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Changes in Harbour porpoise distribution in the North Sea

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Introduction

In 2016, the Offshore Wind Ecological Program (Wozep) has been set up to reduce the knowledge gaps of the effects of offshore wind farms on the North Sea ecosystem. Results from Wozep are used in the so-called Ecology and Cumulation Framework (KEC), which provides a modelled quantification of the cumulative effect of wind farms on harbour porpoise (*Phocoena phocoena*) and other protected species. The effect is tested against the ecological space, to the extent that data is available. KEC takes the distribution of harbour porpoise and current and proposed wind farms into account. Every new KEC has the aim to incorporate new relevant knowledge and to further develop and improve the methodology used in the previous KECs. The wind farms planned up to and including 2031 are included in the Additional Wind Energy Roadmap, and will be analysed in KEC 5.0. The wind farms designated from 2031 to 2040 and beyond will be further assessed in subsequent KECs.

For the subsequent KECs harbour porpoise distribution maps are used. However, there is a time lag between updated distribution maps and their application in the KEC framework. For KEC 5.0 the maps made by Gilles et al. (2020) are used, incorporating the available survey data up to 2019. In recent years new surveys have been conducted, e.g. SCANS-IV (Gillis et al 2023), and in 2024 winter-SCANS and a survey of the DCS, but the results are not publicly available yet. This memo aims to provide a description of any changes in harbour porpoise distribution and densities that may have occurred since 2019. Furthermore, the memo aims to sketch the consequences of using the outdated distribution map for the KEC 5.0 outcome.

Available aerial survey data

The first wide scale SCANS survey of the North Sea from 1994 was primarily conducted by ship with only some areas covered by plane (Hammond et al. 2002). The SCANS-II in 2005 was the first comprehensive survey of the Greater North Sea mainly conducted from aircraft (Hammond et al. 2013). SCANS-III and SCANS-IV, in 2016 and 2022 respectively continued the large-scale coverage (Gilles et al 2023, Hammond et al. 2021).

The first aerial surveys to specifically provide abundance estimates and distribution of harbour porpoise in the Dutch North Sea were conducted 2008 and subsequently extended to offshore areas resulting in the first surveys of the entire Dutch Continental Shelf in 2010-2011 (Geelhoed et al. 2013, Scheidat et al. 2012). In subsequent years the entire DCS was surveyed almost annually till 2019 (Geelhoed et al. 2020). From 2020 onwards the survey frequency changed from an annual summer survey to three-yearly surveys in spring and summer, with a SCANS-survey every sixth year. Covid and unfavourable weather conditions resulted in poor survey coverage in these years. As add-on to SCANS-IV the southern North Sea has been surveyed in winter 2024. Table 1 gives an overview of the conducted surveys.

Apart from the aerial surveys of the DCS and GSN, German waters are surveyed annually by the Institute for Terrestrial and Aquatic Wildlife Research since 2008. Danish waters were surveyed in 2011-2013 by Aarhus University, whereas surveys in Belgian waters are conducted annually by the Royal Belgian Institute of Natural Sciences since 2008. Surveys of a wide area around the Doggerbank were conducted in 2011 and 2013. Gilles et al. (2016, 2020) provide an overview of conducted surveys. Surveys in UK waters are virtually lacking.

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Table 1. Aerial surveys of harbour porpoises on the Dutch Continental Shelf (DCS) and in the Greater North Sea (GNS), 2010-2024.

