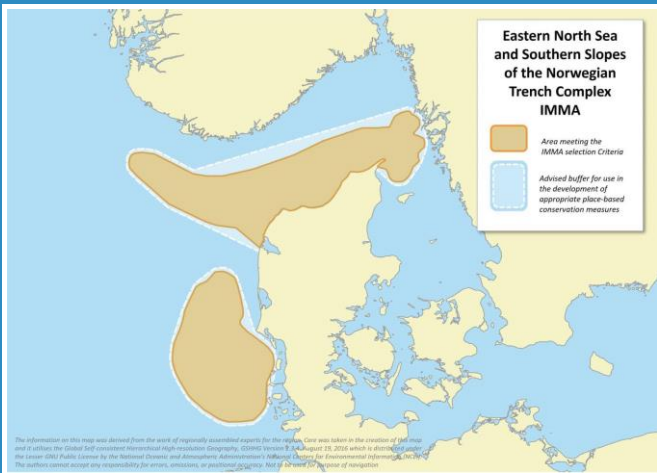


# Eastern North Sea and Southern Slopes of the Norwegian Trench Complex IMMA

## Description:

The IMMA includes important habitat due to a high habitat diversity, including sandbanks as well as reef structures, with food-rich fronts and upwelling areas providing high abundance of important prey species for the harbour porpoise (*Phocoena phocoena*). The southern part of this IMMA complex lies at the flanks of the Elbe glacial valley where the inflow of River Elbe water from the south and mixing with tidal currents from the Northeast Atlantic results in fluctuating salinities, turbulence, and thus fronts and upwelling areas. The biogenic reefs stretch as ribbon-like stone fields along the flanks of the Elbe glacial valley.

The northern habitat in this IMMA complex stretches over a varied bathymetry with relatively shallow water (<50 m) in the northern Kattegat and southern Skagerrak, and deeper waters (~700 m) in the Norwegian Trench in the northern Skagerrak. The Norwegian Trench is an area of inflow of nutrient-rich water from the Atlantic, which flows along the slopes of the trench towards the surface in an upwelling-zone along the middle of Skagerrak (Fonselius, 1996). The varied bathymetry with large areas of hard bottom substrates as well as soft sediments, in combination with the front and upwelling of nutrient-rich currents from the west, results in a rich and highly diverse marine ecosystem (Oug et al., 2015) with cold-water corals, sea pens and sponge habitats as well as a species-rich fish community, providing high abundance of important prey species for harbour porpoises as well as other cetaceans in the



## Area Size

42 648 km<sup>2</sup>

## Qualifying Species and Criteria

Harbour porpoise – *Phocoena phocoena*  
Criterion B (2); C (2)

## Summary

The Eastern North Sea and Southern slopes of the Norwegian Trench complex IMMA is characterised by sandbanks, reef structures, and varied bathymetry including the slopes of the deep Norwegian Trench. Due to food-rich fronts and upwelling, this is a productive area providing prey for harbour porpoises (*Phocoena phocoena*). Two decades of dedicated visual surveys and satellite tracking have provided clear evidence that the IMMA represents important habitats with high harbour porpoise densities throughout the year. The boundary was drawn to include the harbour porpoise high-density areas based on predictions from different species distribution models and kernel density from satellite tracking conducted over the last decades.

