



Document title	CHASE on assessment unit scale 3
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Background

The HELCOM core indicators on hazardous substances have been agreed to be assessed on HELCOM assessment unit scale 4. At the HOLAS II 6E-2017 meeting it was proposed to carry out the CHASE integrated assessment at assessment unit level 3, since HELCOM monitoring data is not of adequate spatial resolution to support an assessment at level 4 (outcome para 4.6).

This document describes the integrated result when presented on assessment unit scale 3. It should be well noted that the results have been prepared by aggregating results from scale 4 and not by redoing the indicator calculations. It should also be noted that there are some inconsistencies between the assessment units on scale 3 and 4.

This document includes an integrated assessment on scale 3 using the core indicator results for 'Radioactive substances: Cs-137 in fish and surface water'. The indicator result is calculated on assessment unit scale 2, and included in the integration by assigning the same score to the open sea and coastal assessment unit as achieved for the scale 2 sub-basin.

HOLAS II 5-2016 requested that the BalticBOOST project explore the effects of including and excluding radionuclides from the CHASE integration (outcome para 4.9). The BalticBOOST HZ WS 2-2016 considered the effect of including and excluding the radionuclides in the test applications of the CHASE tool and noted that radionuclides were included and excluded in the three offshore test areas, and for most cases this did not have any significant effect on the result, only in one instance did the assessment of the water compartment change significantly when radionuclides were excluded (outcome point 26). HOLAS II 6-2016 recalled that the effects of including and excluding radionuclides from the CHASE integration was tested in BalticBOOST (outcome para 4.5). The meeting proposed that the focus on the assessment of hazardous substances in HOLAS II should be on the HELCOM core indicators (outcome para 4.8). No specific guidance on including or excluding radionuclides was given by HOLAS II 6-2016 nor State&Conservation 5-2016.

NB: Attachment 1 to the document as an excel file

Actions requested

Meeting is invited to:

- consider the results when integrating the hazardous substances core indicators on assessment unit scale 3 compared the results when integrated on assessment unit scale 4 (see Document 3),
- consider the results when integrating hazardous substances core indicators and the radioactivity indicator on assessment unit scale 3,
- recommend whether the results are to be used in finalizing the hazardous substances assessment for the 'State of the Baltic Sea' report.

CHASE on assessment unit scale 3

As a discussion base, the same core indicator results as used in Document 3 have in this document been aggregated to assessment unit scale 3.

The core indicators included in the integration are 'HBCDD', 'Metals', 'PBDE', 'PFOS', 'PCBs, dioxin and furan', 'PAH and metabolites' and 'TBT and imposex'. Refer to Document 3 for the indicator specific result tables and the result as it appears when presented as an integration on assessment unit scale 4 which is the same scale used to calculate the indicator results.

For the result tables, please refer to the **Attachment 1** excel file sheet '**CHASE au3 HZ**', and for details on substance specific results per assessment unit to sheet '**HZ-substances**'.

