



Document title	Splitting the Bornholm basin for eutrophication assessment
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Reference	

Background

During the process of checking the data and the eutrophication assessment for HOLAS II, it became obvious that Bornholm Basin was more eutrophied than the surrounding basins (IN-EUTROPHICATION 7-2017). The reason for this was further investigated after the meeting and found to be due to the influence of water from the river Odra. High values of especially DIN, DIP, Chla and low values for secchi depth have been observed in open sea areas near the estuary of the river Odra. As a result, the matter was considered by IN Eutrophication at several meetings, resulting in a proposal for establishing a new assessment unit titled “Pomerian Bay” which was presented at IN-EUTROPHICATION-18-2020.

IN-EUTROPHICATION 19-2021 supported the proposal of splitting the Bornholm Basin and consequently agreed to submit the proposal to STATE & CONSERVATION 14-2021 as a category 4 assessment unit for the eutrophication assessment (document 4J-82 rev.1 to the meeting). The meeting further acknowledged that the threshold values will need to be evaluated after consideration of the proposal by State&Conservation.

STATE & CONSERVATION 14-2021 agreed to the proposal to include a new assessment unit titled “Pomerian Bay” (document 4J-82 rev.1 to the meeting and Annex 1 to this document), to be used in the HEAT eutrophication assessment as a category 4 assessment unit, with the caveat that if no threshold values can be established for the new areas prior to HOLAS III it will revert to using the current threshold values of the Bornholm Basin for the purposes of the assessment

STATE & CONSERVATION 14-2021 further requested IN Eutrophication to evaluate the existing threshold values for HEAT related indicators in Bornholm Basin regarding their validity after splitting Bornholm Basin into two separate units and to come up with new proposals if the need arises.

Action requested

The Meeting is invited to take note of the outcomes of STATE&CONSERVATION 14-2021 regarding splitting the assessment unit and to consider a way forward to evaluate the threshold values for the new assessment unit.

Annex 1 Proposal for splitting Bornholm Basin into two assessment units for the eutrophication assessment: separation of the Pomeranian Bay

During the process of checking the data and the eutrophication assessment for HOLAS II, IN Eutrophication 7-2017 notified that the Bornholm Basin is more eutrophied than the surrounding basins.