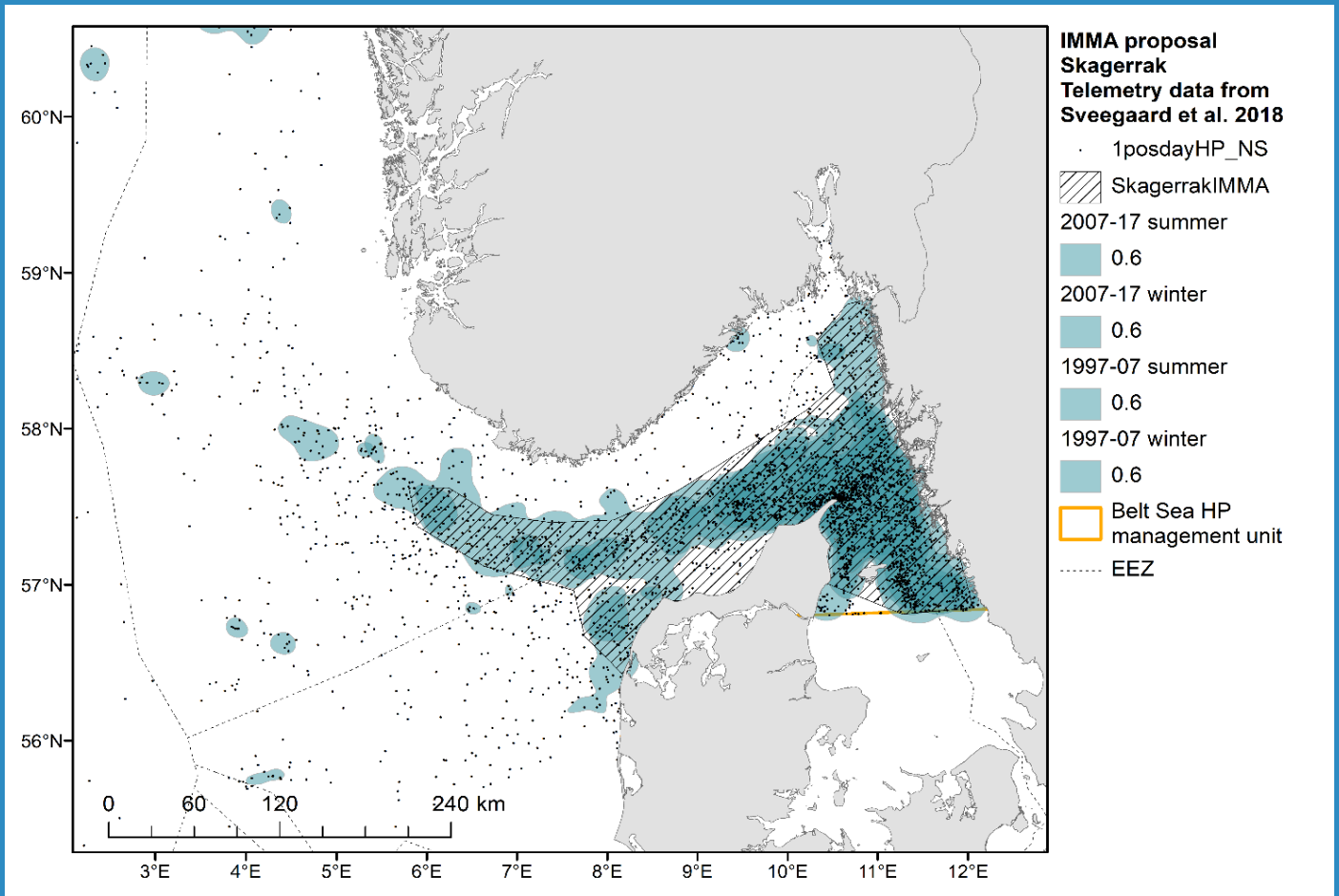


Figure 1: Kernel density estimated of positions from satellite harbour porpoises (*Phocoena phocoena*). Modified from Sveegaard et al. (2018).

area.

The IMMA includes the harbour porpoise sanctuary west of Sylt, the only cetacean sanctuary in the North Sea to date (Sonntag et al., 1999). Furthermore, several Natura 2000 sites (MPAs) for harbour porpoises are designated within the area namely, *Sylt Outer Reef*, *Southern North Sea* and *Skagens Gren og Skagerak*.

## Criterion B: Distribution and Abundance

### Sub-criterion B2: Aggregations

More than 20 years of dedicated visual surveys and habitat-based spatial modelling provided clear evidence that the IMMA includes important habitat for harbour porpoises (*Phocoena phocoena*) throughout the year (Gilles et al., 2009, 2011, 2016; Waggitt et al., 2020; Nachtsheim et al., 2021; Scheidat

et al., 2024; Hansen et al., 2021, 2022; Geelhoed et al., 2022; Lacey et al., 2022). Harbour porpoises occur in the areas at higher density than in surrounding waters and aggregations have been observed consistently during all study years. A relatively high mean harbour porpoise density of 1.4 ind. / km<sup>2</sup> (Gilles et al., 2016) is recorded in the southern IMMA polygon, in Sylt Outer Reef and Horns Rev. Further, high density areas for harbour porpoises were shown in the northern polygon, by means of satellite tracking, with aggregations extending from the northern Kattegat, southern Skagerrak along the southern slope of the Norwegian Trench (Sveegaard et al., 2011, 2018). Satellite tagging of six harbour porpoises in the northern part of the Wadden Sea inside this IMMA showed unexpectedly local and relatively small home ranges as well as very little overlap in distribution with porpoises tagged in Skagerrak. Albeit the small sample size, this may indicate a local

