Arklow Bank Wind Park 2

Environmental Impact Assessment Report

Volume III, Appendix 12.5: Offshore Ornithology Technical Report - Collision Modelling Results

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Arklow Bank Wind Park 2

Technical Appendix 12.05 Offshore Ornithology

Seabird Collision Modelling Results

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Glossary

Term	Meaning
Arklow Bank Wind Park 2 – Offshore Infrastructure	"The Proposed Development", Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements under the existing Maritime Area Consent.
Array Area	The Array Area is the area within which the Wind Turbine Generators (WTGs), the Offshore Substation Platforms (OSPs), and associated cables (export, inter- array and interconnector cabling) and foundations will be installed.
Nocturnal Activity Factor	Nocturnal Activity Factors (NAF) indicate the amount of flight activity at night as a proportion of daytime flight activity. These factors were derived from reviews of seabird activity reported in Garthe and Hüppop (2004) which ranked species from 1 to 5 (1 low, 5 high) for relative nocturnal activity. These rates were subsequently modified for the purposes of CRM into 1 = 0%, 2 = 25%, 3 = 50%, 4 = 75% and 5 = 100% flying activity at night. For example, a nocturnal activity factor of 2 assumes that on average, nocturnal activity is around 25% of daytime level.

Acronyms

Term	Meaning
c.i.	95% Confidence Interval
CRM	Collision Risk Modelling
EIA	Environmental Impact Assessment
NAF	Nocturnal Activity Factor

1 OFFSHORE ORNITHOLOGY TECHNICAL REPORT: SEABIRD COLLISION MODELLING TABULATED RESULTS

1.1 Introduction

1. This Technical Report provides the results of Collision Risk Modelling (CRM) for the Array Area to inform the Environmental Impact Assessment (EIA) of the Arklow Bank Wind Park 2 Offshore Infrastructure (hereafter referred to as 'the Proposed Development').
2. Collision mortality has been estimated using the Band (2012) CRM option 2 (generic flight heights). Collision mortality estimates are presented for each month and summed across the year.
3. Collision risks for non-seabird migrants are provided in Volume III, Appendix 12.07 Migrant Non-Seabird Collision Risk Modelling.

1.2 Seabird Collision Modelling Tabulated Results

4. Model results are presented for the three turbine options under consideration, of which turbine option 1b generates the highest collision risks as set out in Volume II, Chapter 4: Description of Development. Outputs from the CRM are presented for each species.
5. The Band (2012) stochastic CRM was used to produce monthly collision mortality estimates using the mean and standard deviation for seabird densities, bird dimensions and behavioural characteristics (Volume III, Appendix 12.04 Offshore Ornithology - Collision Risk Model Input Parameters for details). Annual and seasonal totals were calculated as the sum of the monthly values for the respective seasons.
6. Summary results by season are provided in Table 12.5.1 with the monthly breakdown for each species in Tables 12.5.2 to 12.5.13.
7. Seasons are defined as per Furness (2015), using the 'full' breeding season (i.e. the maximum period defined by Furness, 2015) with adjoining seasons reduced in duration where seasonal definitions include overlaps (i.e. the values for each month are only included in one season for each species). Seasons are further defined in the EIAR Volume II, Chapter 12: Offshore Ornithology.

Table 12.5.1: Seasonal and annual predicted collision mortality (mean and 95% confidence interval) for all three turbine options, calculated using stochastic CRM with Band Option 2.

