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Offshore Wind Farm Cumulative Effects Assessments – Case Study 1: Including projects without an EIA

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Offshore Wind Farm Cumulative Effects Assessments – Case Study 1: Including projects without an EIA

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Summary

Some Cumulative Effects Assessments (CEAs) screen out projects where a quantitative assessment of the number of animals impacted is not available (i.e. no EIA is available). Other CEAs acknowledge that offshore wind farm (OWF) projects should be considered and use a set of assumptions to estimate the number of animals disturbed. The purpose of this case study was to demonstrate (using iPCoD population modelling) the difference in a quantitative CEA depending on whether projects without an EIA are included in the assessment or not. Two scenarios were run in iPCoD to model the population level effects of disturbance:

- **Scenario 1: EIA Projects Only** - all planned OWF located in the North Sea MU that have an EIA, and
- **Scenario 2: All Projects** -all planned OWF located in the North Sea MU both with and without an EIA, using an effective deterrence range (EDR) and the SCANS IV density to estimate the number of impacted animals for projects without an EIA.

Despite substantially different inputs in terms of the number of projects and the number of piling days between the two scenarios, the population level results were almost identical. The reason for this is apparent when comparing the number of animals potentially disturbed by each project in the two scenarios. The number of animals predicted to be impacted for projects without an EIA are vastly smaller than those predicted in EIAs. Therefore, the results from the two different methods are markedly different and incompatible, and caution used when comparing. This needs to be taken into consideration when reviewing CEAs, and Regulators and Statutory Advisors need to provide clear guidance as to what methods should be used and how to best account for projects without an EIA.

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1. Introduction

Environmental Impact Assessments (EIAs) in the UK must include a Cumulative Effects Assessment (CEA). Typically, offshore wind farm (OWF) CEAs quantitatively assess the potential for population level effects resulting from disturbance from pile driving across multiple OWF developments. However, due to a lack of standardisation or guidance this process varies considerably between assessments (especially by country and by project) (Sinclair 2025). This raises the question of the utility and efficiency of the current CEA process.

Where no prediction of the number of animals impacted is available (i.e. no EIA is available) some CEAs will simply screen out those projects. Other CEAs acknowledge that these projects should be considered quantitatively in some way and use a set of assumptions to provide an illustrative number of animals disturbed, typically by using an effective deterrence range (EDR) to estimate the disturbance area.

The purpose of this case study was to demonstrate the difference in a CEA depending on whether projects without an EIA are included in a quantitative assessment or not.

2. Method

2.1 Scenarios considered

This case study assessed the potential for population level impacts to the North Sea harbour porpoise Management Unit (MU) population from the cumulative impact of disturbance from pile driving of OWFs in the MU. Two scenarios were considered:

1. **Scenario 1: EIA Projects Only** – this quantitatively assessed the cumulative effect of all OWFs located in the North Sea MU that have an EIA available in the public domain (see section 6: EIAs reviewed).
2. **Scenario 2: All Projects** - this quantitatively assessed the cumulative effect of all OWF located in the North Sea MU (both with and without an EIA available in the public domain).

For **Scenario 1: EIA Projects Only**, the following information was obtained from OWF specific EIAs: number of animals disturbed per piling day, the expected piling years and the number of piling days (where available) (see Table 1).

Table 1 Scenario 1: OWF projects with an EIA available

OWF	Pile type	Piling days	Start	End	# Disturbed per piling day (from EIAs)
Berwick Bank	Pin Piles	372	Jan-26	Dec-31	2,822
Caledonia	Pin Piles & Anchors	515	2028	2030	8,201
Dogger Bank A (Creyke Beck A)	Monopiles	95	2023	Dec-25	1,470
Dogger Bank B (Creyke Beck B)	Monopiles	95	May-24	2025	2,599
Dogger Bank C (Dogger Bank Teeside A)	Monopiles	87	2025	2026	1,920
Doggerbank Southeast	Monopiles	100	2028	2030	4,296
Doggerbank Southwest	Monopiles	100	2028	2030	5,098
Dudgeon Extension	Pin Piles	60	2028	2028	5,161
East Anglia 1 North	Pin Piles	134	2026	2028	2,914
East Anglia 2	Pin Piles	150	2025	2027	3,285
East Anglia 3	Pin Piles	344	2025	2027	2,211
Five Estuaries	Pin Piles	85	2029	2030	5,677
Green Volt	Pin Piles	4	Q1 2027	Q1 2027	5,208
Hornsea 3	Pin Piles	554	2027	2028	4,046
Hornsea 4	Pin Piles	270	Q4 2026	Q3 2027	6,417
Inch Cape	Pin Piles	76	Dec-25	May-26	175
Muir Mhòr (WTG)	Anchors	175	Jun-29	Jun-31	14,630
Muir Mhòr (OSP)	Pin Piles	24	Jun-29	Jun-31	15,245
Norfolk Boreas	Pin Piles	386	01/04/2026	30/09/2027	1,016
Norfolk Vanguard	Pin Piles	417	2027	2028	15,959
North Falls	Pin Piles	103	2030	2030	2,274
Ossian (WTG)	Anchors	530	2031	2038	3,857

