



National Indicator for German MSFD report: Near-Bottom Oxygen Concentration

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Why did we use a national oxygen indicator?

HELCOM oxygen debt indicator:

- only applicable for the deep basins,
- German waters not covered (exception: our share of Bornholm basin (target value: oxygen debt of 6.37 mg/l))

Bottom oxygen: primary criterion according to Com Dec

→ national indicator for MSFD reporting needed

- based on indicator concept discussed in IN-Eutrophication

National oxygen indicator

Pragmatic approach:

1. **Assign a stratification type to the individual stations** and assess them using **type-specific threshold values**:
 - a) **Non-stratified** (= well mixed) → at least 6 mg/l O₂ as lowest value between July and November = GES
 - b) **Seasonally stratified** (= stable thermohaline stratification in summer/ autumn): → at least 4 mg/l O₂ as lowest value between July and Nov. = GES

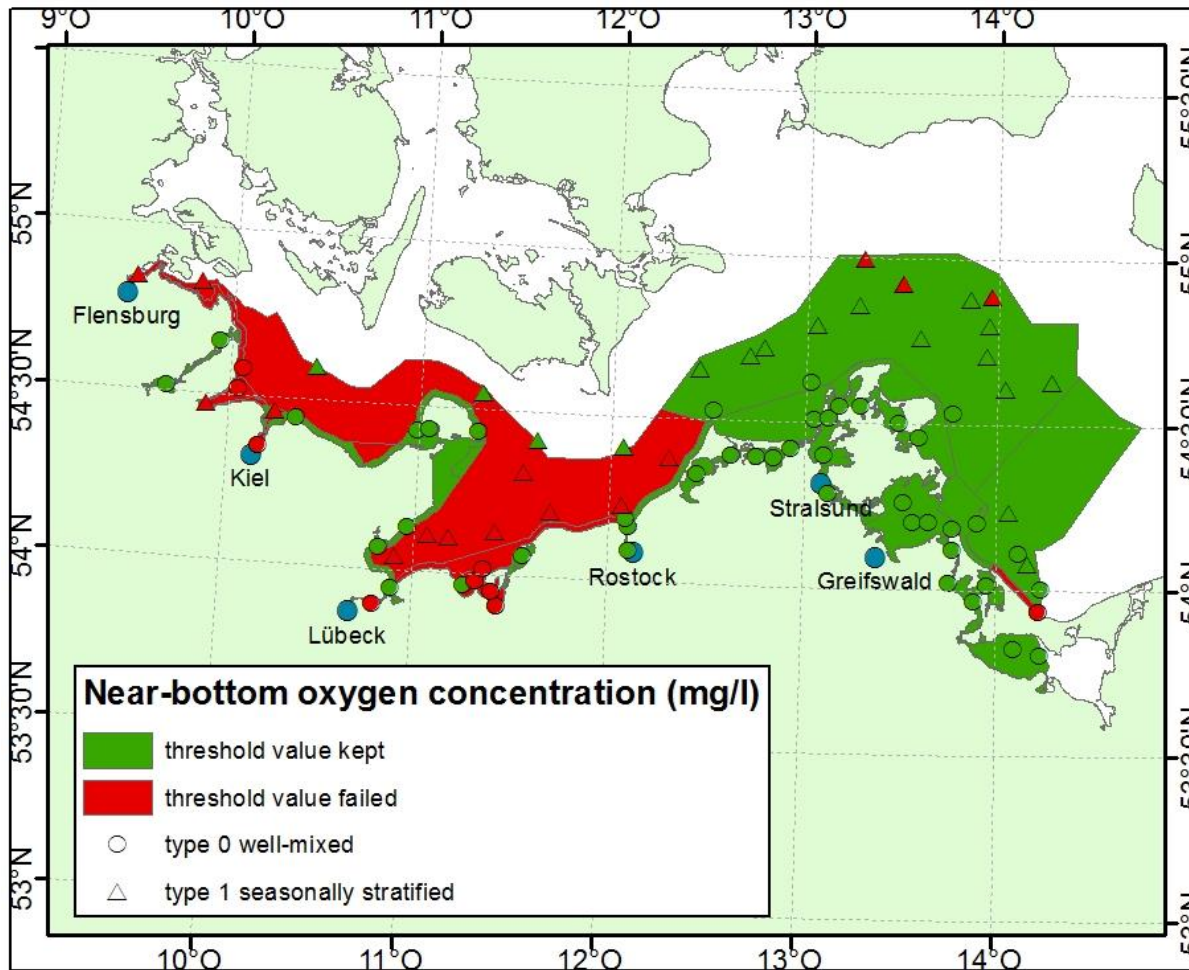
Only these two types of the Swedish WFD oxygen typology occur in our waters.

