

# **RWE Renewables UK Dogger Bank South (West) Limited**

# **RWE Renewables UK Dogger Bank South (East) Limited**

# **Dogger Bank South Offshore Wind Farms**

**Environmental Statement**

**Volume 7**

**Appendix 12-9 Collision Risk Modelling Outputs**

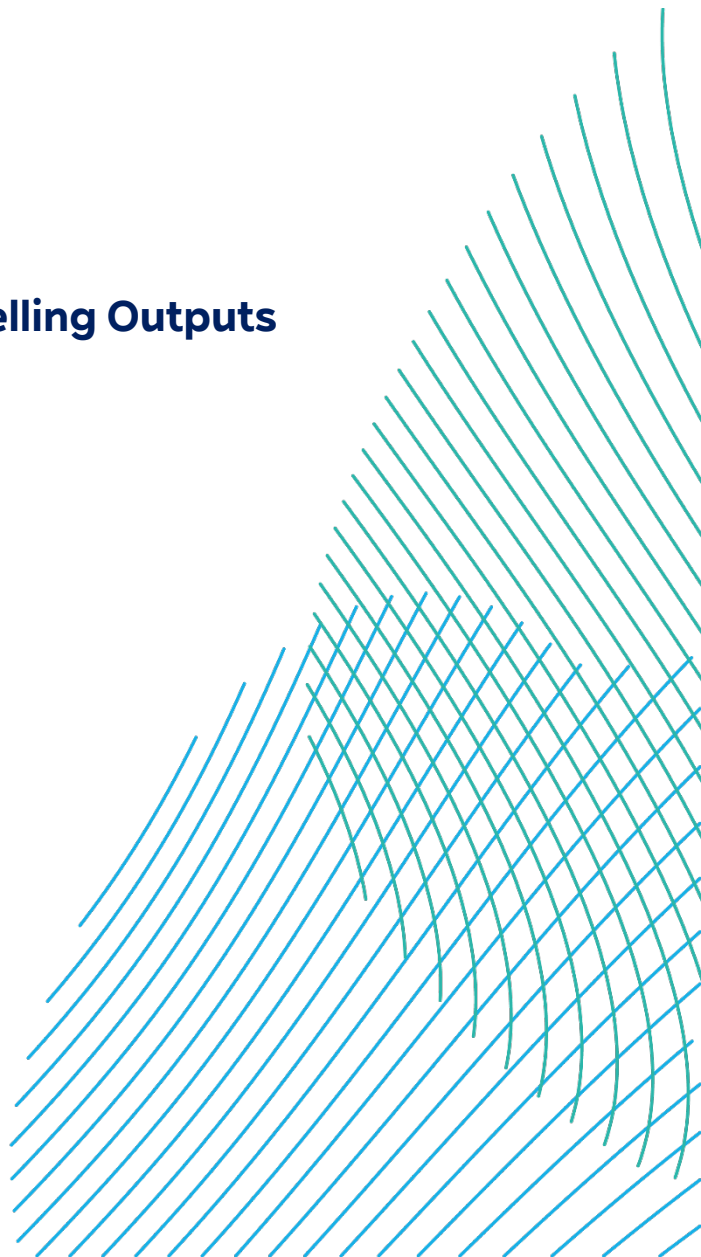
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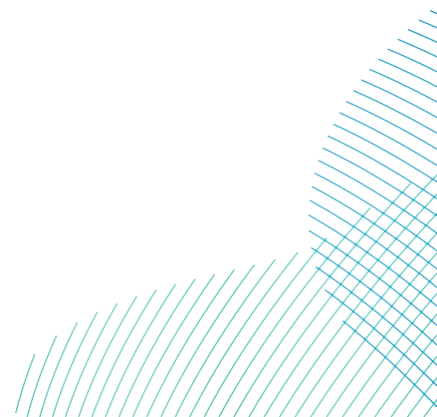
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Green

# Dogger Bank South Offshore Windfarm

## Ornithology Technical Appendix 12-9 Collision Risk Modelling outputs

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**Date:** 18/03/2024

**Tel:** 0141 342 5404

**Web:** [www.macarthurgreen.com](http://www.macarthurgreen.com)

**Address:** 93 South Woodside Road | Glasgow | G20 6NT

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## LIST OF TABLES

Table 1-1 DBS turbine data used in the CRM. ....	2
Table 1-2 Biometrics of each species modelled. Note that gannet avoidance rate includes Macro avoidance at 70% and micro avoidance at 99.3%. ....	2
Table 1-3 Densities of seabirds in flight on DBS East.....	3
Table 1-4 Densities of seabirds in flight on DBS West .....	5
Table 1-5 Arctic skua monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	7
Table 1-6 Arctic tern monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	8
Table 1-7 Common tern monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	9
Table 1-8 Common Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	10
Table 1-9 Common tern monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	11
Table 1-10 Fulmar monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	12
Table 1-11 Gannet monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models using 99.79% total avoidance.....	13
Table 1-12 Gannet monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models using 99.3% total avoidance.....	14
Table 1-13 Great Black-backed Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	15
Table 1-14 Great skua monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	16
Table 1-15 Herring Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	17
Table 1-16 Kittiwake monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	18
Table 1-17 Lesser Black-backed Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.....	19

Table 1-18 Common Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models..... 20

Table 1-19 Fulmar seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models..... 21

Table 1-20 Gannet seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models at a total avoidance rate of 99.79%. .... 22

Table 1-21 Gannet seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models at a total avoidance rate of 99.3%. .... 23

Table 1-22 Great Black-backed Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models..... 24

Table 1-23 Herring Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models..... 25

Table 1-24 Kittiwake seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models..... 26

Table 1-25 Lesser Black-backed Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models..... 27

## 1 INTRODUCTION

This appendix provides tables of the collision risk modelling (CRM) input parameters for the DBS Offshore Wind Farms and the collision mortality results obtained.

The stochastic implementation of the Band model used for this assessment was stochLAB, commissioned by Marine Scotland<sup>1</sup>.

The input data comprise:

- **Table 1-1:** the Array Area and turbine data;
- **Table 1-2:** biometrics of each species modelled (e.g. wingspan, body length, etc.);
- **Table 1-3** and **Table 1-4:** densities of birds in flight in the DBS Array Areas (East and West) in each month, presented as the mean, standard deviation and upper and lower 95% confidence range derived from 1,000 nonparametric bootstrap simulations (note that simulations used the bootstrap samples themselves as inputs; these can be provided to Natural England on request);

And the outputs are presented in:

- **Table 1-5** to **Table 1-17:** monthly and annual stochastic collision estimates, and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.
- **Table 1-18** to **Table 1-25:** seasonal and annual stochastic collision estimates for those species with more than 1 predicted annual collision, and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine model.