	DCS	GNS	Source
2010	Summer	-	Geelhoed et al. 2013
2010	Winter	-	Geelhoed et al. 2013
2011	Spring	-	Geelhoed et al. 2013
2012	Spring	-	Geelhoed & Scheidat. 2018
2013	Spring	-	Geelhoed & Scheidat. 2018
2014	Summer	-	Geelhoed & Scheidat. 2018
2015	Summer	-	Geelhoed & Scheidat. 2018
2016	-	Summer	Hammond et al. 2021
2017	Summer	-	Geelhoed & Scheidat. 2018
2018	Summer	-	Geelhoed et al. 2018
2019	Summer	-	Geelhoed et al. 2020
2020	-	-	
2021	-	-	
2022	-	Summer	Gilles et al 2023
2023	-	-	
2024	Summer	Winter (southern part)	

Harbour porpoise distribution in the North Sea

The large scale SCANS-surveys resulted in abundance estimates of harbour porpoises in the North Sea that were similar for 2022 (339,000, CV = 0.17), 2016 (345,000, CV = 0.18) and 2005 (355,000, CV = 0.22), and slightly smaller for 1994 (289,000, CV = 0.14). The series of SCANS surveys does not indicate a change in harbour porpoise numbers in the North Sea. The data, however, have sufficient statistical power to detect a change in abundance of approximately 1% per year (Gilles et al. 2023). In other words, smaller changes than 1% per year cannot be detected.

The observed distribution during the series of SCANS surveys, however, shows a shift to the southern North Sea, and a steady increase of the number of sightings in the English Channel over the past three decades (Gilles et al. 2023, Hammond et al. 2021). Preliminary SCANS-IV density surface model results suggest a northward contraction of the 2005 and 2016 hotspot in the southern North Sea, between the Dutch mainland coast and the UK, and an extension from the northern part of the southern North Sea to the central North Sea. This area includes a broad band from the UK coast to the North Sea north of the Dutch Wadden Isles, with an extension into the central and northern North Sea. An impression of this 2022 hot spot is given in Figure 1.

Harbour porpoise distribution in the southern North Sea

Based on all available survey data from Belgium, Denmark, Germany and the Netherlands, density surface model outputs for Harbour Porpoise distribution in the southern North Sea were generated for spring, summer and autumn 2005-2013 and for summer 2014-2019 (Gilles et al. 2016, 2020). This summer distribution map is shown in Figure 2. It shows a side by side comparison of the summer distribution maps based on the 2005–2013 data and the 2014–2019 data. The data from 2014 – 2019 seem to show a shift in distribution slightly to the north west with a more prominent

hot spot at the latitude of Newcastle. As sketched in section 0 the distribution has been changed in 2022; the SCANS-IV survey suggest a shift to the east with higher densities off the Dutch Wadden Isles and the central North Sea, whereas lower densities seem to be present off the Dutch mainland coast.
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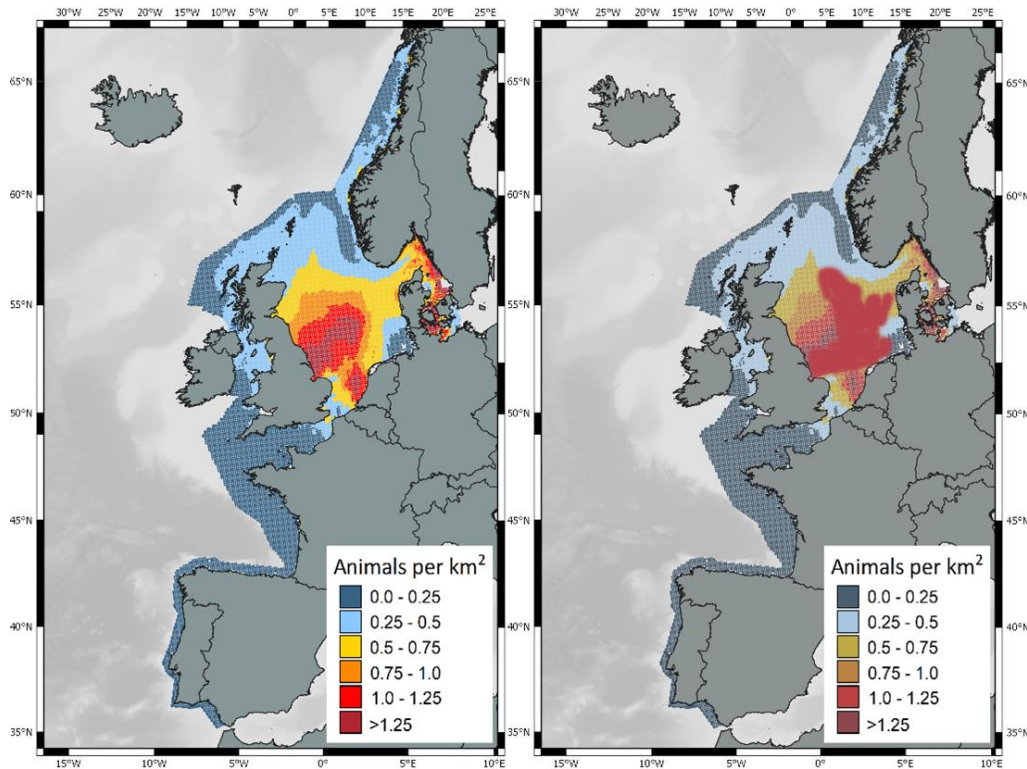3 september 2024