National oxygen indicator

2. Temporal and spatial aggregation:

- as there may be different types per assessment unit:
assess individual stations first (temporal aggregation: median of yearly minima) and perform **spatial aggregation afterwards**
- same number of „GES“ and „sub-GES“ stations: sub-GES
- but usually the dominating result of stations determines the result for the whole assessment unit

Results of oxygen indicator for 2011-2016 (draft)



70 % of coastal water bodies in good status
(= 3,425 km²)

No good status: Kiel Bay, Bay of Meckl.,
good status: Arkona and Bornholm Basin
(62.6 % = 7,075 km²)

Total German Baltic Sea area: 67.7 % in good status
(10,500 km²)

National oxygen indicator: temporal „trends“

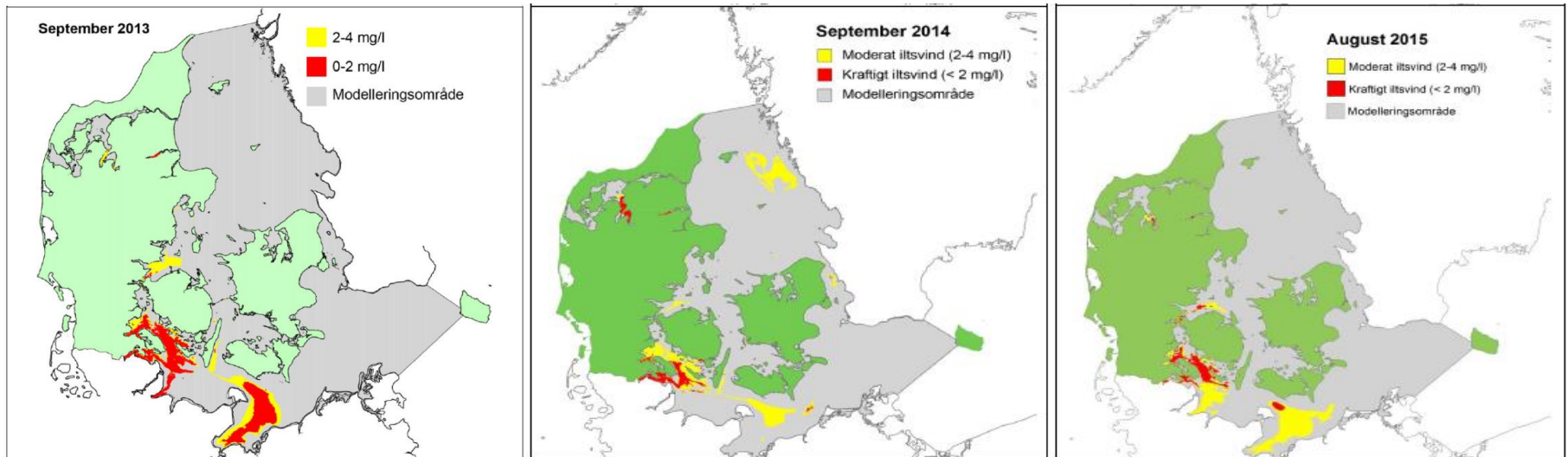
HELCOM-ID	Bewertungseinheit (Wasserkörper/Becken)	Schichtungstyp (0= ungeschichtet, 1 = saisonal geschichtet)	Zeitraum I Level 2001-2006	Zeitraum II Level 2007-2012	Zeitraum III Level 2011-2016	Tendenz zwischen Zeitraum I und II	Tendenz zwischen Zeitraum II und III
GER-001	mesohaline inner coastal waters, Wismarbucht, Suedteil	Typ 0	4,2	4,2	3,9	↔	↔
GER-002	mesohaline inner coastal waters, Wismarbucht, Nordteil	Typ 0	5,6	5,5	3,8	↔	↓
GER-003	mesohaline inner coastal waters, Wismarbucht, Salzhaff	Typ 0	6,9	8,4	8,0	↑	↔
GER-004	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Travemuende bis	Typ 0	2,7	4,0	5,2	↑	↔
GER-005	mesohaline inner coastal waters, Untenwarnow	Typ 0	7,2	6,4	6,0	↔	↔
GER-006	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Warnemunde bis Darss	Typ 0	8,1	5,6	7,4	↓	↑
GER-007	oligohaline inner coastal waters, Ribnitzer See / Saaler Bodden	Typ 0	8,0	8,7	8,8	↔	↔
GER-008	oligohaline inner coastal waters, Koppelstrom / Bodstedter Bodden	Typ 0	8,4	8,7	8,2	↔	↔
GER-009	mesohaline inner coastal waters, Barther Bodden, Grabow	Typ 0	8,6	8,2	8,4	↔	↔
GER-010	mesohaline open coastal waters, Prerowbucht/ Darsser Ort bis Dornbusch	Typ 0	n. b.	8,8	8,5	n. b.	↔
GER-011	mesohaline inner coastal waters, Westruegensche Bodden	Typ 0	8,4	8,6	8,9	↔	↔
GER-012	mesohaline inner coastal waters, Strelasund	Typ 0	8,5	8,8	8,7	↔	↔
GER-013	mesohaline inner coastal waters, Greifswalder Bodden	Typ 0	7,9	7,7	7,7	↔	↔
GER-014	mesohaline inner coastal waters, Kleiner Jasmunder Bodden	Typ 0	8,1	7,7	8,0	↔	↔

Change („trend“): at least 1 mg/l (non-stratified)/0.5 mg/l (stratified)

Need for further work (→ ComDec requirements)