For the avoidance of doubt, the avoidance rates used for CRM were those advised by Natural England for stochastic collision assessment, as follows:

- |   |   |
|---|---|
| • Gannet  | 99.79% (this figure includes macro avoidance at 70%) & 99.3% (as requested by the RSPB) |
| • Kittiwake   | 99.3%   |
| • Herring gull, lesser black-backed gull, great black-backed gull | 99.4%   |
| • Little gull, common gull, black-headed gull                     | 99.5%   |
| • Tern species  | 99.0%   |
| • All other species   | 99.0%   |

<sup>1</sup> <https://hidef-aerial-surveying.github.io/stochLAB/index.html>

**Table 1-1 DBS turbine data used in the CRM.**

Parameter	Turbine parameter set 1		Turbine parameter set 2	
	East	West	East	West
No. turbines	100	100	57	57
Rotor radius (m)	129.4	129.4	187.6	187.6
Hub height (m; MSL)	163.4	163.4	221.6	221.6
Max. blade width (m)	9.4	9.4	13.7	13.7
Mean RPM	7.4	7.4	5.6	5.6
Mean blade angle (°)	15	15	15	15
Array Area width (km)	30	30	30	30
Array Area latitude (centre, °)	54.5	54.62	54.5	54.62
Percentage operational	95	95	95	95

**Table 1-2 Biometrics of each species modelled. Note that gannet avoidance rate includes Macro avoidance at 70% and micro avoidance at 99.3%.**

Species	Body length (m) (±SD)	Wingspan (m) (±SD)	Flight speed (ms <sup>-1</sup> ) (±SD)	Nocturnal activity factor (%) (±SD)	Flight type	Avoidance rate (%) (±SD)
Arctic skua	0.44 (0)	1.18 (0)	13.3 (0)	0% (0)	Flapping	99.1 (0.04)
Arctic tern	0.33 (0)	0.87 (0)	10.5 (0)	0% (0)	Flapping	99.1 (0.04)
Common gull	0.42 (0)	1.30 (0)	13.4 (0)	25% (0)	Flapping	99.5 (0.02)
Common tern	0.33 (0)	0.87 (0)	10.5 (0)	0% (0)	Flapping	99.1 (0.04)
Fulmar	0.48 (0)	1.07 (0)	13.0 (0)	75% (0)	Flapping	99.1 (0.04)
Gannet	0.94 (0.0325)	1.72 (0.0375)	14.9 (0)	8% (10%)	Flapping	99.79 (0.03) & 99.3 (0.03)
Great black-backed gull	0.71 (0.035)	1.58 (0.0375)	13.7 (1.20)	37.5% (6.37%)	Flapping	99.4 (0.04)
Great skua	0.56 (0)	1.36 (0)	14.9 (0)	0% (0)	Flapping	99.1 (0.04)
Herring gull	0.60 (0.0225)	1.44 (0.03)	12.8 (1.80)	37.5% (6.37%)	Flapping	99.4 (0.04)
Kittiwake	0.39 (0.005)	1.08 (0.0625)	13.1 (0.40)	37.5% (6.37%)	Flapping	99.3 (0.03)
Lesser black-backed gull	0.58 (0.03)	1.42 (0.0375)	13.1 (1.90)	37.5% (6.37%)	Flapping	99.4 (0.04)



Table 1-3 Densities of seabirds in flight on DBS East

Species	Site	Metric	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arctic skua	East	Mean	0	0	0	0	0	0	0	0	0	0.011	0	0
	East	SD	0	0	0	0	0	0	0	0	0	0.02	0	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0	0	0	0	0	0	0	0	0	0.071	0	0
Arctic tern	East	Mean	0	0	0	0	0.058	0	0.036	0.107	0	0	0	0
	East	SD	0	0	0	0	0.076	0	0.035	0.124	0	0	0	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0	0	0	0	0.239	0	0.096	0.382	0	0	0	0
Commic tern	East	Mean	0	0	0	0	0.095	0	0.036	0.227	0	0	0	0
	East	SD	0	0	0	0	0.129	0	0.038	0.28	0	0	0	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0	0	0	0	0.406	0	0.145	0.883	0	0	0	0
Common gull	East	Mean	0.012	0	0	0	0	0	0	0.037	0	0	0.024	0
	East	SD	0.021	0	0	0	0	0	0	0.032	0	0	0.041	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0.072	0	0	0	0	0	0	0.119	0	0	0.145	0
Common tern	East	Mean	0	0	0	0	0	0	0	0.012	0	0	0	0
	East	SD	0	0	0	0	0	0	0	0.02	0	0	0	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0	0	0	0	0	0	0	0.072	0	0	0	0
Fulmar	East	Mean	0.157	0.109	0	0.012	0.037	0.024	0	0.047	0.037	0.095	0.11	0.047
	East	SD	0.091	0.053	0	0.017	0.028	0.031	0	0.056	0.024	0.058	0.121	0.058
	East	Lwr95	0.024	0.024	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0.361	0.238	0	0.048	0.097	0.097	0	0.168	0.096	0.216	0.339	0.186
Gannet	East	Mean	0	0.035	0.204	0.597	0.136	0.012	0.095	0.144	0.264	0.536	0.389	0.035
	East	SD	0	0.047	0.145	0.184	0.122	0.018	0.06	0.072	0.221	0.228	0.189	0.046

Species	Site	Metric	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Great black backed gull	East	Lwr95	0	0	0.024	0.334	0	0	0	0.024	0	0.191	0.145	0
	East	Upr95	0	0.143	0.481	0.976	0.364	0.048	0.216	0.31	0.598	0.928	0.799	0.139
	East	Mean	0.06	0.024	0	0	0	0	0	0.024	0	0	0.012	0
	East	SD	0.057	0.023	0	0	0	0	0	0.034	0	0	0.02	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0.216	0.072	0	0	0	0	0	0.119	0	0	0.073	0
Great skua	East	Mean	0	0	0	0	0	0	0	0	0	0	0.012	0
	East	SD	0	0	0	0	0	0	0	0	0	0	0.02	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0	0	0	0	0	0	0	0	0	0	0.071	0
Herring gull	East	Mean	0.012	0	0	0	0	0	0	0	0	0	0.013	0
	East	SD	0.021	0	0	0	0	0	0	0	0	0	0.021	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0.072	0	0	0	0	0	0	0	0	0	0.073	0
Kittiwake	East	Mean	1.269	0.987	4.515	1.408	0.694	0.238	0.3	3.047	0.516	0.759	3.521	1.451
	East	SD	0.549	0.335	1.919	0.58	0.176	0.119	0.182	3.885	0.175	0.397	2.254	1.357
	East	Lwr95	0.6	0.504	1.694	0.596	0.406	0.073	0.048	0.024	0.231	0.24	1.015	0.024
	East	Upr95	2.665	1.717	7.599	2.501	1.115	0.478	0.672	12.499	0.909	1.522	7.17	3.391
Lesser black backed gull	East	Mean	0	0	0	0	0.012	0	0	0.024	0	0	0	0
	East	SD	0	0	0	0	0.021	0	0	0.041	0	0	0	0
	East	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	East	Upr95	0	0	0	0	0.073	0	0	0.143	0	0	0	0