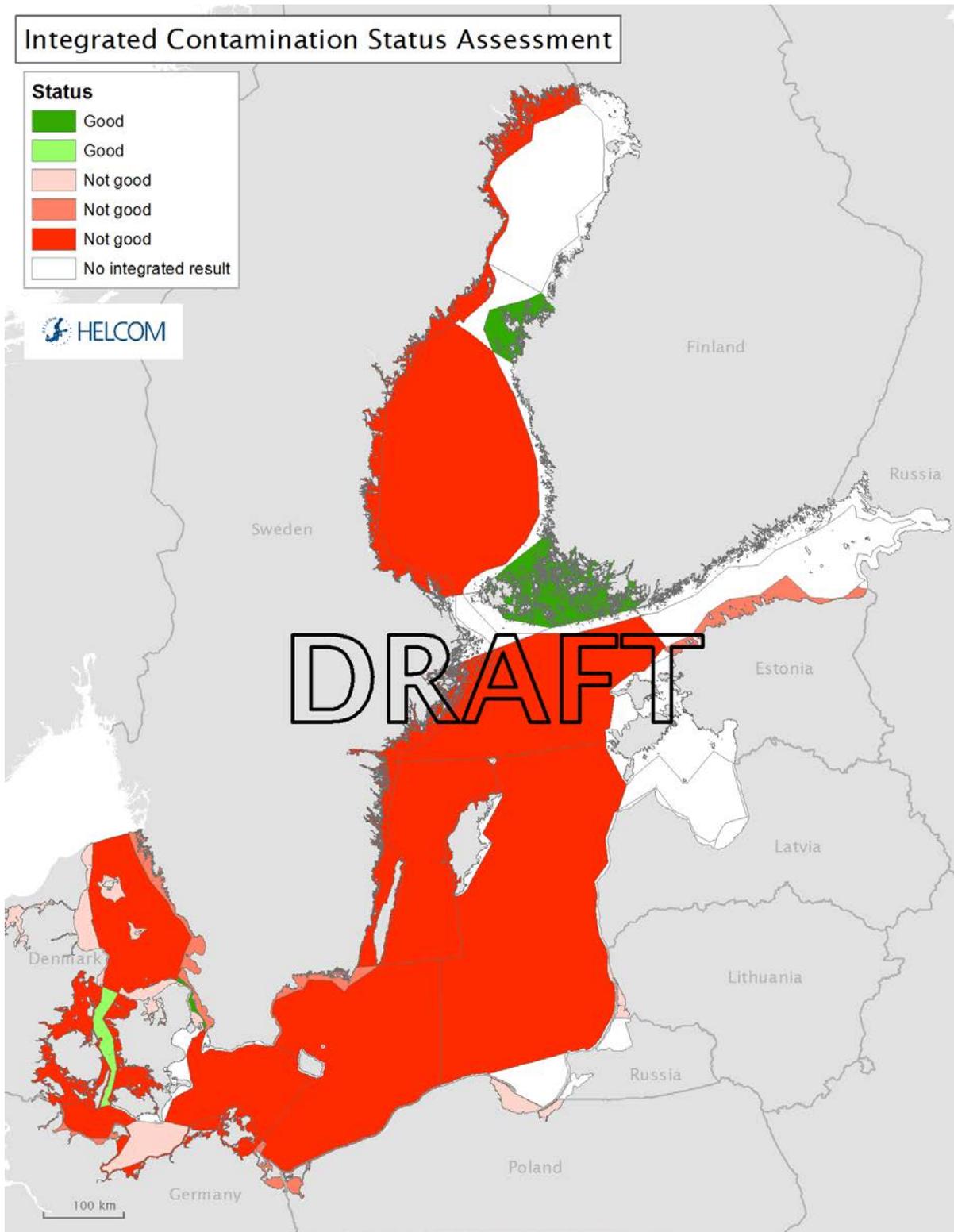


Figure 1. DRAFT integrated assessment of contamination status on HELCOM assessment unit scale 3. This result is provided as a discussion base. The result has been made by aggregating the core indicator assessment results made on HELCOM assessment unit scale 4. The figure is a draft and subjected to change before publishing, e.g. the coastal and territorial waters of Denmark (0-12 nautical miles) will be made blank before any results are published, and no assessments will be presented for the Kattegat and Sound areas.