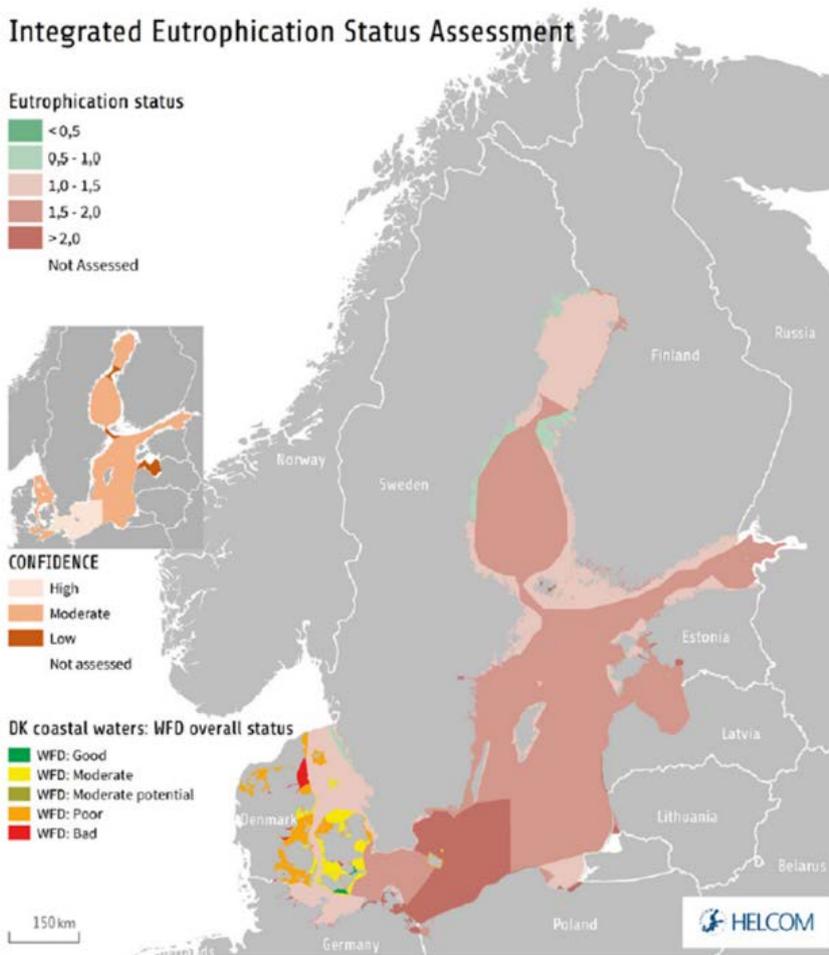


Fig. 1: Integrated Eutrophication Status Assessment – Source: HELCOM Status of the Baltic Sea Report 2018

The reason for this was further investigated after the meeting and found to be due to the influence of water from the river Odra. High values of especially DIN, DIP, Chla- and low values for secchi depth have been observed in open sea areas near the estuary of the river Odra (Fig. 2).

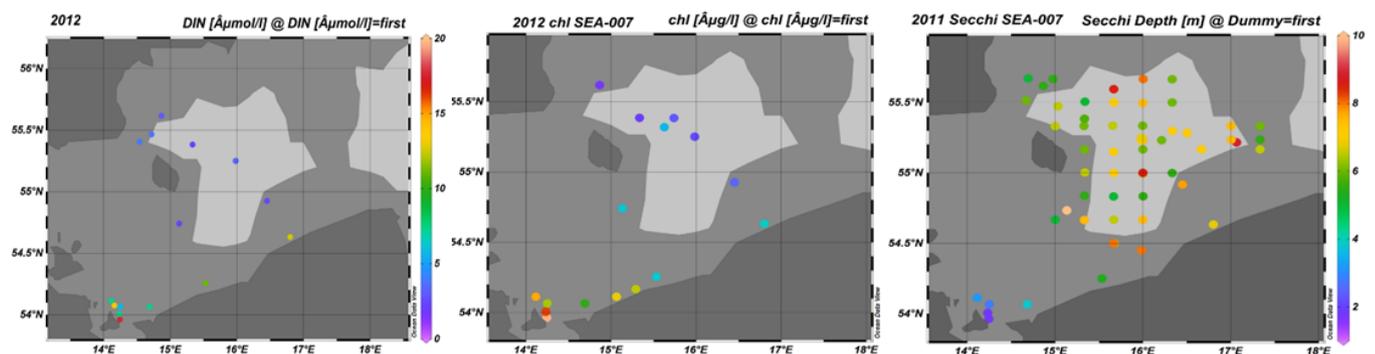


Fig. 2: DIN, Chla and Secchi depth for selected years in Bornholm Basin (source: Karin Wesslander, SMHI)

In the process of HOLAS II it was discussed how to handle this situation. The following solutions were proposed: 1) using the median value instead of the mean to reduce the influence of outliers, 2) removing stations with high river influence, 3) not doing any changes to data or method but highlight this issue a) in the text and b) in accompanying maps showing the concentrations. Solution 3.a) was finally chosen for HOLAS II. Reference to the influence of the Odra plume on the eutrophication assessment result is made in the HOLAS II report as well as in the Thematic Assessment of Eutrophication (2018).

For HOLAS III it is desirable to find a better solution and to split off the area under influence of the Odra plume from Bornholm Basin to allow for a more realistic assessment of the main part of Bornholm Basin.

Approach

As a starting point it was decided to try to define the new assessment unit based on the Odra plume as such, making use of e.g. the chlorophyll or the nutrient plume, hydrographic parameters like salinity, water depth etc. This turned out to be complicated because the Odra plume is highly variable in space and time, depending on natural conditions (river water flow rate, floods, wind regime and currents in the Pomeranian Bay etc.). It is possible to delineate the average area influenced by the Odra plume using a modelling approach or Chl a satellite data, but this approach has the disadvantage of requiring substantial financial and personal resources as well as time. However, a solution is needed soon if to be applied in HOLAS III.

Therefore, a more pragmatic approach was used based on geographical or maritime maps. One option is to use the Odra bank as northern boundary (20 m isobath), another to look for definitions of the Pomeranian Bay in geographical or maritime maps. But while the name 'Pomeranian Bay' turns up in many maps, no clear delineation or definition is given.