Table 1-4 Densities of seabirds in flight on DBS West

Species	Site	Metric	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arctic skua	West	Mean	0	0	0	0	0	0	0	0.012	0	0	0	0
	West	SD	0	0	0	0	0	0	0	0.021	0	0	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0	0	0	0	0.072	0	0	0	0
Arctic tern	West	Mean	0	0	0	0	0	0	0.023	0.059	0	0	0	0
	West	SD	0	0	0	0	0	0	0.039	0.084	0	0	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0	0	0	0.141	0.264	0	0	0	0
Commic tern	West	Mean	0	0	0	0	0.011	0	0.058	0.071	0	0	0	0
	West	SD	0	0	0	0	0.019	0	0.039	0.097	0	0	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0	0.071	0	0.142	0.312	0	0	0	0
Common gull	West	Mean	0	0	0	0	0	0	0	0.12	0.012	0	0	0
	West	SD	0	0	0	0	0	0	0	0.149	0.02	0	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0	0	0	0	0.456	0.072	0	0	0
Common tern	West	Mean	0	0	0	0	0.024	0	0	0	0	0	0	0
	West	SD	0	0	0	0	0.023	0	0	0	0	0	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0	0.071	0	0	0	0	0	0	0
Fulmar	West	Mean	0.094	0.117	0.023	0.094	0.097	0.011	0.012	0.035	0.046	0.06	0.066	0.025
	West	SD	0.052	0.108	0.023	0.061	0.053	0.02	0.021	0.045	0.034	0.038	0.045	0.035
	West	Lwr95	0	0	0	0	0.023	0	0	0	0	0	0	0
	West	Upr95	0.213	0.331	0.072	0.236	0.211	0.072	0.071	0.14	0.12	0.143	0.167	0.121
Gannet	West	Mean	0	0.024	0.109	0.965	0.262	0.012	0.117	0.26	0.313	0.621	0.63	0.073
	West	SD	0	0.029	0.098	0.575	0.084	0.018	0.099	0.11	0.114	0.261	0.256	0.08

Species	Site	Metric	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Great black backed gull	West	Lwr95	0	0	0	0.259	0.117	0	0	0.096	0.12	0.262	0.167	0
	West	Upr95	0	0.094	0.29	1.943	0.427	0.048	0.282	0.468	0.504	1.049	1.069	0.217
	West	Mean	0	0.012	0	0	0	0	0	0	0.012	0.012	0	0
	West	SD	0	0.02	0	0	0	0	0	0	0.021	0.021	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0.071	0	0	0	0	0	0	0	0.072	0.072	0
Great skua	West	Mean	0	0	0	0	0	0	0	0	0.012	0.012	0.014	0
	West	SD	0	0	0	0	0	0	0	0	0.02	0.021	0.024	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0	0	0	0	0	0.072	0.071	0.083	0
Herring gull	West	Mean	0.012	0	0	0	0	0.012	0	0.012	0	0	0.024	0
	West	SD	0.021	0	0	0	0	0.02	0	0.021	0	0	0.033	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0.071	0	0	0	0	0.072	0	0.072	0	0	0.095	0
Kittiwake	West	Mean	1.105	1.207	1.955	3.674	1.246	0.443	0.894	4.643	0.629	1.053	2.475	1.423
	West	SD	0.268	0.486	0.908	1.824	0.24	0.213	0.579	6.464	0.554	0.33	1.715	1.321
	West	Lwr95	0.64	0.488	0.699	1.391	0.807	0.145	0.237	0	0.024	0.571	0.555	0.024
	West	Upr95	1.667	2.196	3.79	8.033	1.739	0.879	2.041	22.642	1.913	1.903	5.131	3.762
Lesser black backed gull	West	Mean	0	0	0	0.011	0	0	0	0	0	0	0	0
	West	SD	0	0	0	0.019	0	0	0	0	0	0	0	0
	West	Lwr95	0	0	0	0	0	0	0	0	0	0	0	0
	West	Upr95	0	0	0	0.071	0	0	0	0	0	0	0	0

1.1 Monthly and annual stochastic collision estimates

Table 1-5 Arctic skua monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1	East	Mean	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0.01
		Sd	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0.02
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0	0.05	0	0	0.05
	West	Mean	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0.01
		Sd	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0.03
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0.07	0	0	0	0	0.07
	Total	Mean	0	0	0	0	0	0	0	0	0.01	0	0.01	0	0	0.02
		Sd	0	0	0	0	0	0	0	0	0.03	0	0.02	0	0	0.03
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0.07	0	0.05	0	0	0.1
2	East	Mean	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0.01
		Sd	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0.02
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0	0.04	0	0	0.04
	West	Mean	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0.01
		Sd	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0.03
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0.06	0	0	0	0	0.06
	Total	Mean	0	0	0	0	0	0	0	0	0.01	0	0.01	0	0	0.01
		Sd	0	0	0	0	0	0	0	0	0.03	0	0.02	0	0	0.03
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0.06	0	0.04	0	0	0.09

**Table 1-6 Arctic tern monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1	East	Mean	0	0	0	0	0.09	0	0.05	0.15	0	0	0	0	0.29	
		Sd	0	0	0	0	0.21	0	0.1	0.35	0	0	0	0	0.56	
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0	0	0	0	0.64	0	0.33	1.13	0	0	0	0	1.9	
	West	Mean	0	0	0	0	0	0	0	0.04	0.08	0	0	0	0	0.11
		Sd	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0.26
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0.3	0.56	0	0	0	0	0.82
	Total	Mean	0	0	0	0	0.09	0	0.09	0.23	0	0	0	0	0	0.41
		Sd	0	0	0	0	0.21	0	0.14	0.41	0	0	0	0	0	0.62
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.64	0	0.48	1.42	0	0	0	0	0	2.23
2	East	Mean	0	0	0	0	0.06	0	0.04	0.11	0	0	0	0	0.22	
		Sd	0	0	0	0	0.15	0	0.08	0.25	0	0	0	0	0.41	
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0	0	0	0	0.44	0	0.26	0.8	0	0	0	0	1.42	
	West	Mean	0	0	0	0	0	0	0	0.03	0.06	0	0	0	0	0.09
		Sd	0	0	0	0	0	0	0	0.08	0.15	0	0	0	0	0.2
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0	0	0	0	0	0	0	0.2	0.46	0	0	0	0	0.62
	Total	Mean	0	0	0	0	0.06	0	0.07	0.17	0	0	0	0	0	0.3
		Sd	0	0	0	0	0.15	0	0.11	0.29	0	0	0	0	0	0.45
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0	0	0	0	0.44	0	0.38	1.02	0	0	0	0	0	1.61

**Table 1-7 Commic tern monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	0	0	0	0	0.25	0	0.1	0.54	0	0	0	0	0.9
		Sd	0	0	0	0	0.37	0	0.11	0.73	0	0	0	0	1
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	1.15	0	0.4	2.36	0	0	0	0	3.25
	West	Mean	0	0	0	0	0.03	0	0.15	0.17	0	0	0	0	0.36
		Sd	0	0	0	0	0.05	0	0.12	0.25	0	0	0	0	0.33
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.18	0	0.44	0.82	0	0	0	0	1.18
	Total	Mean	0	0	0	0	0.28	0	0.26	0.71	0	0	0	0	1.25
		Sd	0	0	0	0	0.37	0	0.17	0.78	0	0	0	0	1.06
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0.06
		Upr95	0	0	0	0	1.2	0	0.65	2.62	0	0	0	0	3.76
2	East	Mean	0	0	0	0	0.19	0	0.07	0.41	0	0	0	0	0.68
		Sd	0	0	0	0	0.28	0	0.09	0.56	0	0	0	0	0.75
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.88	0	0.3	1.75	0	0	0	0	2.4
	West	Mean	0	0	0	0	0.02	0	0.12	0.13	0	0	0	0	0.27
		Sd	0	0	0	0	0.04	0	0.09	0.19	0	0	0	0	0.25
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.14	0	0.34	0.62	0	0	0	0	0.88
	Total	Mean	0	0	0	0	0.21	0	0.19	0.54	0	0	0	0	0.94
		Sd	0	0	0	0	0.28	0	0.13	0.59	0	0	0	0	0.79
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0.05
		Upr95	0	0	0	0	0.91	0	0.5	1.94	0	0	0	0	2.77