Species	Turbine scenario	Spring migration	Breeding (full)	Autumn migration	Winter	Non-breeding	Annual
Arctic tern	1a	0.6 (0.1-1.3)	4.4 (1-7.7)	0.1 (0-0.2)	0.7 (0.1-1.5)	0 (0-0.1)	5.1 (1.1-9.3)
	1b	0.7 (0.1-1.4)	5.3 (1.3-9.6)	0.1 (0-0.2)	0.8 (0.1-1.7)	0 (0-0.1)	6.1 (1.4-11.3)
	2	0.6 (0.1-1.3)	4.7 (1-8.2)	0.1 (0-0.2)	0.7 (0.1-1.6)	0 (0-0.1)	5.4 (1.1-9.8)
Black-headed gull	1a	0 (0-0)	0.1 (0-0.3)	0 (0-0)	22.7 (3.5-45.4)	0 (0-0)	22.8 (3.5-45.6)
	1b	0 (0-0)	0.1 (0-0.3)	0 (0-0)	26.3 (3.1-53.4)	0 (0-0)	26.4 (3.1-53.8)
	2	0 (0-0)	0.1 (0-0.3)	0 (0-0)	23.1 (3.5-46.4)	0 (0-0)	23.2 (3.5-46.7)
Common gull	1a	0 (0-0)	1.9 (0.1-4.4)	0 (0-0)	115.3 (16-229.6)	0 (0-0)	117.2 (16.2-234)
	1b	0 (0-0)	2.2 (0.2-5.2)	0 (0-0)	134.8 (17.6-269.3)	0 (0-0)	137 (17.8-274.5)
	2	0 (0-0)	2 (0.1-4.6)	0 (0-0)	117.2 (18.7-234.5)	0 (0-0)	119.2 (18.8-239.1)
Common tern	1a	0.5 (0.1-0.9)	6 (2.1-9.9)	0.7 (0.2-1.3)	0 (0-0)	0 (0-0)	7.2 (2.4-12.1)
	1b	0.6 (0.1-1)	7.2 (2.5-11.9)	0.9 (0.2-1.5)	0 (0-0)	0 (0-0)	8.6 (2.8-14.5)
	2	0.5 (0.1-0.9)	6.3 (2.1-10.4)	0.8 (0.2-1.4)	0 (0-0)	0 (0-0)	7.6 (2.4-12.8)
Fulmar	1a	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	1b	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	2	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
Gannet	1a	0 (0-0.1)	0.6 (0-1.3)	0.3 (0-0.6)	0.4 (0-0.9)	0.1 (0-0.2)	0.9 (0.1-2.2)
	1b	0 (0-0.1)	0.6 (0-1.5)	0.3 (0-0.6)	0.4 (0-0.9)	0.1 (0-0.2)	1 (0.1-2.4)
	2	0 (0-0.1)	0.6 (0-1.4)	0.2 (0-0.6)	0.4 (0-0.9)	0.1 (0-0.2)	0.9 (0.1-2.2)
Great black-backed gull	1a	1.6 (0.2-3.9)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	1.6 (0.2-3.9)
	1b	1.8 (0.1-4.2)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	1.8 (0.1-4.2)

Species	Turbine scenario	Spring migration	Breeding (full)	Autumn migration	Winter	Non-breeding	Annual
	2	1.5 (0.1-3.5)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	1.5 (0.1-3.5)
Herring gull	1a	0.7 (0-1.6)	0 (0-0)	0.7 (0-1.6)	1.3 (0.1-3.3)	0 (0-0)	1.3 (0.1-3.3)
	1b	0.7 (0.1-1.7)	0 (0-0)	0.8 (0-1.8)	1.5 (0.1-3.5)	0 (0-0)	1.5 (0.1-3.5)
	2	0.7 (0-1.6)	0 (0-0)	0.7 (0-1.7)	1.3 (0.1-3.2)	0 (0-0)	1.3 (0.1-3.2)
Kittiwake	1a	127.3 (43.1-217.9)	16.7 (3.5-30.7)	42.8 (6.2-83.9)	0 (0-0)	0 (0-0)	186.8 (52.9-332.4)
	1b	142.9 (47.7-252.6)	18.8 (4.1-35.7)	47.3 (6.1-94.8)	0 (0-0)	0 (0-0)	209.1 (57.8-383.1)
	2	128.7 (37.7-223.6)	16.8 (3.5-31.8)	43.2 (6.3-87.9)	0 (0-0)	0 (0-0)	188.8 (47.5-343.3)
Lesser black-backed gull	1a	0.7 (0-1.6)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0.7 (0-1.6)
	1b	0.7 (0.1-1.7)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0.7 (0.1-1.7)
	2	0.6 (0-1.5)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0.6 (0-1.5)
Little gull	1a	0 (0-0)	0 (0-0)	0 (0-0)	42.6 (5.3-87.6)	0 (0-0)	42.6 (5.3-87.6)
	1b	0 (0-0)	0 (0-0)	0 (0-0)	50.4 (6.1-103.3)	0 (0-0)	50.4 (6.1-103.3)
	2	0 (0-0)	0 (0-0)	0 (0-0)	44.1 (4.7-89.5)	0 (0-0)	44.1 (4.7-89.5)
Sandwich tern	1a	0 (0-0)	0.2 (0-0.4)	0.1 (0-0.2)	0.1 (0-0.2)	0 (0-0)	0.3 (0-0.6)
	1b	0 (0-0)	0.2 (0-0.5)	0.1 (0-0.3)	0.1 (0-0.3)	0 (0-0)	0.3 (0-0.7)
	2	0 (0-0)	0.2 (0-0.4)	0.1 (0-0.2)	0.1 (0-0.2)	0 (0-0)	0.3 (0-0.6)