Ossian (OSP)	Pin Piles	72	2031	2038	7,309
Outer Dowsing	Pin Piles	130	Q3 2027	Q2 2029	1,799
Pentland	Anchors	63	2025	2026	641
Rampion 2	Pin Piles	95	Jul-29	Feb-30	652
Salamander	Anchors	80	Apr-28	Oct-28	12,366
Sheringham Shoal Extension	Pin Piles	50	2028	2028	445
Sofia (Dogger Bank Teeside B)	Monopiles	100	2025	2026	2,035
West of Orkney	Pin Piles	290	2028	2030	1,149

For **Scenario 2: All Projects**, for projects in the North Sea MU with no EIA available, a search was conducted into planned OWF in the UK, Germany, Sweden, Denmark, the Netherlands and France. Data were sourced on the expected foundation type (fixed or floating), the maximum number of wind turbine generators (WTGs) (or maximum GW capacity) and the potential construction timelines (see Table 2). The following sources were used in this search:

- OWF specific scoping report (where available)
- OWF specific websites (where available)
- Developer websites (e.g. Orsted, Vattenfall, SSE, RWE, EnBW)
- Noordzeeloket.nl (offshore wind energy database for the Netherlands)
- Bsh.de (The Federal Maritime and Hydrographic Agency in Germany)
- 4coffshore.com (Global offshore wind farm database)
- thewindpower.net (Wind Energy Database)
- power-technology.com (offshore wind news and information platform)
- OffshoreWIND.biz (offshore wind news and information platform)

Projects were screened out of the assessment if there was no information available on the potential construction timelines. For all projects, where information was not available to inform the assessment, the following assumptions were made with respect to the spatial extent of behavioural disturbance, density and piling duration (in order to estimate the number of animals disturbed per day, expected piling years and number of piling days):

- Monopile = 26 km EDR (JNCC 2020)
- Jacket = 15 km EDR (JNCC 2020)
- Floating anchor = 15 km EDR (assumed similar to jacket pin piles)
- Mitigated piling = 15 km EDR (JNCC 2020)
- Density = SCANS IV block (Gilles et al. 2023)
- Monopile = 1 piling day
- Jacket = 2 piling days
- Anchors = 4 piling days

Table 2 OWF projects without an EIA available (included in Scenario 2 in addition to all those listed in Table 1)

OWF	Country	Pile type	# WTGs	Piling days	Start	End	# Disturbed per piling day (estimated using EDR & SCANS IV block density)
Arven	United Kingdom	Floating	161	725	2026	2030	364
Ayre	United Kingdom	Floating	67	302	2029	2032	199
Bowdun	United Kingdom	Floating	67	302	2029	2031	423
Buchan	United Kingdom	Floating	70	315	2028	2030	364
Morven	United Kingdom	Floating	191	573	2027	2030	423
Atlantis I	Germany	Fixed	73	146	2024	2029	435
Bluewater - Metcentre	Norway	Floating	1	4	2026	2026	87
Borkum Riffgrund 3	Germany	Monopile	83	83	2024	2025	435
Centre-Manche 1	France	Monopile	67	67	2025	2031	74
Centre-Manche 2	France	Monopile	100	100	2026	2032	74
Dieppe Le Treport	France	Jacket	33	66	2024	2026	74
Dunkerque	France	Monopile	46	46	2024	2028	74
Freya	Denmark	Floating	50	200	2025	2029	334
Hanstholm Syd	Denmark	Fixed	11	21	2024	2028	334
Hirtshals Havn Offshore	Denmark	Fixed	9	17	2024	2028	367
HKW Kavel VII	Netherlands	Fixed	47	93	2023	2025	568
Hollandse Kust west zuidelijk deel (HK-w-z)	Netherlands	Monopile	108	108	2024	2026	568
IJmuiden Ver (Alpha)	Netherlands	Fixed	133	267	2028	2030	568
IJmuiden Ver (Beta)	Netherlands	Fixed	133	267	2028	2029	219
IJmuiden Ver (Gamma A)	Netherlands	Fixed	67	133	2028	2030	568

IJmuiden Ver (Gamma B)	Netherlands	Fixed	67	133	2028	2030	219
Jyske Banke Nord	Denmark	Fixed	73	147	2027	2031	334
Mareld	Sweden	Fixed	167	333	2030	2032	367
N-10.1	Germany	Fixed	10	20	2026	2030	435
N-10.2	Germany	Fixed	10	20	2026	2030	435
N-11.1	Germany	Fixed	133	267	2026	2030	435
N-12.1	Germany	Fixed	133	267	2026	2030	435
N-12.2	Germany	Fixed	133	267	2026	2030	435
N-6.6	Germany	Fixed	42	84	2026	2028	435
N-6.7	Germany	Fixed	9	18	2025	2029	568
N-9.1	Germany	Fixed	10	20	2029	2031	568
N-9.2	Germany	Fixed	10	20	2030	2032	435
N-9.4	Germany	Fixed	10	20	2026	2030	568
Nordlicht I	Germany	Fixed	65	131	2026	2027	435
Nordseecluster A	Germany	Fixed	44	88	2026	2027	435
Nordseecluster B	Germany	Fixed	60	120	2028	2029	435
Parc eolien pose au large de la Normadie (AO4)	France	Fixed	44	88	2030	2031	74
Poseidon Nord	Sweden	Floating	93	373	2027	2031	367
Poseidon Syd	Sweden	Floating	93	373	2027	2031	653
Romo	Denmark	Fixed	15	30	2025	2029	435
Ten Noorden van de Waddeneilanden Zone	Netherlands	Fixed	47	93	2027	2031	568
Thor - 2020 Tender	Denmark	Fixed	72	144	2024	2026	435
Thybo I	Denmark	Fixed	200	400	2025	2029	334