**Table 1-8 Common Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1	East	Mean	0.12	0	0	0	0	0	0	0.5	0	0	0.22	0	0.84	
		Sd	0.2	0	0	0	0	0	0	0.46	0	0	0.39	0	0.56	
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0.7	0	0	0	0	0	0	0	1.59	0	0	1.26	0	2.18
	West	Mean	0	0	0	0	0	0	0	0	1.54	0.14	0	0	0	1.68
		Sd	0	0	0	0	0	0	0	0	2.01	0.24	0	0	0	2.14
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	6.46	0.8	0	0	0	6.8
	Total	Mean	0.12	0	0	0	0	0	0	0	2.04	0.14	0	0.22	0	2.52
		Sd	0.2	0	0	0	0	0	0	0	2.07	0.24	0	0.39	0	2.22
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0.7	0	0	0	0	0	0	0	7.1	0.8	0	1.26	0	7.84
2	East	Mean	0.08	0	0	0	0	0	0	0.36	0	0	0.16	0	0.6	
		Sd	0.15	0	0	0	0	0	0	0.33	0	0	0.28	0	0.41	
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0.49	0	0	0	0	0	0	0	1.17	0	0	0.96	0	1.55
	West	Mean	0	0	0	0	0	0	0	0	1.18	0.1	0	0	0	1.28
		Sd	0	0	0	0	0	0	0	0	1.5	0.18	0	0	0	1.59
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	4.79	0.6	0	0	0	5.08
	Total	Mean	0.08	0	0	0	0	0	0	0	1.53	0.1	0	0.16	0	1.88
		Sd	0.15	0	0	0	0	0	0	0	1.54	0.18	0	0.28	0	1.64
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0.49	0	0	0	0	0	0	0	5.22	0.6	0	0.96	0	5.76



**Table 1-9 Common tern monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1	East	Mean	0	0	0	0	0	0	0	0.03	0	0	0	0	0.03	
		Sd	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0.05
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0.17	0	0	0	0	0.17
	West	Mean	0	0	0	0	0.06	0	0	0	0	0	0	0	0	0.06
		Sd	0	0	0	0	0.06	0	0	0	0	0	0	0	0	0.06
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.21	0	0	0	0	0	0	0	0	0.21
	Total	Mean	0	0	0	0	0.06	0	0	0.03	0	0	0	0	0	0.09
		Sd	0	0	0	0	0.06	0	0	0.05	0	0	0	0	0	0.08
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.21	0	0	0.17	0	0	0	0	0	0.3
2	East	Mean	0	0	0	0	0	0	0	0.02	0	0	0	0	0.02	
		Sd	0	0	0	0	0	0	0	0.04	0	0	0	0	0.04	
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Upr95	0	0	0	0	0	0	0	0.14	0	0	0	0	0	0.14
	West	Mean	0	0	0	0	0.05	0	0	0	0	0	0	0	0	0.05
		Sd	0	0	0	0	0.05	0	0	0	0	0	0	0	0	0.05
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.18	0	0	0	0	0	0	0	0	0.18
	Total	Mean	0	0	0	0	0.05	0	0	0.02	0	0	0	0	0	0.07
		Sd	0	0	0	0	0.05	0	0	0.04	0	0	0	0	0	0.07
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0.18	0	0	0.14	0	0	0	0	0	0.22

**Table 1-10 Fulmar monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	0.17	0.11	0	0.01	0.05	0.03	0	0.06	0.04	0.11	0.11	0.06	0.75
		Sd	0.33	0.2	0	0.04	0.1	0.08	0	0.15	0.09	0.21	0.29	0.15	1.21
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.17	0.69	0	0.14	0.37	0.29	0	0.58	0.3	0.79	1.1	0.57	4
	West	Mean	0.1	0.11	0.03	0.11	0.12	0.01	0.01	0.04	0.05	0.07	0.07	0.03	0.75
		Sd	0.19	0.26	0.07	0.21	0.22	0.05	0.05	0.12	0.11	0.13	0.14	0.08	1.21
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0.66	0.97	0.23	0.74	0.8	0.14	0.17	0.44	0.4	0.48	0.5	0.29	4.05
	Total	Mean	0.27	0.23	0.03	0.12	0.16	0.04	0.01	0.1	0.1	0.18	0.18	0.08	1.5
		Sd	0.38	0.33	0.07	0.21	0.24	0.09	0.05	0.19	0.14	0.25	0.32	0.17	1.69
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.35	1.14	0.23	0.76	0.87	0.32	0.17	0.69	0.48	0.88	1.22	0.62	5.62
2	East	Mean	0.13	0.08	0	0.01	0.03	0.02	0	0.04	0.03	0.08	0.09	0.04	0.55
		Sd	0.24	0.15	0	0.03	0.07	0.06	0	0.11	0.06	0.16	0.23	0.11	0.9
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0.83	0.5	0	0.12	0.26	0.23	0	0.43	0.21	0.59	0.86	0.39	3.07
	West	Mean	0.08	0.09	0.02	0.09	0.1	0.01	0.01	0.03	0.04	0.05	0.05	0.02	0.6
		Sd	0.15	0.21	0.05	0.17	0.17	0.04	0.04	0.09	0.08	0.1	0.11	0.06	0.95
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0.52	0.78	0.18	0.58	0.6	0.11	0.13	0.34	0.29	0.36	0.38	0.24	3.14
	Total	Mean	0.21	0.18	0.02	0.1	0.13	0.03	0.01	0.07	0.07	0.13	0.14	0.06	1.15
		Sd	0.28	0.26	0.05	0.17	0.19	0.07	0.04	0.14	0.11	0.19	0.26	0.12	1.31
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0.99	0.93	0.18	0.6	0.66	0.26	0.13	0.5	0.37	0.66	0.95	0.43	4.31