- 1) regionally harmonized threshold values
- 2) areal extent and duration of oxygen deficiency
(areal extent: existing approaches e.g. Danish Iltsvind reports and IOW work;
timely extent: high-frequency measurements/autonomous devices + modelling)
- 3) natural and anthropogenic components of low bottom oxygen - reasons for not reaching GES

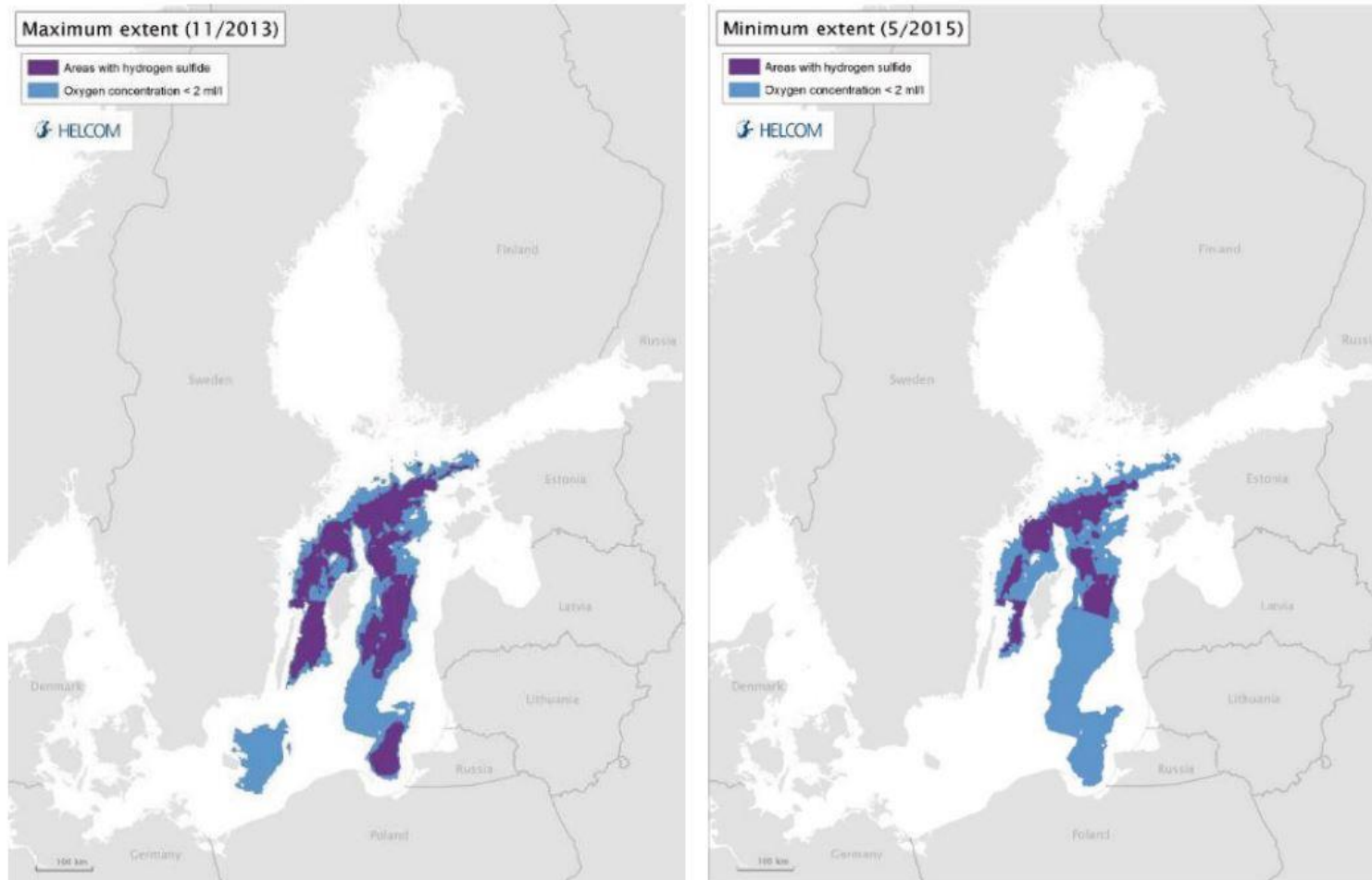
Areal extent: Danish Iltsvind reports



4 reports per year (July-Oct/Nov.), Danish + Swedish + German data

Source: Iltsvind i de indre farvande, Hansen et al., Aarhus University/DCE

Areal extent: IOW information for HOLAS II



Minimum and maximum extent of anoxic and hypoxic areas 2011-2015 (IOW)

Way forward - MSFD Call 2018?

- Joint effort to get forward with areal extent issue?
- Timely extent: combination of point and high- frequency measurements (autonomous devices) and modelling
- With clear understanding of areal extent available: use hind-cast modelling(e.g. 1880 szenario as done for German waters)
→ difference between today and former times → differentiation between natural and anthropogenic component of bottom oxygen concentration
- Work package under HELCOM proposal for MSFD 2018 call?
→ understand regional conditions and reasons for failing GES

**Thank you for your
attention!**