Thybo II	Denmark	Fixed	88	176	2025	2029	334
Utsira Nord 1	Norway	Floating	100	400	2028	2030	87
Utsira Nord 2	Norway	Floating	33	133	2028	2030	87
Vest Nordsoen II + III	Denmark	Fixed	67	133	2024	2027	435
Vidar	Sweden	Floating	93	373	2027	2031	367
Vigso Bay	Denmark	Fixed	22	45	2026	2030	334

The screening and data collection resulted in **Scenario 1: EIA Projects Only** consisting of 31 OWF operations, piling between January 2025 and December 2038 inclusive, resulting in 5,439 piling days. **Scenario 2: All Projects** consisted of 80 OWF operations, piling between January 2025 and December 2038 inclusive, resulting in 13,704 piling days (Table 3 and Figure 1).

Table 3 Summary of the OWF inputs to the iPCoD model under both scenarios.

Input		Scenario 1: EIA Projects Only	Scenario 2: All Projects
Number of OWF projects		28	77
Number of OWF operations[1]		31	80
Start piling		Jan 2025	Jan 2025
End piling		Dec 2038	Dec 2038
Number of piling years		14	14
Total number of piling days		5,439	13,704
Total piling days per year	2025	391	821
	2026	789	1,639
	2027	1,272	2,405
	2028	1,109	2,766
	2029	517	2,279
	2030	612	2,207
	2031	232	872
	2032	85	283
	2033	85	85
	2034	85	85
	2035	85	85
	2036	85	85
	2037	83	83
	2038	9	9

[1] In certain instances, an OWF project may have multiple "operations" within it. For example, if a different number of animals were predicted to be disturbed by different foundation types within an OWF project.

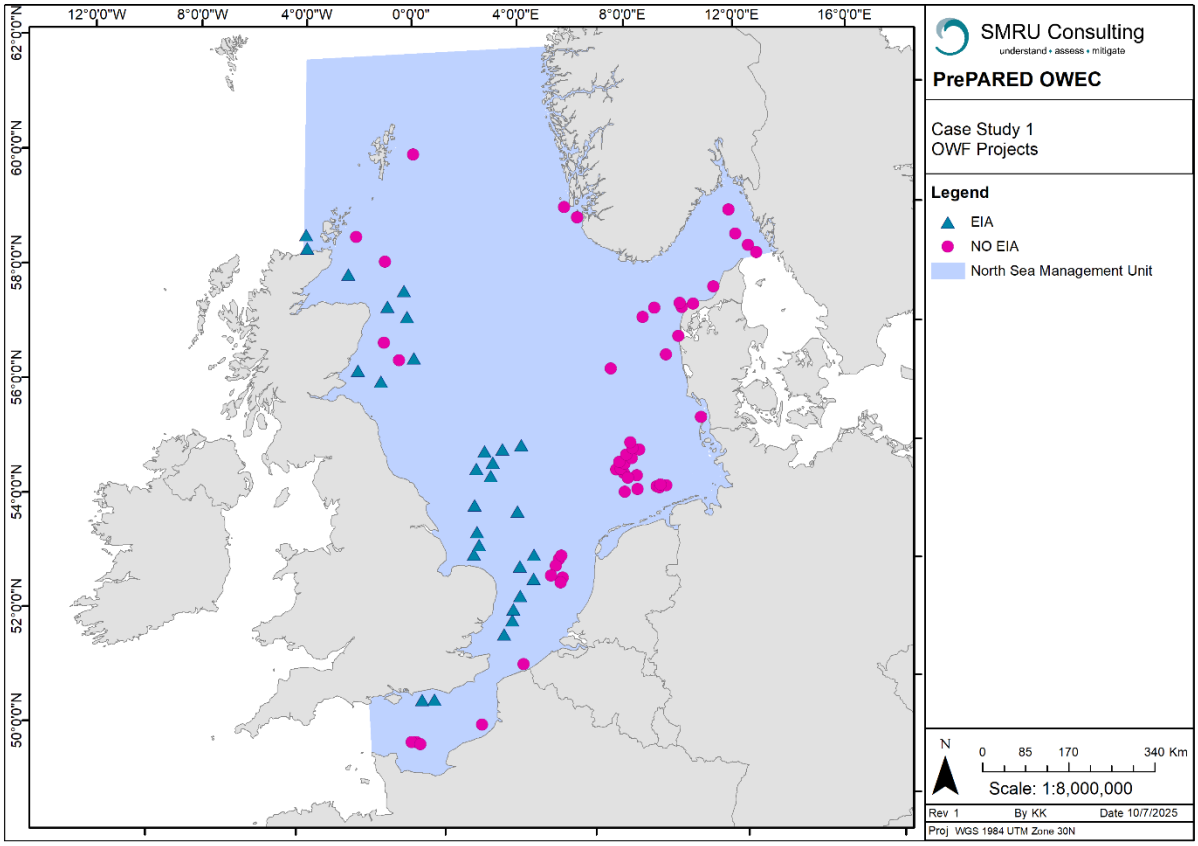

Figure 1 OWF projects screened into Scenario 1 (EIA projects, blue triangles) and Scenario 2 (all projects, magenta circles).