1.2.1 Arctic Tern

Table 12.5.2: Arctic tern collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	0	0	0	0.6	0.3	0	0	4.1	0.1	0	0	0	5.1
	95% c.i.	0-0	0-0	0-0	0.1-1.3	0-0.5	0-0	0-0	1-7.2	0-0.2	0-0.1	0-0	0-0	1.1-9.3
1b	***Mean***	0	0	0	0.7	0.3	0	0	5	0.1	0	0	0	6.1
	95% c.i.	0-0	0-0	0-0	0.1-1.4	0-0.6	0-0	0-0	1.3-9	0-0.2	0-0.1	0-0	0-0	1.4-11.3
2	***Mean***	0	0	0	0.6	0.3	0	0	4.4	0.1	0	0	0	5.4
	95% c.i.	0-0	0-0	0-0	0.1-1.3	0-0.5	0-0	0-0	1-7.7	0-0.2	0-0.1	0-0	0-0	1.1-9.8

1.2.2 Black-headed Gull

Table 12.5.3: Black-headed gull collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	6.2	5.8	0	0	0	0	0.1	0.1	0	1	2.6	7	22.8
	95% c.i.	1.3-11.8	0.9-11.4	0-0	0-0	0-0	0-0	0-0.3	0-0.3	0-0	0.1-2	0.6-4.8	0.6-15.1	3.5-45.6
1b	***Mean***	7.2	6.7	0	0	0	0	0.1	0.1	0	1.2	3.1	8	26.4
	95% c.i.	0.9-13.3	0.7-13.6	0-0	0-0	0-0	0-0	0-0.3	0-0.3	0-0	0.2-2.5	0.6-5.9	0.7-17.8	3.1-53.8
2	***Mean***	6.4	5.8	0	0	0	0	0.1	0.1	0	1	2.6	7	23.2
	95% c.i.	1.2-11.7	1-11.5	0-0	0-0	0-0	0-0	0-0.3	0-0.3	0-0	0.1-2	0.5-5.2	0.8-15.7	3.5-46.7

1.2.3 Common Gull

Table 12.5.4: Common gull collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	24.3	63.7	0.3	0	0	1.9	0	0	0	0	7	20	117.2
	95% c.i.	2.9-49.9	10.1-120	0-0.7	0-0	0-0	0.1-4.4	0-0	0-0	0-0	0-0	1.6-13.1	1.5-45.9	16.2-234
1b	***Mean***	27.1	74.8	0.3	0	0	2.2	0	0	0	0	8.5	24.1	137
	95% c.i.	3.6-53.3	10.3-144.9	0-0.8	0-0	0-0	0.2-5.2	0-0	0-0	0-0	0-0	1.7-15.8	2-54.5	17.8-274.5
2	***Mean***	23.7	65.4	0.3	0	0	2	0	0	0	0	7.3	20.5	119.2
	95% c.i.	3.1-47.2	12.4-125.2	0-0.7	0-0	0-0	0.1-4.6	0-0	0-0	0-0	0-0	1.3-13.5	1.8-47.9	18.8-239.1