**Table 1-11 Gannet monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models using 99.79% total avoidance.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	0	0.06	0.43	1.4	0.37	0.03	0.27	0.37	0.57	1.02	0.6	0.05	5.16
		Sd	0	0.09	0.41	0.91	0.42	0.06	0.24	0.29	0.62	0.74	0.48	0.08	2.92
		Lwr95	0	0	0.03	0.27	0	0	0	0.04	0	0.15	0.09	0	1.15
		Upr95	0	0.33	1.51	3.65	1.47	0.22	0.92	1.11	2.14	2.82	1.87	0.28	11.44
	West	Mean	0	0.04	0.22	2.22	0.69	0.03	0.33	0.65	0.67	1.16	0.96	0.1	7.06
		Sd	0	0.06	0.26	1.92	0.46	0.06	0.36	0.48	0.47	0.85	0.7	0.14	4.45
		Lwr95	0	0	0	0.25	0.13	0	0	0.09	0.1	0.17	0.13	0	1.37
		Upr95	0	0.19	0.94	7.01	1.79	0.2	1.22	1.91	1.82	3.33	2.68	0.47	17.77
	Total	Mean	0	0.09	0.65	3.62	1.07	0.07	0.6	1.02	1.24	2.17	1.55	0.15	12.22
		Sd	0	0.11	0.49	2.14	0.62	0.08	0.44	0.56	0.78	1.13	0.86	0.17	5.34
		Lwr95	0	0	0.07	0.91	0.21	0	0.06	0.25	0.22	0.59	0.4	0	3.97
		Upr95	0	0.4	1.86	8.89	2.5	0.29	1.63	2.4	3.04	4.89	3.66	0.57	24.48
2	East	Mean	0	0.04	0.3	1	0.26	0.02	0.19	0.26	0.4	0.72	0.43	0.04	3.65
		Sd	0	0.06	0.3	0.65	0.3	0.04	0.17	0.2	0.45	0.53	0.34	0.06	2.08
		Lwr95	0	0	0.02	0.19	0	0	0	0.03	0	0.11	0.06	0	0.82
		Upr95	0	0.22	1.1	2.58	1.04	0.15	0.62	0.79	1.5	2.03	1.34	0.2	8.29
	West	Mean	0	0.03	0.16	1.57	0.5	0.02	0.23	0.47	0.48	0.82	0.68	0.07	5.02
		Sd	0	0.04	0.19	1.35	0.33	0.04	0.25	0.35	0.34	0.61	0.49	0.1	3.14
		Lwr95	0	0	0	0.17	0.09	0	0	0.07	0.08	0.12	0.1	0	0.98
		Upr95	0	0.14	0.68	5.08	1.3	0.14	0.86	1.36	1.32	2.35	1.88	0.33	12.7
	Total	Mean	0	0.07	0.46	2.56	0.76	0.05	0.42	0.73	0.88	1.54	1.1	0.11	8.67
		Sd	0	0.07	0.36	1.49	0.45	0.06	0.3	0.4	0.56	0.8	0.6	0.11	3.75
		Lwr95	0	0	0.04	0.66	0.15	0	0.04	0.18	0.16	0.44	0.29	0	2.98
		Upr95	0	0.26	1.35	6.28	1.85	0.2	1.14	1.7	2.22	3.44	2.55	0.4	17.09

**Table 1-12 Gannet monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models using 99.3% total avoidance.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	0	0.2	1.43	4.67	1.23	0.1	0.9	1.23	1.9	3.4	2	0.17	17.2
		Sd	0	0.3	1.37	3.03	1.4	0.2	0.8	0.97	2.07	2.47	1.6	0.27	9.73
		Lwr95	0	0	0.1	0.9	0	0	0	0.13	0	0.5	0.3	0	3.83
		Upr95	0	1.1	5.03	12.17	4.9	0.73	3.07	3.7	7.13	9.4	6.23	0.93	38.13
	West	Mean	0	0.13	0.73	7.4	2.3	0.1	1.1	2.17	2.23	3.87	3.2	0.33	23.53
		Sd	0	0.2	0.87	6.4	1.53	0.2	1.2	1.6	1.57	2.83	2.33	0.47	14.83
		Lwr95	0	0	0	0.83	0.43	0	0	0.3	0.33	0.57	0.43	0	4.57
		Upr95	0	0.63	3.13	23.37	5.97	0.67	4.07	6.37	6.07	11.1	8.93	1.57	59.23
	Total	Mean	0	0.3	2.17	12.07	3.57	0.23	2	3.4	4.13	7.23	5.17	0.5	40.73
		Sd	0	0.37	1.63	7.13	2.07	0.27	1.47	1.87	2.6	3.77	2.87	0.57	17.8
		Lwr95	0	0	0.23	3.03	0.7	0	0.2	0.83	0.73	1.97	1.33	0	13.23
		Upr95	0	1.33	6.2	29.63	8.33	0.97	5.43	8	10.13	16.3	12.2	1.9	81.6
2	East	Mean	0	0.13	1	3.33	0.87	0.07	0.63	0.87	1.33	2.4	1.43	0.13	12.17
		Sd	0	0.2	1	2.17	1	0.13	0.57	0.67	1.5	1.77	1.13	0.2	6.93
		Lwr95	0	0	0.07	0.63	0	0	0	0.1	0	0.37	0.2	0	2.73
		Upr95	0	0.73	3.67	8.6	3.47	0.5	2.07	2.63	5	6.77	4.47	0.67	27.63
	West	Mean	0	0.1	0.53	5.23	1.67	0.07	0.77	1.57	1.6	2.73	2.27	0.23	16.73
		Sd	0	0.13	0.63	4.5	1.1	0.13	0.83	1.17	1.13	2.03	1.63	0.33	10.47
		Lwr95	0	0	0	0.57	0.3	0	0	0.23	0.27	0.4	0.33	0	3.27
		Upr95	0	0.47	2.27	16.93	4.33	0.47	2.87	4.53	4.4	7.83	6.27	1.1	42.33
	Total	Mean	0	0.23	1.53	8.53	2.53	0.17	1.4	2.43	2.93	5.13	3.67	0.37	28.9
		Sd	0	0.23	1.2	4.97	1.5	0.2	1	1.33	1.87	2.67	2	0.37	12.5
		Lwr95	0	0	0.13	2.2	0.5	0	0.13	0.6	0.53	1.47	0.97	0	9.93
		Upr95	0	0.87	4.5	20.93	6.17	0.67	3.8	5.67	7.4	11.47	8.5	1.33	56.97

**Table 1-13 Great Black-backed Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	1.76	0.67	0	0	0	0	0	0.92	0	0	0.33	0	3.68
		Sd	1.77	0.7	0	0	0	0	0	1.32	0	0	0.6	0	2.42
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0.58
		Upr95	6.28	2.41	0	0	0	0	0	4.42	0	0	2.05	0	9.83
	West	Mean	0	0.34	0	0	0	0	0	0	0.42	0.4	0	0	1.16
		Sd	0	0.6	0	0	0	0	0	0	0.73	0.71	0	0	1.54
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	1.99	0	0	0	0	0	0	2.51	2.35	0	0	4.92
	Total	Mean	1.76	1.01	0	0	0	0	0	0.92	0.42	0.4	0.33	0	4.84
		Sd	1.77	0.93	0	0	0	0	0	1.32	0.73	0.71	0.6	0	2.86
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0.74
		Upr95	6.28	3.27	0	0	0	0	0	4.42	2.51	2.35	2.05	0	11.5
2	East	Mean	1.23	0.46	0	0	0	0	0	0.64	0	0	0.23	0	2.56
		Sd	1.22	0.47	0	0	0	0	0	0.91	0	0	0.43	0	1.68
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0.41
		Upr95	4.46	1.63	0	0	0	0	0	2.99	0	0	1.42	0	7.01
	West	Mean	0	0.23	0	0	0	0	0	0	0.29	0.28	0	0	0.8
		Sd	0	0.41	0	0	0	0	0	0	0.52	0.5	0	0	1.08
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	1.37	0	0	0	0	0	0	1.75	1.72	0	0	3.58
	Total	Mean	1.23	0.69	0	0	0	0	0	0.64	0.29	0.28	0.23	0	3.35
		Sd	1.22	0.62	0	0	0	0	0	0.91	0.52	0.5	0.43	0	2
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0.5
		Upr95	4.46	2.22	0	0	0	0	0	2.99	1.75	1.72	1.42	0	8.16