It was decided to define the new assessment unit in a simple, pragmatic, and practical way by using the Bornholm Basin boundary in the western part, the EEZ boundary in the northern part and the WFD water body boundaries in the coastal area as depicted in Fig. 3. The Eastern boundary of the proposed area was aligned with the boundary of Polskie wody przybrzeżne Zatoki Pomorskiej waterbody from the revised typology of coastal and transitional waterbodies in Poland (Figures 3b and 3c). New Polish typology will be in force in 2022.

The aim is to allow for a proper eutrophication status assessment of Bornholm Basin which is non-biased by stations influenced by the Odra plume. The proposal is made in the understanding that there are no implications for MAI and NIC, respectively, as these will stay as they are for Bornholm Basin with the new unit "Pomeranian Bay" being in integral part of Bornholm Basin for PLC and MAI and NIC assessments. The intention is to use the new unit "Pomeranian Bay" for the eutrophication assessment only.

As discussed at IN Eutrophication 19-2021, there is potential need of defining new threshold values for the new assessment units. The Meeting took note that in case of the establishment of the two new assessment units, new threshold values would be needed primarily for the Pomeranian Bay, but also for Bornholm Basin since the TARGREV-values so far applied for Bornholm Basin were derived for the whole basin and are therefore not valid for parts of it. The Meeting agreed that in case threshold values cannot be re-evaluated in time to be approved for HOLAS III, the present threshold values will be used for both basins. IN Eutrophication 19-2021 supported the proposal of splitting the Bornholm Basin, acknowledging that the threshold values will need to be evaluated, and supported submitting the proposal by IN-Eutrophication to STATE & CONSERVATION 14-2021 as a category 4 assessment unit for the eutrophication assessment.

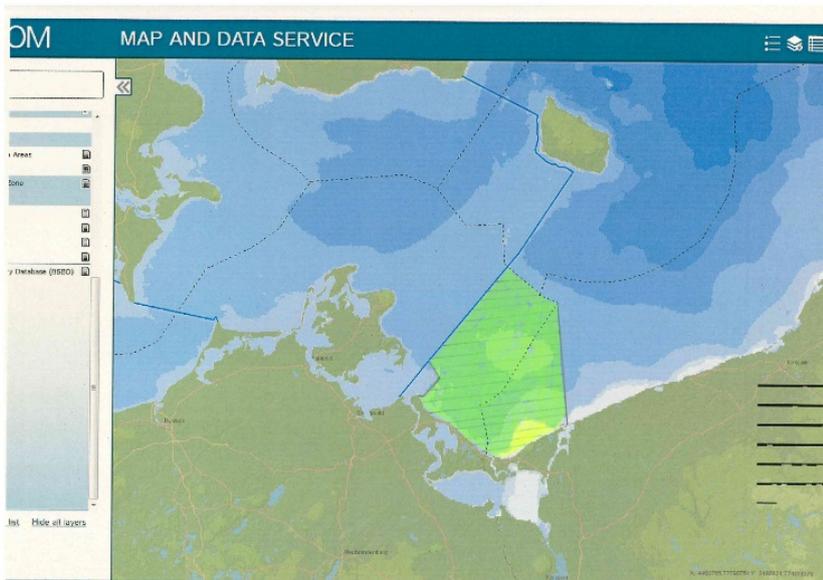


Fig. 3a: Original figure of the proposed new eutrophication unit "Pomeranian Bay" (highlighted in green).