1.2.4 Common Tern

Table 12.5.5: Common tern collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	0	0	0	0.5	0	0	0	6	0.7	0	0	0	7.2
	95% c.i.	0-0	0-0	0-0	0.1-0.9	0-0	0-0	0-0	2.1-9.9	0.2-1.3	0-0	0-0	0-0	2.4-12.1
1b	***Mean***	0	0	0	0.6	0	0	0	7.2	0.9	0	0	0	8.6
	95% c.i.	0-0	0-0	0-0	0.1-1	0-0	0-0	0-0	2.5-11.9	0.2-1.5	0-0	0-0	0-0	2.8-14.5
2	***Mean***	0	0	0	0.5	0	0	0	6.3	0.8	0	0	0	7.6
	95% c.i.	0-0	0-0	0-0	0.1-0.9	0-0	0-0	0-0	2.1-10.4	0.2-1.4	0-0	0-0	0-0	2.4-12.8

1.2.5 Fulmar

Table 12.5.6: Fulmar collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	0	0	0	0	0	0	0	0	0	0	0	0	0
	95% c.i.	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0
1b	***Mean***	0	0	0	0	0	0	0	0	0	0	0	0	0
	95% c.i.	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0
2	***Mean***	0	0	0	0	0	0	0	0	0	0	0	0	0
	95% c.i.	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0

1.2.6 Great Black-backed Gull

Table 12.5.7: Great black-backed gull collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	1.6	0	0	0	0	0	0	0	0	0	0	0	1.6
	95% c.i.	0.2-3.9	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0.2-3.9
1b	***Mean***	1.8	0	0	0	0	0	0	0	0	0	0	0	1.8
	95% c.i.	0.1-4.2	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0.1-4.2
2	***Mean***	1.5	0	0	0	0	0	0	0	0	0	0	0	1.5
	95% c.i.	0.1-3.5	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0.1-3.5

1.2.7 Gannet

Table 12.5.8: Gannet collision collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	0	0	0.1	0	0	0.2	0.1	0.2	0	0.2	0	0.1	0.9
	95% c.i.	0-0.1	0-0	0-0.2	0-0	0-0	0-0.5	0-0.2	0-0.4	0-0.1	0-0.5	0-0	0-0.2	0.1-2.2
1b	***Mean***	0	0	0.1	0	0	0.2	0.1	0.2	0.1	0.2	0	0.1	1
	95% c.i.	0-0.1	0-0	0-0.3	0-0	0-0	0-0.5	0-0.3	0-0.4	0-0.1	0-0.5	0-0	0-0.2	0.1-2.4
2	***Mean***	0	0	0.1	0	0	0.2	0.1	0.2	0.1	0.2	0	0.1	0.9
	95% c.i.	0-0.1	0-0	0-0.3	0-0	0-0	0-0.5	0-0.2	0-0.4	0-0.1	0-0.4	0-0	0-0.2	0.1-2.2

1.2.8 Herring Gull

Table 12.5.9: Herring gull collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	0	0.7	0	0	0	0	0	0	0	0	0.7	0	1.3
	95% c.i.	0-0	0-1.6	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1.6	0-0	0.1-3.3
1b	***Mean***	0	0.7	0	0	0	0	0	0	0	0	0.8	0	1.5
	95% c.i.	0-0	0.1-1.7	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1.8	0-0	0.1-3.5
2	***Mean***	0	0.7	0	0	0	0	0	0	0	0	0.7	0	1.3
	95% c.i.	0-0	0-1.6	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1.7	0-0	0.1-3.2