2.1 Population modelling

The interim Population Consequences of Disturbance (iPCoD) framework (Harwood et al. 2014, King et al. 2015) was used to predict the potential population consequences of disturbance resulting from the piling from OWFs in the North Sea MU for harbour porpoise under each scenario. The iPCoD model uses a stage structured model of population dynamics with nine age classes and one stage class (adults 10 years and older). The model is used to run a number of simulations of future population trajectory with and without the predicted level of impact, to allow an understanding of the potential future population level consequences of predicted behavioural responses.

Each iPCoD model simulation is run with matched pairs of populations: one un-impacted population and one impacted population (1,000 simulations are recommended for each scenario of interest). These matched-pairs experience exactly the same environmental and demographic stochasticity within one simulation of the model. The only variable element between the matched pair is that one population is subjected to a stressor (impulsive noise) and therefore demonstrates the potential effect of disturbance (this is the impacted population in the pair), the other population in the pair receives no exposure to a stressor and is the un-impacted population. Thus, any difference in the resulting modelled population size between the un-impacted and the impacted populations is entirely due to the effect of the disturbance modelled.

Table 4 provides a summary of the porpoise values input to the iPCoD model under both scenarios.

Table 4 Summary of the porpoise inputs to the iPCoD model under both scenarios.

Input		Scenario 1: EIA Projects Only	Scenario 2: All Projects
Spec	Species	HP (harbour porpoise)	
Pmean	Population size	346,601 (IAMMWG 2023)	
Surv[1]	Calf survival	0.8455 (Sinclair et al. 2020)	
Surv[7]	Juvenile survival	0.85 (Sinclair et al. 2020)	
Surv[13]	Adult survival	0.925 (Sinclair et al. 2020)	
Fertility	Fertility	0.34 (Sinclair et al. 2020)	
Age 1	Age at independence	1 (Sinclair et al. 2020)	
Age 2	Age of first birth	5 (Sinclair et al. 2020)	
Pile years	Number of years with piling	14	
Vulnmean	Vulnerable subpopulation	no	
days	Residual days of disturbance	0	
Pilesx1	Number of piling operations	31	80
numDT	Number of animals disturbed per piling day	OWF specific: see Table 1 and Figure 2	OWF specific: see Table 1 and Table 2 and Figure 3

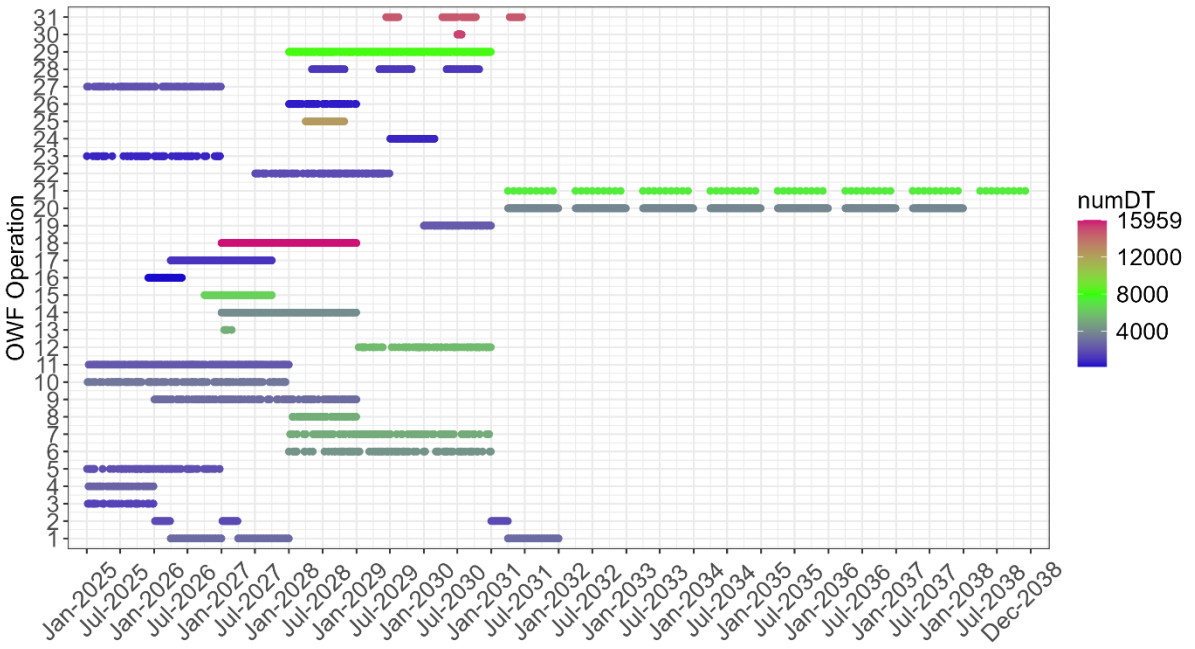

Figure 2 Piling schedules for all OWF operations included in Scenario 1: EIA Projects Only, showing their corresponding number of animals disturbed per piling day (numDT).