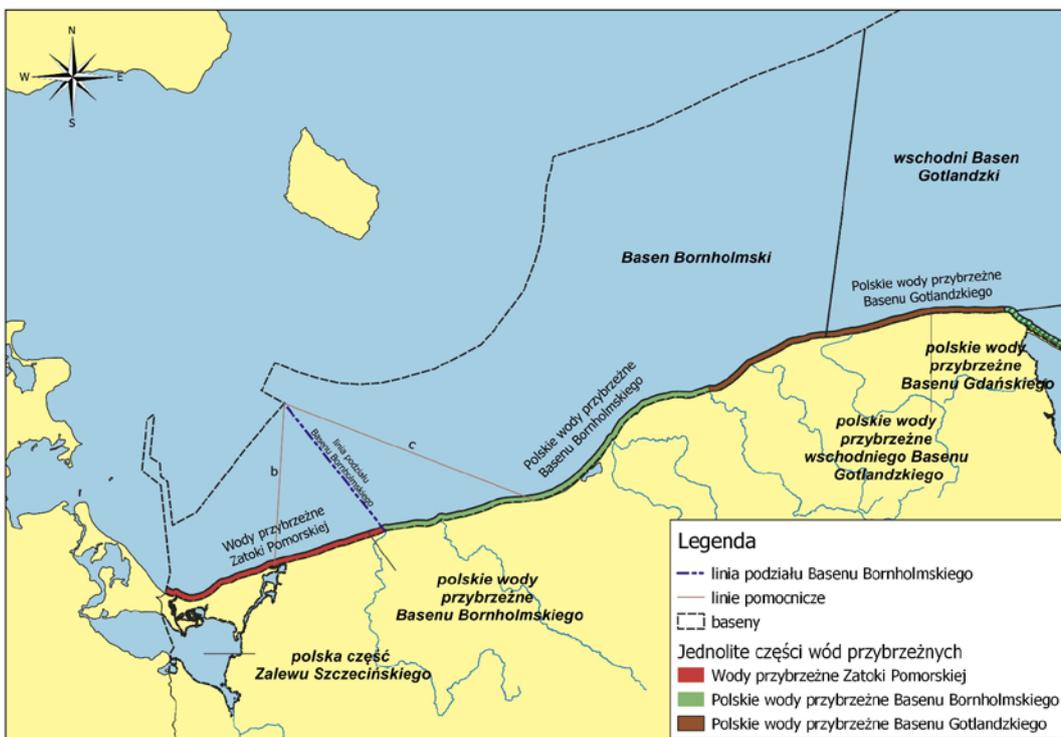


Figure 3b. The new figure should include the boundary of Polskie wody przybrzeżne Zatoki Pomorskiej waterbody from revised polish typology which will be in force in 2022.