1.2.9 Kittiwake

Table 12.5.10: Kittiwake collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	20.1	107.2	3	2.6	6.1	0.7	2.1	2.2	1.5	3.7	12.3	25.4	186.8
	95% c.i.	6.9-33.9	36.3-184	0.5-5.9	0.3-5.3	1.9-10.3	0.1-1.4	0.3-4.1	0.5-3.8	0.2-3	0.8-7	3-22.2	2.3-51.7	52.9-332.4
1b	***Mean***	22.7	120.3	3.5	2.8	6.8	0.8	2.4	2.5	1.7	4.1	13.9	27.7	209.1
	95% c.i.	8.6-38.8	39.1-213.8	0.5-7	0.4-5.9	2.1-12	0.1-1.6	0.4-4.8	0.6-4.5	0.2-3.4	0.9-7.4	2.4-25	2.5-59.1	57.8-383.1
2	***Mean***	20.7	108	3.1	2.6	6	0.7	2.2	2.3	1.5	3.7	12.6	25.5	188.8
	95% c.i.	7.5-34.5	30.2-189.1	0.5-6.2	0.3-5.2	1.8-10.5	0.1-1.5	0.3-4.3	0.6-4.1	0.3-3	0.7-6.7	2.4-23.7	2.9-54.5	47.5-343.3

1.2.10 Lesser Black-backed Gull

Table 12.5.11: Lesser black-backed gull collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	0	0	0.7	0	0	0	0	0	0	0	0	0	0.7
	95% c.i.	0-0	0-0	0-1.6	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1.6
1b	***Mean***	0	0	0.7	0	0	0	0	0	0	0	0	0	0.7
	95% c.i.	0-0	0-0	0.1-1.7	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0.1-1.7
2	***Mean***	0	0	0.6	0	0	0	0	0	0	0	0	0	0.6
	95% c.i.	0-0	0-0	0-1.5	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1.5

1.2.11 Little Gull

Table 12.5.12: Little gull collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	***Stochastic CRM***													
1a	***Mean***	7.7	1.5	4.2	0	0	0	0	0.5	3.1	3.6	7.6	14.4	42.6
	95% c.i.	0.8-16.5	0.1-3.2	0.3-8.8	0-0	0-0	0-0	0-0	0.1-1.1	0.3-6.7	0.3-7.8	1.5-14.6	1.9-28.8	5.3-87.6
1b	***Mean***	9.5	1.8	5	0	0	0	0	0.6	3.6	4.1	8.7	17.2	50.4
	95% c.i.	1.1-20.2	0.2-4	0.5-10.2	0-0	0-0	0-0	0-0	0.1-1.3	0.3-7.9	0.4-9.1	1.3-16.6	2.3-34	6.1-103.3
2	***Mean***	8.2	1.5	4.3	0	0	0	0	0.5	3.3	3.6	7.9	14.7	44.1
	95% c.i.	0.7-17.4	0.1-3.5	0.5-8.8	0-0	0-0	0-0	0-0	0.1-1.1	0.4-7.2	0.3-8	1.3-14.6	1.4-28.9	4.7-89.5

1.2.12 Sandwich Tern

Table 12.5.13: Sandwich tern collision mortality for all three turbine options, calculated using stochastic CRM with Band Option 2. Monthly values are the mean and 95% confidence intervals (c.i.).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Turbine model	*Stochastic CRM*													
1a	*Mean*	0	0	0	0	0.1	0	0	0.1	0.1	0	0	0	0.3
	95% c.i.	0-0	0-0	0-0	0-0	0-0.1	0-0	0-0	0-0.3	0-0.2	0-0	0-0	0-0	0-0.6
1b	*Mean*	0	0	0	0	0.1	0	0	0.1	0.1	0	0	0	0.3
	95% c.i.	0-0	0-0	0-0	0-0	0-0.2	0-0	0-0	0-0.3	0-0.3	0-0	0-0	0-0	0-0.7
2	*Mean*	0	0	0	0	0.1	0	0	0.1	0.1	0	0	0	0.3
	95% c.i.	0-0	0-0	0-0	0-0	0-0.1	0-0	0-0	0-0.3	0-0.2	0-0	0-0	0-0	0-0.6

1.3 References

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