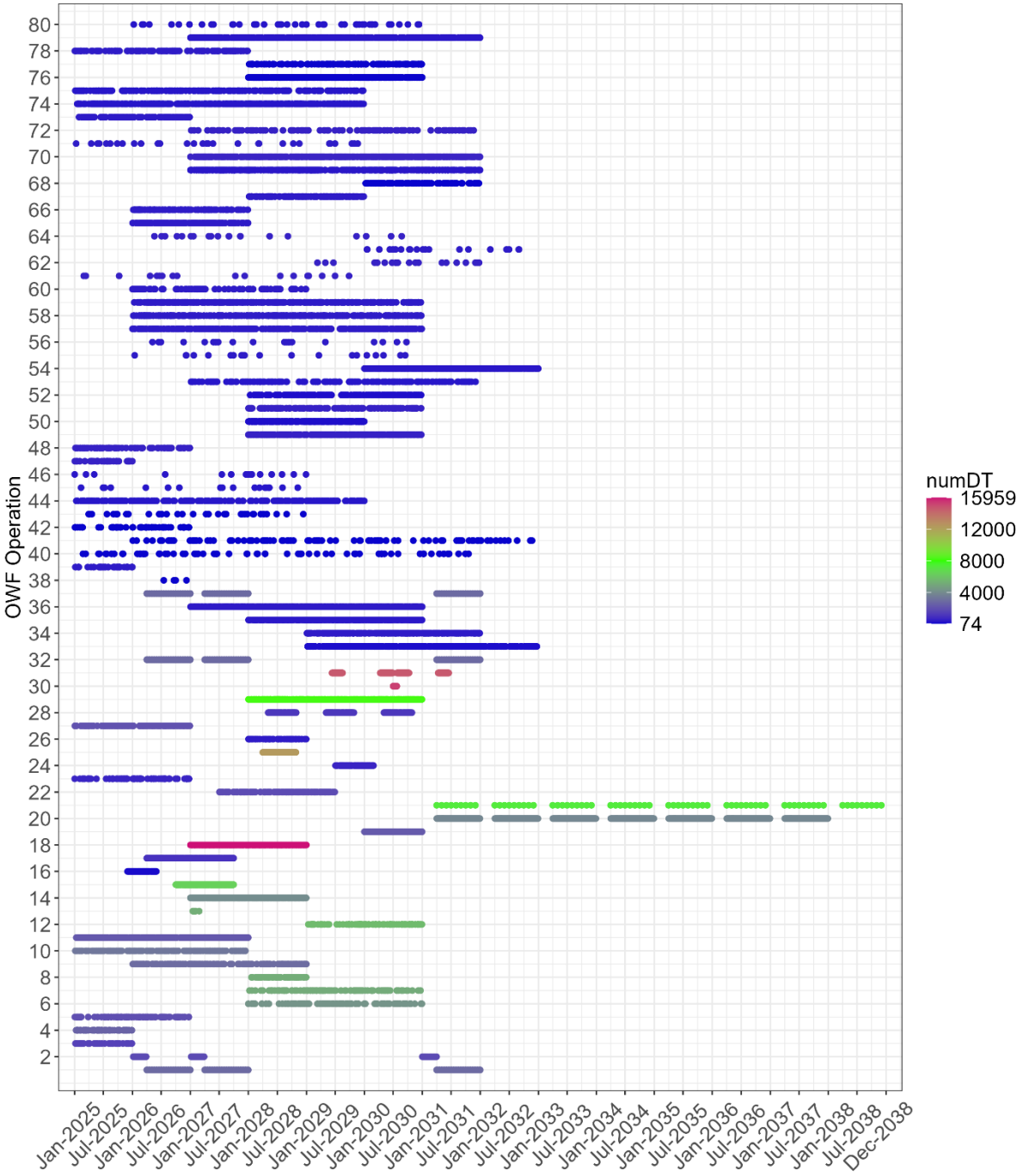

Figure 3 Piling schedules for all OWF operations included in Scenario 2: All Projects, showing their corresponding number of animals disturbed per piling day (numDT).

3. Results

Figure 4 presents the predicted population size for the un-impacted and impacted North Sea MU population under **Scenario 1: EIA Projects Only**.

Figure 5 presents the predicted population size for the un-impacted and impacted North Sea MU population under **Scenario 2: All Projects**.

Table 5 provides the mean predicted population size for the un-impacted and impacted North Sea MU population under both scenarios in each of the 25 years modelled.

Intuitively, given that:

- the number of OWF projects considered in **Scenario 2: All Projects** was 2.8 x larger than the number considered in **Scenario 1: EIA Projects Only** (77 vs 28), and
- the total number of piling days considered in **Scenario 2: All Projects** was 2.5 x larger than considered in **Scenario 1: EIA Projects Only** (13,704 vs 5,439 days),

it was expected that **Scenario 2: All Projects** would result in a significantly larger impact to the North Sea MU population. However, this was not the case.

The mean impacted North Sea MU population under Scenario 1 dropped to 96.7% of the mean un-impacted population size, while for Scenario 2 it only dropped to 96.0% of the mean un-impacted population size (Table 5). Thus, there was almost no difference in the population level results between the two scenarios, despite substantially different inputs.

The reason for this is apparent when comparing the number of animals potentially disturbed between Scenario 1 and Scenario 2 (Table 6). The number of animals predicted to be impacted using an EDR approach combined with the SCANS IV density results is substantially lower than what is calculated in EIAs. This is because the EIAs use different disturbance thresholds (e.g. dose-response) and density surfaces (e.g. site-specific surveys). For example, the Five Estuaries EIA predicts disturbance to 5,677 porpoise per piling day for pin piles, using the site-specific digital aerial survey density (1.82 porpoise/km^2) and the Graham et al. (2017) dose-response function. Using the 15 km EDR and SCANS IV density (0.3096 porpoise/km^2) approach, only 219 porpoise are predicted to be disturbed. Thus, the number of animals predicted to be disturbed under the EDR and SCANS IV calculation is only 4% of the number of animals predicted to be disturbed in the EIA (Table 6). Therefore, the results from the two different methods are markedly different and incompatible, and caution used when comparing.