**Table 1-14 Great skua monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1	East	Mean	0	0	0	0	0	0	0	0	0	0	0.02	0	0.02	
		Sd	0	0	0	0	0	0	0	0	0	0	0	0.06	0	0.06
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0	0	0.21	0	0.21
	West	Mean	0	0	0	0	0	0	0	0	0	0.04	0.03	0.03	0	0.1
		Sd	0	0	0	0	0	0	0	0	0	0.09	0.09	0.08	0	0.2
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0.31	0.29	0.24	0	0.71
	Total	Mean	0	0	0	0	0	0	0	0	0	0.04	0.03	0.06	0	0.13
		Sd	0	0	0	0	0	0	0	0	0	0.09	0.09	0.1	0	0.21
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0.31	0.29	0.34	0	0.74
2	East	Mean	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0.02
		Sd	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0.05
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0	0	0.15	0	0.15
	West	Mean	0	0	0	0	0	0	0	0	0	0.03	0.02	0.02	0	0.08
		Sd	0	0	0	0	0	0	0	0	0	0.07	0.06	0.06	0	0.15
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0.25	0.2	0.18	0	0.53
	Total	Mean	0	0	0	0	0	0	0	0	0	0.03	0.02	0.04	0	0.1
		Sd	0	0	0	0	0	0	0	0	0	0.07	0.06	0.07	0	0.16
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	0	0	0	0	0	0.25	0.2	0.25	0	0.57

**Table 1-15 Herring Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1	East	Mean	0.28	0	0	0	0	0	0	0	0	0	0	0.29	0	0.57
		Sd	0.51	0	0	0	0	0	0	0	0	0	0	0.52	0	0.61
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.78	0	0	0	0	0	0	0	0	0	0	1.79	0	2.08
	West	Mean	0.3	0	0	0	0	0	0.38	0	0.38	0	0	0.55	0	1.61
		Sd	0.53	0	0	0	0	0	0.67	0	0.66	0	0	0.82	0	1.12
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.82	0	0	0	0	0	2.28	0	2.22	0	0	2.72	0	4.22
	Total	Mean	0.58	0	0	0	0	0	0.38	0	0.38	0	0	0.84	0	2.18
		Sd	0.74	0	0	0	0	0	0.67	0	0.66	0	0	0.97	0	1.28
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	2.43	0	0	0	0	0	2.28	0	2.22	0	0	3.26	0	5.18
2	East	Mean	0.19	0	0	0	0	0	0	0	0	0	0	0.21	0	0.4
		Sd	0.35	0	0	0	0	0	0	0	0	0	0	0.36	0	0.42
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.17	0	0	0	0	0	0	0	0	0	0	1.23	0	1.44
	West	Mean	0.2	0	0	0	0	0	0.27	0	0.27	0	0	0.39	0	1.12
		Sd	0.35	0	0	0	0	0	0.48	0	0.47	0	0	0.57	0	0.78
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.18	0	0	0	0	0	1.63	0	1.61	0	0	1.88	0	3.02
	Total	Mean	0.38	0	0	0	0	0	0.27	0	0.27	0	0	0.6	0	1.52
		Sd	0.5	0	0	0	0	0	0.48	0	0.47	0	0	0.68	0	0.88
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	1.67	0	0	0	0	0	1.63	0	1.61	0	0	2.28	0	3.57

**Table 1-16 Kittiwake monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	8.34	6.26	35.02	11.27	6.21	2.11	2.72	25.98	4	5.59	22.7	9.1	139.3
		Sd	3.97	2.44	16.47	5.1	1.94	1.14	1.75	34.49	1.57	3.15	15.42	8.95	54.01
		Lwr95	3.42	2.74	11.44	4.14	3.09	0.53	0.45	0.21	1.51	1.54	5.34	0.18	66.87
		Upr95	18.56	11.92	67.51	22.18	10.7	4.68	6.6	110.7	7.67	12.31	53.38	24.92	261.27
	West	Mean	7.21	7.68	14.93	29.53	11.1	3.95	8.18	40.15	4.89	7.69	16.16	9.17	160.64
		Sd	2.26	3.48	7.6	15.89	2.97	2.04	5.57	56.85	4.45	2.88	11.78	8.77	92.82
		Lwr95	3.5	2.81	4.62	10.48	5.95	1.23	1.84	0	0.22	3.62	3.09	0.21	55.88
		Upr95	12.3	15.22	31.52	69.78	17.47	8.43	20.25	184.32	15.34	15.02	38.38	26.13	372.05
	Total	Mean	15.55	13.93	49.96	40.8	17.31	6.06	10.9	66.12	8.89	13.29	38.86	18.28	299.94
		Sd	4.55	4.22	18	16.61	3.5	2.33	5.8	66.03	4.74	4.25	19.16	12.34	106.75
		Lwr95	8.75	7.19	21.07	18.21	11.18	2.52	3.29	0.54	2.79	6.58	10.78	0.97	150.92
		Upr95	26.38	23.22	85.89	82.28	24.74	11.15	23.4	230.8	19.75	22.38	78.9	42.51	540.51
2	East	Mean	6.18	4.7	26.01	8.4	4.62	1.58	2	19.76	2.98	4.16	16.99	6.82	104.18
		Sd	3.01	1.87	12.05	3.82	1.39	0.86	1.29	26.73	1.14	2.32	11.61	6.71	41.5
		Lwr95	2.53	1.96	8.62	3.14	2.33	0.4	0.34	0.15	1.18	1.2	4	0.14	49.42
		Upr95	13.92	9.13	49.64	16.51	7.73	3.47	4.81	87.86	5.71	9.2	39.36	18.61	203.13
	West	Mean	5.35	5.68	11.2	21.8	8.23	2.93	6.01	29	3.53	5.7	11.82	6.64	117.89
		Sd	1.65	2.53	5.76	11.62	2.18	1.52	4.08	41.45	3.22	2.14	8.64	6.47	67.23
		Lwr95	2.63	2.06	3.48	7.68	4.44	0.89	1.37	0	0.15	2.62	2.3	0.13	42.34
		Upr95	9.02	11.41	23.75	50.91	12.84	6.4	14.78	130.82	11.18	11	28.15	19.37	265.93
	Total	Mean	11.52	10.38	37.21	30.2	12.85	4.51	8.01	48.75	6.51	9.86	28.82	13.46	222.07
		Sd	3.44	3.2	13.36	12.32	2.61	1.77	4.29	49.39	3.41	3.18	14.63	9.47	79.84
		Lwr95	6.57	5.29	15.65	13.47	8.18	1.84	2.39	0.34	2.09	4.92	7.98	0.69	110.04
		Upr95	19.85	17.25	64.05	60.35	18.37	8.47	17.27	168.16	14.53	16.81	58.39	32.19	396.99