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Figure 1. Side by side comparison of distribution maps for harbour porpoise in summer 2016 (left) and summer 2022 (right). The distribution in 2016 is based on published density surface models from SCANS-II (Hammond et al. 2021), whereas the distribution in 2022 shows an 'impression' of the extent of high density areas (red blob overlayed on 2016 distribution) based on preliminary SCANS-IV density surface model results. High density areas in the northern North Sea are not shown. Final SCANS-IV distribution maps can differ

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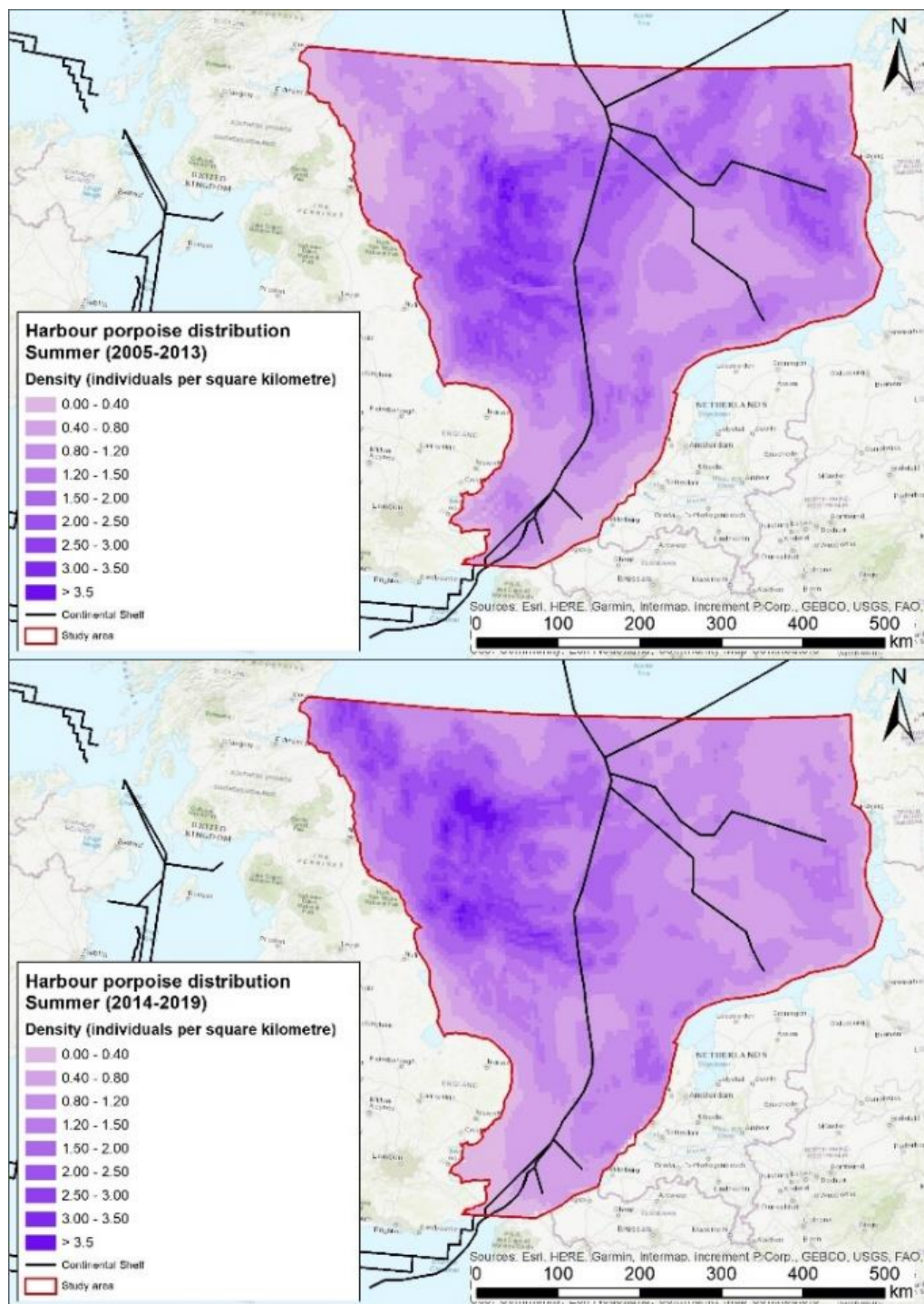
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Figure 2: Side by side comparison of the updated distribution maps for harbour porpoise in summer based on 2005 – 2013 survey data (top) and 2014 – 2019 survey data (bottom). Source Gilles et al. 2016, 2020