This means that the inclusion of non-EIA projects in Scenario 2, with such small numbers of animals disturbed per OWF, makes almost no difference compared to the result from Scenario 1 which included only EIA projects. If all non-EIA projects actually had an EIA available, it is expected that the number of animals disturbed per project would be substantially higher and thus far more likely to have a greater population level effect.

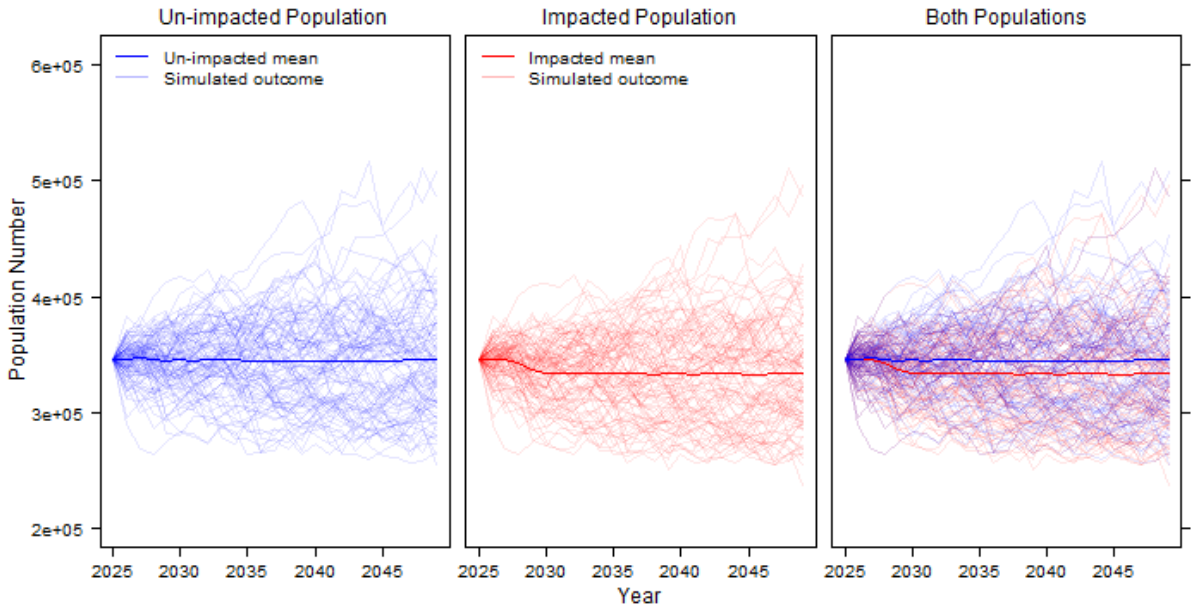

Figure 4 Predicted population size for the un-impacted and impacted North Sea MU population under Scenario 1: EIA Projects Only.

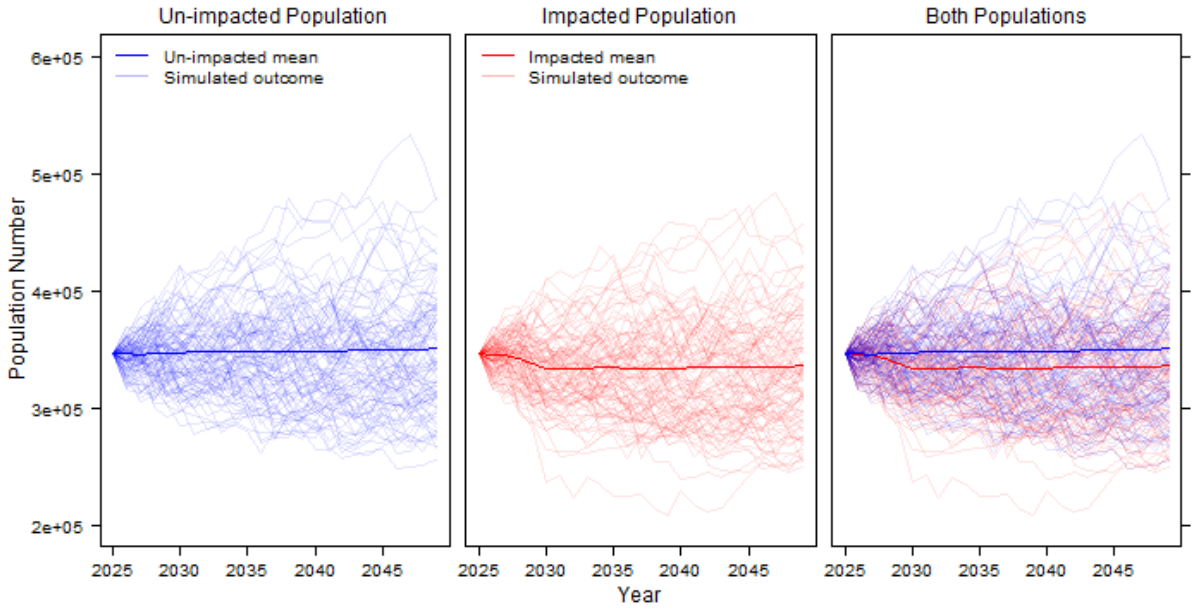

Figure 5 Predicted population size for the un-impacted and impacted North Sea MU population under Scenario 2: All Projects (all OWF operations in the North Sea MU both with and without an EIA available).