**Table 1-17 Lesser Black-backed Gull monthly and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	East	Mean	0	0	0	0	0.34	0	0	0.6	0	0	0	0	0.93
		Sd	0	0	0	0	0.61	0	0	1.13	0	0	0	0	1.12
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	2.09	0	0	3.76	0	0	0	0	3.82
	West	Mean	0	0	0	0.28	0	0	0	0	0	0	0	0	0.28
		Sd	0	0	0	0.51	0	0	0	0	0	0	0	0	0.51
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	1.7	0	0	0	0	0	0	0	0	1.7
	Total	Mean	0	0	0	0.28	0.34	0	0	0.6	0	0	0	0	1.21
		Sd	0	0	0	0.51	0.61	0	0	1.13	0	0	0	0	1.24
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	1.7	2.09	0	0	3.76	0	0	0	0	4.37
2	East	Mean	0	0	0	0	0.24	0	0	0.44	0	0	0	0	0.67
		Sd	0	0	0	0	0.44	0	0	0.82	0	0	0	0	0.81
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	0	1.4	0	0	2.59	0	0	0	0	2.66
	West	Mean	0	0	0	0.19	0	0	0	0	0	0	0	0	0.19
		Sd	0	0	0	0.37	0	0	0	0	0	0	0	0	0.37
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	1.22	0	0	0	0	0	0	0	0	1.22
	Total	Mean	0	0	0	0.19	0.24	0	0	0.44	0	0	0	0	0.87
		Sd	0	0	0	0.37	0.44	0	0	0.82	0	0	0	0	0.89
		Lwr95	0	0	0	0	0	0	0	0	0	0	0	0	0
		Upr95	0	0	0	1.22	1.4	0	0	2.59	0	0	0	0	3.05

## 1.2 Seasonal and annual stochastic collision estimates

**Table 1-18 Common Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	0	0	0	0	0.84	0.84
		Sd	0	0	0	0	0.56	0.56
		Lwr95	0	0	0	0	0	0
		Upr95	0	0	0	0	2.18	2.18
	West	Mean	0	0	0	0	1.68	1.68
		Sd	0	0	0	0	2.14	2.14
		Lwr95	0	0	0	0	0	0
		Upr95	0	0	0	0	6.8	6.8
	Total	Mean	0	0	0	0	2.52	2.52
		Sd	0	0	0	0	2.22	2.22
		Lwr95	0	0	0	0	0	0
		Upr95	0	0	0	0	7.84	7.84
2	East	Mean	0	0	0	0	0.6	0.6
		Sd	0	0	0	0	0.41	0.41
		Lwr95	0	0	0	0	0	0
		Upr95	0	0	0	0	1.55	1.55
	West	Mean	0	0	0	0	1.28	1.28
		Sd	0	0	0	0	1.59	1.59
		Lwr95	0	0	0	0	0	0
		Upr95	0	0	0	0	5.08	5.08
	Total	Mean	0	0	0	0	1.88	1.88
		Sd	0	0	0	0	1.64	1.64
		Lwr95	0	0	0	0	0	0
		Upr95	0	0	0	0	5.76	5.76

**Table 1-19 Fulmar seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	0.06	0.43	0.15	0.11	0	0.75
		Sd	0.15	0.71	0.26	0.29	0	1.21
		Lwr95	0	0	0	0	0	0
		Upr95	0.57	2.44	0.93	1.1	0	4
	West	Mean	0.03	0.53	0.12	0.07	0	0.75
		Sd	0.08	0.87	0.22	0.14	0	1.21
		Lwr95	0	0	0	0	0	0
		Upr95	0.29	2.97	0.78	0.5	0	4.05
	Total	Mean	0.08	0.96	0.27	0.18	0	1.5
		Sd	0.17	1.12	0.34	0.32	0	1.69
		Lwr95	0	0	0	0	0	0
		Upr95	0.62	3.69	1.14	1.22	0	5.62
2	East	Mean	0.04	0.32	0.11	0.09	0	0.55
		Sd	0.11	0.53	0.19	0.23	0	0.9
		Lwr95	0	0	0	0	0	0
		Upr95	0.39	1.82	0.68	0.86	0	3.07
	West	Mean	0.02	0.43	0.09	0.05	0	0.6
		Sd	0.06	0.69	0.17	0.11	0	0.95
		Lwr95	0	0	0	0	0	0
		Upr95	0.24	2.29	0.58	0.38	0	3.14
	Total	Mean	0.06	0.75	0.2	0.14	0	1.15
		Sd	0.12	0.87	0.26	0.26	0	1.31
		Lwr95	0	0	0	0	0	0
		Upr95	0.43	2.93	0.88	0.95	0	4.31

**Table 1-20 Gannet seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models at a total avoidance rate of 99.79%.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	0.11	3.44	1.61	0	0	5.16
		Sd	0.16	1.98	0.97	0	0	2.92
		Lwr95	0	0.76	0.34	0	0	1.15
		Upr95	0.55	7.78	3.81	0	0	11.44
	West	Mean	0.14	4.81	2.11	0	0	7.06
		Sd	0.19	2.89	1.52	0	0	4.45
		Lwr95	0	1.02	0.31	0	0	1.37
		Upr95	0.63	11.39	5.92	0	0	17.77
	Total	Mean	0.25	8.25	3.72	0	0	12.22
		Sd	0.25	3.5	1.82	0	0	5.34
		Lwr95	0	2.71	1.12	0	0	3.97
		Upr95	0.88	16.09	8.13	0	0	24.48
2	East	Mean	0.08	2.43	1.14	0	0	3.65
		Sd	0.11	1.41	0.69	0	0	2.08
		Lwr95	0	0.55	0.24	0	0	0.82
		Upr95	0.38	5.56	2.76	0	0	8.29
	West	Mean	0.1	3.42	1.5	0	0	5.02
		Sd	0.13	2.05	1.07	0	0	3.14
		Lwr95	0	0.72	0.24	0	0	0.98
		Upr95	0.44	8.28	4.2	0	0	12.7
	Total	Mean	0.17	5.86	2.64	0	0	8.67
		Sd	0.17	2.48	1.28	0	0	3.75
		Lwr95	0	2.04	0.82	0	0	2.98
		Upr95	0.61	11.26	5.69	0	0	17.09