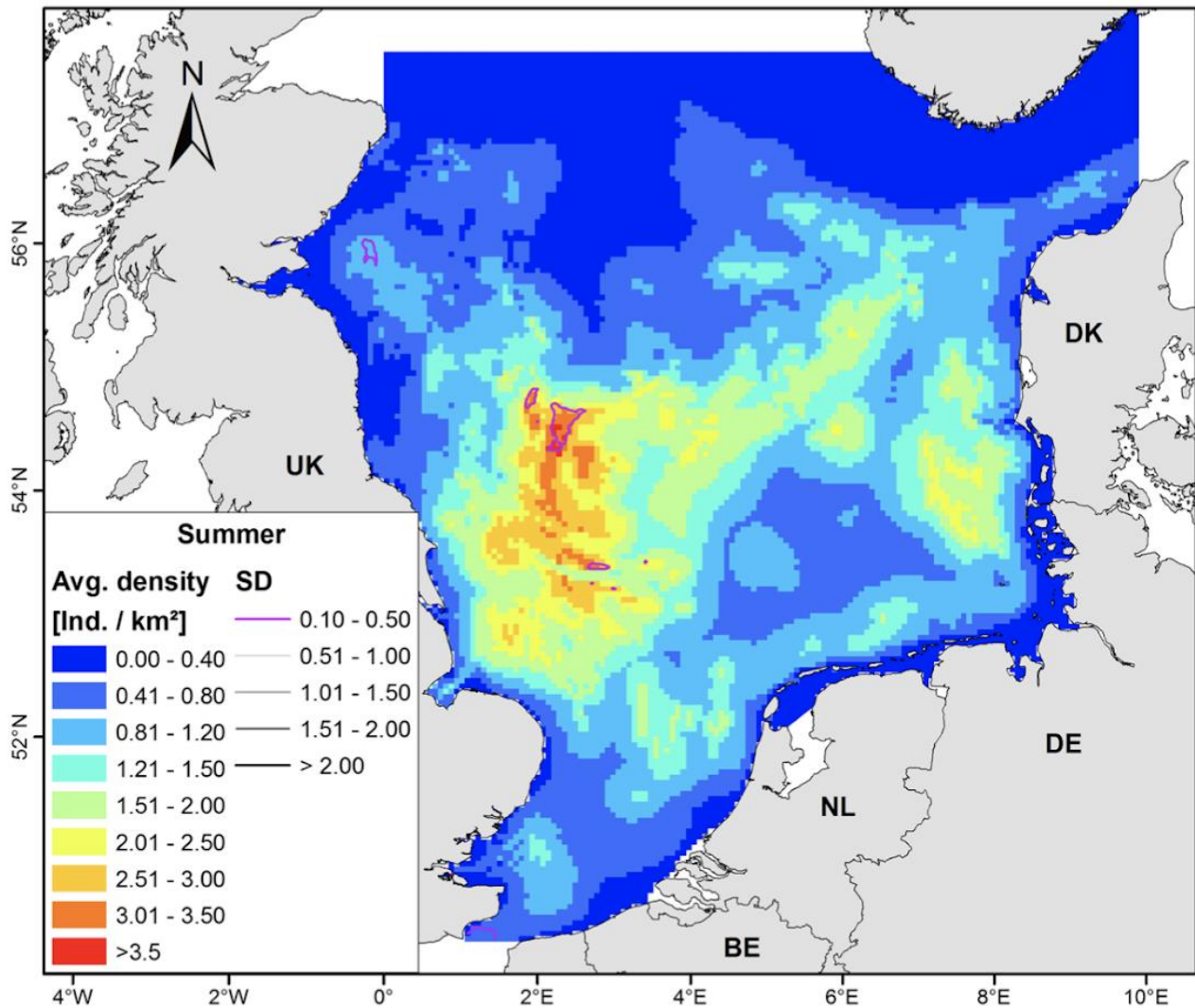


Figure 2: Predicted harbour porpoise (*Phocoena phocoena*) densities in the North Sea in summer (Jun.–Aug.). Excerpt from Gilles et al. (2016).

population of harbour porpoises residing in this part of the Wadden Sea (van Beest et al., 2018).

### Criterion C: Key Life Cycle Activities

#### Sub-criterion C2: Feeding Areas

The high porpoise densities and aggregations recorded in this IMMA are indicative of an abundance of prey fish species, nourished by food-rich fronts and upwelling areas. The IMMA hosts fish species characteristically found on sandbanks (such as many flatfish species), but also sandeels (*Ammodytes* spp.) and reef dwellers, for example cod (*Gadus morhua*),

and pelagic species such as sprat (*Sprattus sprattus*) and herring (*Clupea harengus*). All these species are described as prey species for harbour porpoises (Benke et al., 1998; Gilles, 2008; Leopold et al., 2015; Andreassen et al., 2017; Scheidat et al., 2024). Furthermore, porpoises have been connected with the high presence of herring in the Skagerrak (Sveegaard et al., 2012). Harbour porpoises have been shown to feed nearly continuously (Wisniewska et al., 2016; Rojana-Donate et al., 2018). Their aggregations shown by telemetry (Sveegaard et al., 2018) indicate a strong association to feeding grounds.



Figure 3: Harbour porpoise (*Phocoena phocoena*) observed surfacing during a ship survey. Photo credit: Isabel C. Avila / TiHo-ITAW

## Supporting Information

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