Table 5 Mean predicted population size for the un-impacted and impacted North Sea MU population under each Scenario (piling occurs between 2025 and 2038 inclusive)

	Scenario 1: EIA Projects Only			Scenario 2: All Projects		
Year	Mean un-impacted population size	Mean impacted population size	Mean impacted population size as % of un-impacted	Mean un-impacted population size	Mean impacted population size	Mean impacted population size as % of un-impacted
Start 2025	346,602	346,602	100.0%	346,602	346,602	100.0%
End 2025	346,683	346,578	100.0%	345,986	345,830	100.0%
End 2026	347,251	346,727	99.9%	345,724	344,987	99.8%
End 2027	346,483	343,154	99.0%	346,561	342,527	98.8%
End 2028	345,223	337,100	97.7%	347,210	337,430	97.2%
End 2029	345,393	334,444	96.8%	346,661	333,519	96.2%
End 2030	345,232	333,893	96.7%	347,405	333,556	96.0%
End 2031	345,518	333,591	96.6%	347,418	332,792	95.8%
End 2032	345,896	334,656	96.8%	348,036	334,120	96.0%
End 2033	345,751	334,740	96.8%	347,802	334,172	96.1%
End 2034	345,002	333,961	96.8%	348,078	334,400	96.1%
End 2035	344,911	333,687	96.8%	347,900	334,019	96.0%
End 2036	344,947	333,566	96.7%	347,775	333,700	96.0%
End 2037	344,895	333,403	96.7%	348,130	333,935	95.9%
End 2038	344,945	333,423	96.7%	347,501	333,306	95.9%
End 2039	344,895	333,421	96.7%	348,101	333,953	95.9%
End 2040	344,820	333,393	96.7%	348,446	334,328	96.0%
End 2041	345,013	333,540	96.7%	348,655	334,513	95.9%
End 2042	345,296	333,813	96.7%	349,638	335,478	96.0%
End 2043	345,165	333,652	96.7%	349,755	335,573	96.0%
End 2044	344,489	333,019	96.7%	349,423	335,292	96.0%
End 2045	344,615	333,143	96.7%	349,550	335,405	96.0%
End 2046	345,976	334,486	96.7%	349,217	335,085	96.0%
End 2047	345,665	334,159	96.7%	349,534	335,388	96.0%
End 2048	345,524	334,015	96.7%	350,715	336,512	96.0%
End 2049	345,428	333,923	96.7%	350,887	336,692	96.0%

Table 6 Difference in the number of porpoise disturbed (# HP) between EIA values and what would have been estimated if no EIA was available (based on an EDR and the SCANS IV block density (# porpoise/km^2, from Gilles et al. (2023))).

OWF	Pile	EIA # HP	SCANS IV Density	EDR (km)	Assumed # HP	Assumed as % EIA
Berwick Bank	Pin	2,822	0.5985	15	423	15%
Dogger Bank A	Mono	1,470	0.6027	26	1,280	87%
Dogger Bank B	Mono	2,599	0.6027	26	1,280	49%
Dogger Bank C	Mono	1,920	0.8034	26	1,706	89%
Dogger Bank SE	Mono	4,296	0.6027	26	1,280	30%
Dogger Bank SW	Mono	5,098	0.6027	26	1,280	25%
Dudgeon Ext	Mono	5,161	0.6027	26	1,280	25%
East Anglia 1 N	Pin	2,914	0.3096	15	219	8%
East Anglia 2	Pin	3,285	0.3096	15	219	7%
East Anglia 3	Pin	2,211	0.3096	15	219	10%
Five Estuaries	Pin	5,677	0.3096	15	219	4%
Green Volt OSP	Pin	5,208	0.5985	15	423	8%
Hornsea 3	Pin	4,046	0.6027	15	426	11%
Hornsea 4	Pin	6,417	0.6027	15	426	7%
Morecambe	Mono	3,443	0.5153	26	1,094	32%
Norfolk Boreas	Pin	1,016	0.3096	15	219	22%
Norfolk Vanguard	Pin	15,959	0.3096	15	219	1%
North Falls	Pin	2,274	0.3096	15	219	10%
Ossian (WTG)	Anchor	3,857	0.5985	15	423	11%
Ossian (OSP)	Pin	7,309	0.5985	15	423	6%
Outer Dowsing	Pin	1,799	0.6027	15	426	24%
Pentland	Anchor	641	0.2813	15	199	31%
Rampion 2	Pin	652	0.1045	15	74	11%
Salamander	Anchor	12,366	0.5985	15	423	3%
Sheringham Shoal Ext	Pin	445	0.6027	15	426	96%
Sofia	Mono	2,035	0.6027	26	1,280	63%
West of Orkney	Pin	1,149	0.0994	15	70	6%
Caledonia	Pin & anchor	8,201	0.2813	15	199	2%
Muir Mhòr (OSP)	Pin	15,245	0.5985	15	423	3%
Muir Mhòr (WTG)	Anchor	14,630	0.5985	15	423	3%

4. Recommendations

Despite **Scenario 1: EIA Projects Only** having fewer OWF operations (n=31) and fewer piling days (n=5,439), the results at the population level were almost identical to those from **Scenario 2: All Projects** which had more OWF operations (n=80) and more piling days (n=13,704). The reason the population level result was almost identical between the two scenarios is due to the difference in how the number of animals disturbed per piling day is calculated in EIAs compared to using the EDR and SCANS IV calculation for projects without an EIA.