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Bruinvis in Nederlandse Noordzee

Index (trend 1991 = 100)

- Waarneming
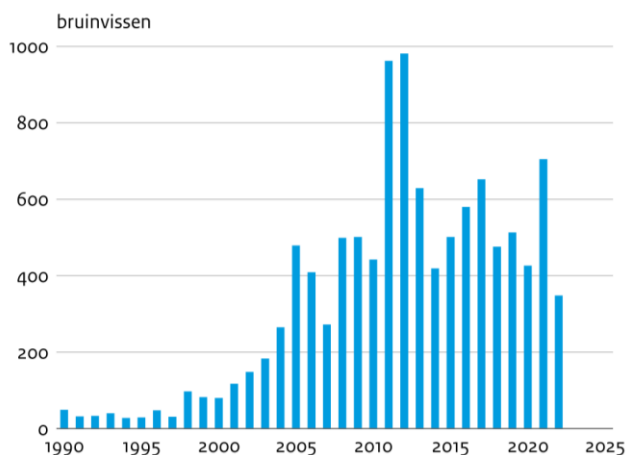- Trend
- Onzekerheid trend

Bron: Rijkswaterstaat

CBS/mei24
www.clo.nl/nl125009

Figure 3. Harbour porpoise trend during aerial surveys on the Dutch Continental Shelf, 1991-2022. Source: MWTL & WMR.

