision risk estimates for kittiwake by season and for a whole year. Density distribution, median, 66% and 95% quantile intervals and quantile dotplots (each dot represents ~2% chance outcome) of simulated values. Note CRM Option 3 was disabled.**




**Appendix H Figure 3. Collision risk estimates for great black-backed gull by season and for a whole year. Density distribution, median, 66% and 95% quantile intervals and quantile dotplots (each dot represents ~2% chance outcome) of simulated values. Note CRM Option 3 was disabled.**




**Appendix H Figure 4.. Collision risk estimates for herring gull by season and for a whole year. Density distribution, median, 66% and 95% quantile intervals and quantile dotplots (each dot represents ~2% chance outcome) of simulated values. Note CRM Option 3 was disabled.**

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