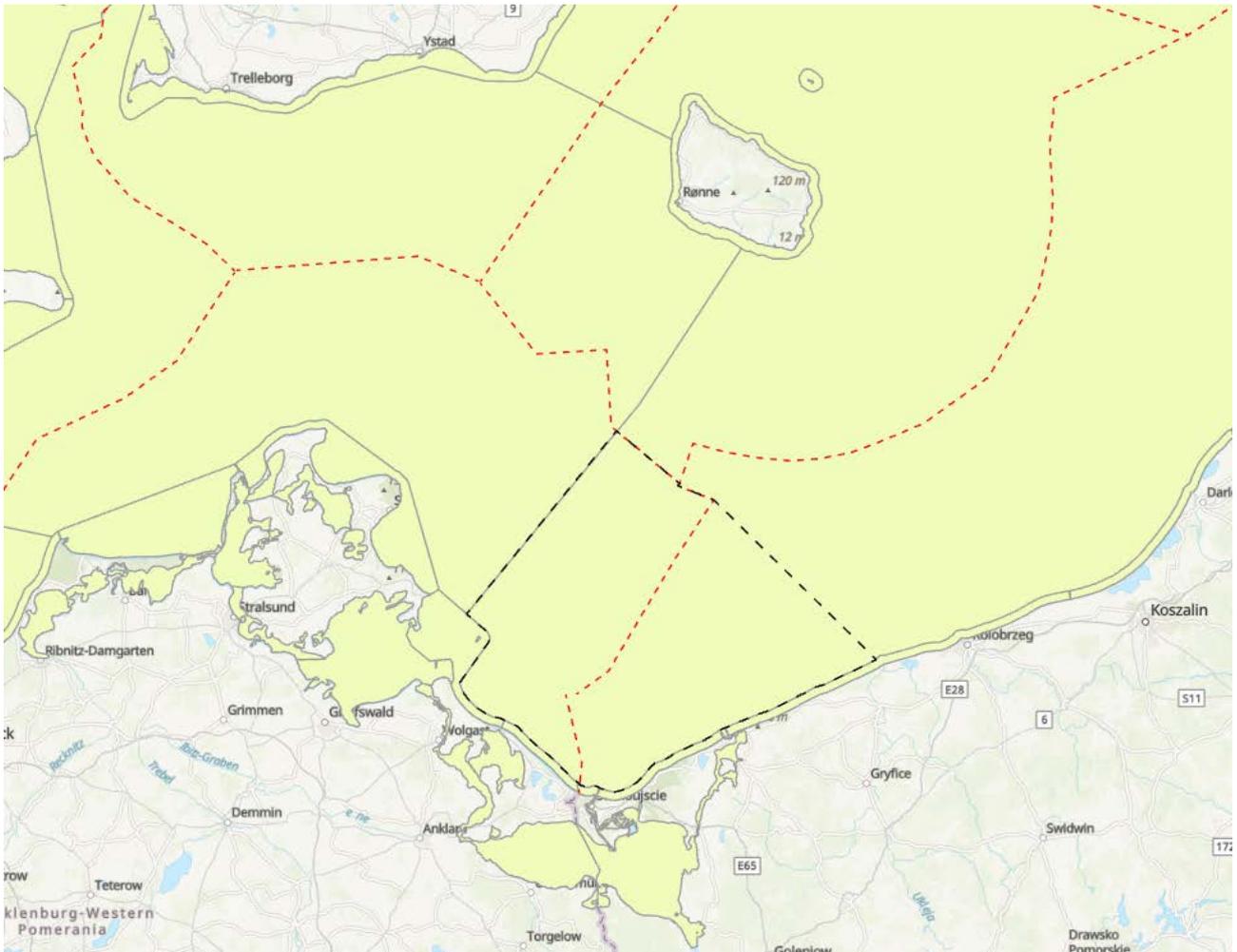


Figure 3c. Combined DE and PL areas as of new open sea assessment unit drafted by Secretariat. Black dashed line is the draft new open sea assessment unit. Red dashed line is EEZ line and yellow polygons with grey outline are [HELCOM Subbasins with coastal WFD water types or water bodies 2018](#).

Please note that in the German part of Bornholm Basin, there is a small non-highlighted area near the coast (Fig. 3a). This is because the current boundary of Bornholm Basin is cutting two WFD waterbodies into smaller units (Fig. 4). To avoid this, Germany will make a proposal via State & Conservation at a later stage to align the HELCOM and waterbody boundaries. If approved, the small non-highlighted part in Fig. 3a would be assigned to Arkona Basin, and this change would be a general one and not only be relevant for the eutrophication assessment. This change is already considered in the figure above, but please note that this is preliminary and included here for information.

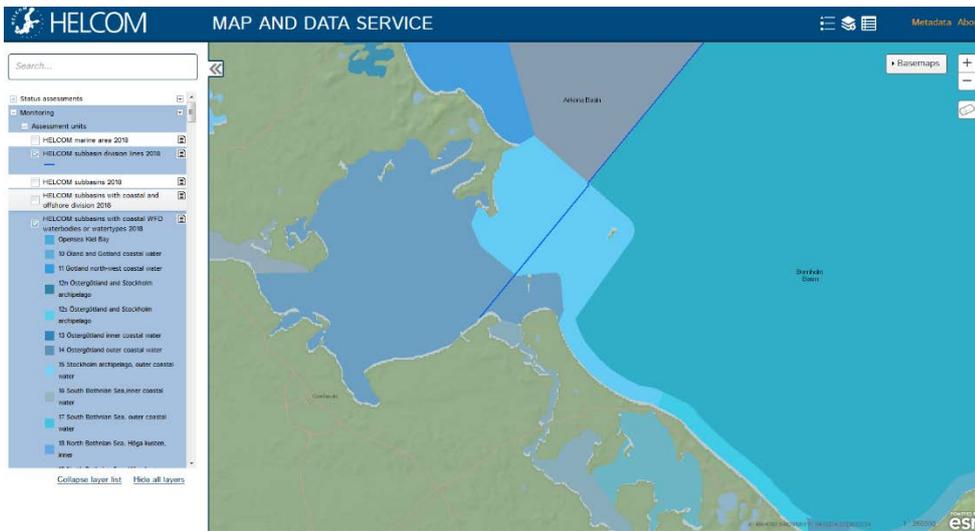


Fig. 4: Bornholm Basin boundary is cutting two WFD waterbodies into pieces. A proposal to avoid this is already included in Fig. 3 but will be presented to State & Conservation at a later stage and only become valid if approved.