Aantal gestrande bruinvissen in Nederland
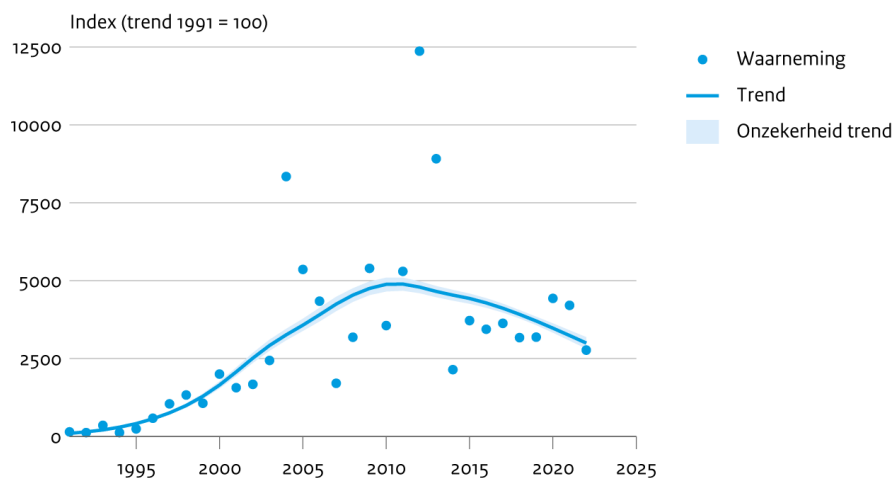
bruinvissen

Bron: Stranding.nl, Naturalis Biodiversity Center

CBS/mei24
www.clo.nl/nl125009

Figure 4. Stranded Harbour porpoises on the Dutch coast,1990-2022. Source: www.walvisstrandingen.nl Naturalis Biodiversity Center/

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Bruinvis dicht onder de kust

Figure 5. Harbour porpoise trend based on dedicated sea watching counts of the Dutch coast, 1991-2022. Source: Trektellen.nl & NZG.

Harbour porpoise distribution on the Dutch Continental Shelf

The virtual lack of surveys on the Dutch Continental Shelf since 2019 and the fact that the summer 2024 surveys are not analysed yet, do not permit to draw any firm conclusions on changes in distribution in Dutch waters. However, the SCANS-IV survey in summer 2022 and the summer survey in July 2024 do point at higher densities north of the Wadden Isles, albeit higher numbers were found closer to the Wadden Isles in 2022 than in 2024. In 2024 more porpoises than in 2022 were observed north of the Frisian Front and (very) low numbers were recorded between the Wadden Isles and the Frisian Front. SCANS-IV showed high densities already further south between the Frisian Front and the Wadden Isles. The observations during the summer 2024 survey off the mainland coast did not show any clear patterns to infer distribution maps without a proper analysis (taking environmental and observation conditions into account). Numbers closer to the coast, however, seemed to be lower than further offshore, suggesting a similar distribution as SCANS-IV.

In the Netherlands, there are three other main sources that systematically collect data on harbour porpoises: stranding network, MWTL and seawatching. MWTL aerial surveys and coastal seawatching are aimed at quantifying bird numbers, but collect data on porpoises as well.

Unfortunately, the MWTL aerial surveys of the Dutch Continental Shelf did only cover the coastal zone in summer 2016, but the summer 2022 survey, covering the whole DCS, showed the highest numbers of harbour porpoises north of the Wadden Isles until the Frisian Front (Van Bemmelen et al 2022, Fijn et al. 2017).

Conclusions

The aerial survey data highlight that Harbour porpoise distribution is dynamic, and spatial shifts in porpoise distribution (throughout the year and between years) continue to occur in the North Sea as well as on the Dutch Continental Shelf. Additional data from the MWTL surveys, strandings and seawatching are in accordance with the aerial surveys.

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The observed changes that occurred since the publication of distribution maps by Gilles et al. (2020) will have consequences for KEC 5.0 results:

- Modelled effects of the mainland coast extending to the west of Texel will be an overestimation, since the densities off the Noord-Holland coast seem to be lower in recent years (post-Gilles et al. 2020)
- Modelled effects north of the Wadden Isles will be an underestimation, since the densities in recent years (post-Gilles et al. 2020) are higher and extend over a larger area.

All in all, future KECs need to take into account that harbour porpoise distribution patterns change over time.

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Kwaliteitsborging

Wageningen Marine Research beschikt over een ISO 9001:2015 gecertificeerd kwaliteitsmanagementsysteem. De organisatie is gecertificeerd sinds 27 februari 2001. De certificering is uitgevoerd door DNV.

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Verantwoording

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