By using the EDR and SCANS IV calculation, in most cases, the predicted number of animals disturbed is substantially less than is predicted in EIAs which use different disturbance thresholds and density surfaces. Therefore, the results from the two different methods are markedly different and incompatible, and caution used when comparing.

One way to address this incomparability would be to standardise the inputs to the CEA. For example, use the EDR and SCANS IV calculation for all OWF projects scoped into the assessment, whether or not they have an EIA available. However, this risks significantly underestimating the potential disturbance levels compared to an assessment that uses OWF specific density surfaces and a dose-response approach. Alternatively, the CEA could scope out projects without an EIA to avoid this incompatibility, but this risks significantly underestimating the potential disturbance levels as it doesn't consider all potential projects within an MU.

Given this issue, **it is recommended** that Regulators and Statutory Advisors provide clear guidance as to what methods should be used in a CEA, how best to account for projects without an EIA, and how to interpret the results if both methods are used in a single assessment.

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6. EIAs reviewed

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Dogger Bank A (Creyke Beck A)	Dogger Bank Creyke Beck Environmental Statement. Chapter 14 Marine Mammals. Application Reference 6.14. Document Number: F-OFC-CH-014. August 2013.
Dogger Bank B (Creyke Beck B)	
Dogger Bank C (Dogger Bank Teeside A)	Dogger Bank Teesside A & B Environmental Statement. Chapter 14 Marine Mammals. Application Reference 6.14. Document Number: F-OFC-CH-014. March 2014.
Dogger Bank SE	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 Chapter 11 – Marine Mammals. Application ref: 7.11. APFP Regulation: 5(2)(a). Revision: 01. June 2024.
Dogger Bank SW	
Dudgeon Extension	Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects. Environmental Statement. Volume 1. Chapter 10 - Marine Mammal Ecology. Document Reference: 6.1.10. APFP Regulation: 5(2)(a). August 2022.
East Anglia 1 N	East Anglia ONE North Offshore Windfarm. Chapter 11 Marine Mammals. Environmental Statement Volume 1. Document Reference: 6.1.11. APFP Regulation: 5(2)(a). October 2019.
East Anglia 2	East Anglia TWO Offshore Windfarm. Chapter 11 Marine Mammals. Environmental Statement Volume 1. Document Reference: 6.1.11. APFP Regulation: 5(2)(a). October 2019.
East Anglia 3	East Anglia THREE. Chapter 12 Marine Mammal Ecology. Environmental Statement Volume 1. Document reference – 6.1.12. November 2015.
Five Estuaries	Five Estuaries Offshore Wind Farm Environmental Statement. Volume 6, Part 2, Chapter 7: Marine Mammal Ecology. Application Reference EN010115. Application Document Number 6.2.7. Revision A. APFP Regulation 5(2)(a). March 2024.
Green Volt	Green Volt Offshore EIA Report: Volume 1. Chapter 11 Marine Mammal Ecology. January 2023.

Hornsea 3	Hornsea Project Three Offshore Wind Farm Environmental Statement: Volume 2, Chapter 4 – Marine Mammals. PINS Document Reference: A6.2.4. APFP Regulation 5(2)(a). May 2018.
Hornsea 4	Hornsea Project Four: Environmental Statement (ES). PINS Document Reference: A2.4. APFP Regulation: 5(2)(a). Volume A2, Chapter 4: Marine Mammals. Doc. No. A2.4 Version B. September 2021.
Morecambe	Morecambe Offshore Windfarm: Generation Assets. Environmental Statement. Volume 5. Chapter 11 Marine Mammals. PINS Document Reference: 5.1.11. APFP Regulation: 5(2)(a). Rev 01. May 2024.
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Norfolk Vanguard	Norfolk Vanguard Offshore Wind Farm. Chapter 12 Marine Mammals. Environmental Statement Volume 1. Document Reference: 6.1.12. APFP Regulation 5(2)(a). Revision: Version 1. June 2018.
North Falls	North Falls Offshore Wind Farm. Environmental Statement. Chapter 12 Marine Mammals. Document Reference 3.1.14. Volume 3.1. APFP Regulation: 5(2)(a). July 2024.
Ossian	Ossian. Chapter 10: Marine Mammals. Array EIA Report. June 2024
Outer Dowsing	Outer Dowsing Offshore Wind. Environmental Statement. Chapter 11 Marine Mammals. Volume 1. Document Reference: 6.1.11. Pursuant to APFP Regulation: 5(2)(a). Rev: 1. March 2024.
Pentland	Pentland floating offshore wind farm. Volume 2: Offshore EIAR. Chapter 11: Marine Mammals and Other Megafauna. Document no. GBPNTD-ENV-XOD-RP-00006. Revision 01. July 2022.
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Salamander	Salamander Offshore Wind Farm. Offshore EIA Report. Volume ER.A.3, Chapter 11: Marine Mammals. Document no: 08435483. Revision 00. April 2024.
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