**Table 1-21 Gannet seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models at a total avoidance rate of 99.3%.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	0.37	11.47	5.37	0	0	17.2
		Sd	0.53	6.6	3.23	0	0	9.73
		Lwr95	0	2.53	1.13	0	0	3.83
		Upr95	1.83	25.93	12.7	0	0	38.13
	West	Mean	0.47	16.03	7.03	0	0	23.53
		Sd	0.63	9.63	5.07	0	0	14.83
		Lwr95	0	3.4	1.03	0	0	4.57
		Upr95	2.1	37.97	19.73	0	0	59.23
	Total	Mean	0.83	27.5	12.4	0	0	40.73
		Sd	0.83	11.67	6.07	0	0	17.8
		Lwr95	0	9.03	3.73	0	0	13.23
		Upr95	2.93	53.63	27.1	0	0	81.6
2	East	Mean	0.27	8.1	3.8	0	0	12.17
		Sd	0.37	4.7	2.3	0	0	6.93
		Lwr95	0	1.83	0.8	0	0	2.73
		Upr95	1.27	18.53	9.2	0	0	27.63
	West	Mean	0.33	11.4	5	0	0	16.73
		Sd	0.43	6.83	3.57	0	0	10.47
		Lwr95	0	2.4	0.8	0	0	3.27
		Upr95	1.47	27.6	14	0	0	42.33
	Total	Mean	0.57	19.53	8.8	0	0	28.9
		Sd	0.57	8.27	4.27	0	0	12.5
		Lwr95	0	6.8	2.73	0	0	9.93
		Upr95	2.03	37.53	18.97	0	0	56.97

**Table 1-22 Great Black-backed Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	2.43	0.92	0.33	0	2.76	3.68
		Sd	1.94	1.32	0.6	0	1.99	2.42
		Lwr95	0	0	0	0	0	0.58
		Upr95	7.35	4.42	2.05	0	7.66	9.83
	West	Mean	0.34	0	0.82	0	1.16	1.16
		Sd	0.6	0	1.18	0	1.54	1.54
		Lwr95	0	0	0	0	0	0
		Upr95	1.99	0	3.81	0	4.92	4.92
	Total	Mean	2.77	0.92	1.15	0	3.92	4.84
		Sd	2.02	1.32	1.32	0	2.5	2.86
		Lwr95	0	0	0	0	0	0.74
		Upr95	7.95	4.42	4.43	0	9.76	11.5
2	East	Mean	1.69	0.64	0.23	0	1.92	2.56
		Sd	1.32	0.91	0.43	0	1.37	1.68
		Lwr95	0	0	0	0	0	0.41
		Upr95	5.07	2.99	1.42	0	5.34	7.01
	West	Mean	0.23	0	0.57	0	0.8	0.8
		Sd	0.41	0	0.84	0	1.08	1.08
		Lwr95	0	0	0	0	0	0
		Upr95	1.37	0	2.74	0	3.58	3.58
	Total	Mean	1.92	0.64	0.8	0	2.72	3.35
		Sd	1.38	0.91	0.94	0	1.75	2
		Lwr95	0	0	0	0	0	0.5
		Upr95	5.47	2.99	3.2	0	6.91	8.16

**Table 1-23 Herring Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	0.28	0	0.29	0	0.57	0.57
		Sd	0.51	0	0.52	0	0.61	0.61
		Lwr95	0	0	0	0	0	0
		Upr95	1.78	0	1.79	0	2.08	2.08
	West	Mean	0.3	0.76	0.55	0	0.85	1.61
		Sd	0.53	0.77	0.82	0	0.79	1.12
		Lwr95	0	0	0	0	0	0
		Upr95	1.82	2.62	2.72	0	2.81	4.22
	Total	Mean	0.58	0.76	0.84	0	1.42	2.18
		Sd	0.74	0.77	0.97	0	1	1.28
		Lwr95	0	0	0	0	0	0
		Upr95	2.43	2.62	3.26	0	3.78	5.18
2	East	Mean	0.19	0	0.21	0	0.4	0.4
		Sd	0.35	0	0.36	0	0.42	0.42
		Lwr95	0	0	0	0	0	0
		Upr95	1.17	0	1.23	0	1.44	1.44
	West	Mean	0.2	0.54	0.39	0	0.58	1.12
		Sd	0.35	0.55	0.57	0	0.55	0.78
		Lwr95	0	0	0	0	0	0
		Upr95	1.18	1.9	1.88	0	1.94	3.02
	Total	Mean	0.38	0.54	0.6	0	0.98	1.52
		Sd	0.5	0.55	0.68	0	0.68	0.88
		Lwr95	0	0	0	0	0	0
		Upr95	1.67	1.9	2.28	0	2.55	3.57

**Table 1-24 Kittiwake seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	14.59	83.31	41.39	0	0	139.3
		Sd	5.74	33.44	21.45	0	0	54.01
		Lwr95	6.83	42.28	14.65	0	0	66.87
		Upr95	28.02	168.51	82.93	0	0	261.27
	West	Mean	14.88	107.83	37.92	0	0	160.64
		Sd	5.28	69.18	23.62	0	0	92.82
		Lwr95	7.07	36.94	9.54	0	0	55.88
		Upr95	26.47	280.76	81.91	0	0	372.05
	Total	Mean	29.48	191.14	79.32	0	0	299.94
		Sd	7.76	76.79	31.46	0	0	106.75
		Lwr95	16.89	96.22	30.47	0	0	150.92
		Upr95	47.35	378.38	143.14	0	0	540.51
2	East	Mean	10.88	62.36	30.94	0	0	104.18
		Sd	4.34	26.05	16.21	0	0	41.5
		Lwr95	5.02	31.16	10.59	0	0	49.42
		Upr95	21.28	130.43	61.9	0	0	203.13
	West	Mean	11.03	79.16	27.7	0	0	117.89
		Sd	3.83	50.03	17.29	0	0	67.23
		Lwr95	5.25	28.07	7.12	0	0	42.34
		Upr95	19.56	200.2	59.12	0	0	265.93
	Total	Mean	21.9	141.52	58.64	0	0	222.07
		Sd	5.87	56.66	24.08	0	0	79.84
		Lwr95	12.67	71.51	22.35	0	0	110.04
		Upr95	35.1	274.48	107.28	0	0	396.99



**Table 1-25 Lesser Black-backed Gull seasonal and annual stochastic collision estimates and 95% confidence intervals obtained from 5,000 simulations, for the DBS East and West sites, separately and summed, for the two different turbine models.**

Turbine model	Site	Value	Spring	Breeding	Autumn	Winter	Nonbreeding	Annual
1	East	Mean	0	0.93	0	0	0	0.93
		Sd	0	1.12	0	0	0	1.12
		Lwr95	0	0	0	0	0	0
		Upr95	0	3.82	0	0	0	3.82
	West	Mean	0	0.28	0	0	0	0.28
		Sd	0	0.51	0	0	0	0.51
		Lwr95	0	0	0	0	0	0
		Upr95	0	1.7	0	0	0	1.7
	Total	Mean	0	1.21	0	0	0	1.21
		Sd	0	1.24	0	0	0	1.24
		Lwr95	0	0	0	0	0	0
		Upr95	0	4.37	0	0	0	4.37
2	East	Mean	0	0.67	0	0	0	0.67
		Sd	0	0.81	0	0	0	0.81
		Lwr95	0	0	0	0	0	0
		Upr95	0	2.66	0	0	0	2.66
	West	Mean	0	0.19	0	0	0	0.19
		Sd	0	0.37	0	0	0	0.37
		Lwr95	0	0	0	0	0	0
		Upr95	0	1.22	0	0	0	1.22
	Total	Mean	0	0.87	0	0	0	0.87
		Sd	0	0.89	0	0	0	0.89
		Lwr95	0	0	0	0	0	0
		Upr95	0	3.05	0	0	0	3.05