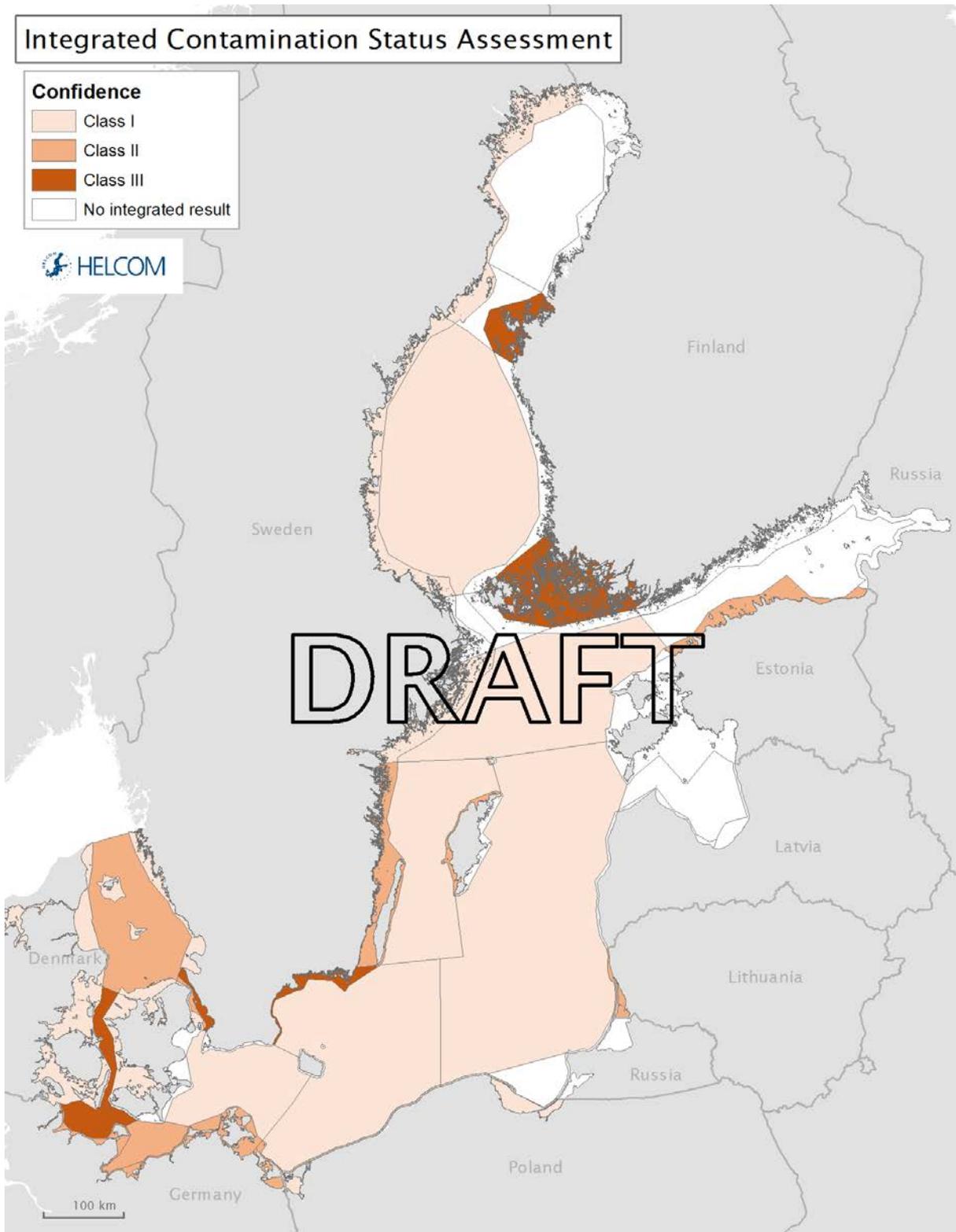


Figure 2. DRAFT confidence assessment for the contamination status on HELCOM assessment unit scale 3. This result is provided as a discussion base. The result has been made by aggregating the core indicator assessment results made on HELCOM assessment unit scale 4. The figure is a draft and subjected to change before publishing, e.g. the coastal and territorial waters of Denmark (0-12 nautical miles) will be made blank before any results are published, and no assessments will be presented for the Kattegat and Sound areas.

CHASE integration on assessment unit scale 3 including the core indicator 'Radioactive substances: Cs-137 in fish and surface water'

The CHASE integration result when including the core indicator 'Radioactive substances: Cs-137 in fish and surface water' has been prepared on assessment unit scale 3 as a discussion base to explore the results when the radionuclides are included. The core indicator results are calculated on assessment unit scale 2 (Table 2) and have been included in the CHASE integration on assessment unit scale 3 by assigning the same value to the open sea and coastal assessment units on scale 3 that are included in the sub-basin on scale 2.

For the result tables, please refer to the **Attachment 1** excel file sheet '**CHASE au3 HZ&radio**', and for details on substance specific results per assessment unit to sheet '**HZ&radio-substances**'.

The overall status results do not change significantly when the radionuclides are included. The most significant change in the overall assessment outcome is that 27 assessment units are assessed only for radioactivity and are included in the results, for these assessment units the confidence category 'Class III' indicate low confidence Table 1.

Table 1. List of assessment units on scale 3 for which the only available indicator result is the 'Radioactive substances: Cs-137 in fish and surface water'

Assessment unit - scale 3
Arkona Basin Danish Coastal waters
Bornholm Basin Danish Coastal waters
Bornholm Basin Swedish Coastal waters
Bothnian Bay - open sea
Bothnian Bay Finnish Coastal waters
Bothnian Sea Finnish Coastal waters
Eastern Gotland Basin Estonian Coastal waters
Eastern Gotland Basin Latvian Coastal waters
Eastern Gotland Basin Polish Coastal waters
Eastern Gotland Basin Russian Coastal waters
Eastern Gotland Basin Swedish Coastal waters
Gdansk Basin - open sea
Gdansk Basin Russian Coastal waters
Gulf of Finland - open sea
Gulf of Finland Finnish Coastal waters
Gulf of Finland Russian Coastal waters
Gulf of Riga - open sea
Gulf of Riga Estonian Coastal waters
Gulf of Riga Latvian Coastal waters
Kiel Bight Danish Coastal waters
Mecklenburg Bight Danish Coastal waters
Northern Baltic Proper Estonian Coastal waters
Northern Baltic Proper Finnish Coastal waters
The Quark - open sea
Åland Sea - open sea
Åland Sea Finnish Coastal waters
Åland Sea Swedish Coastal waters

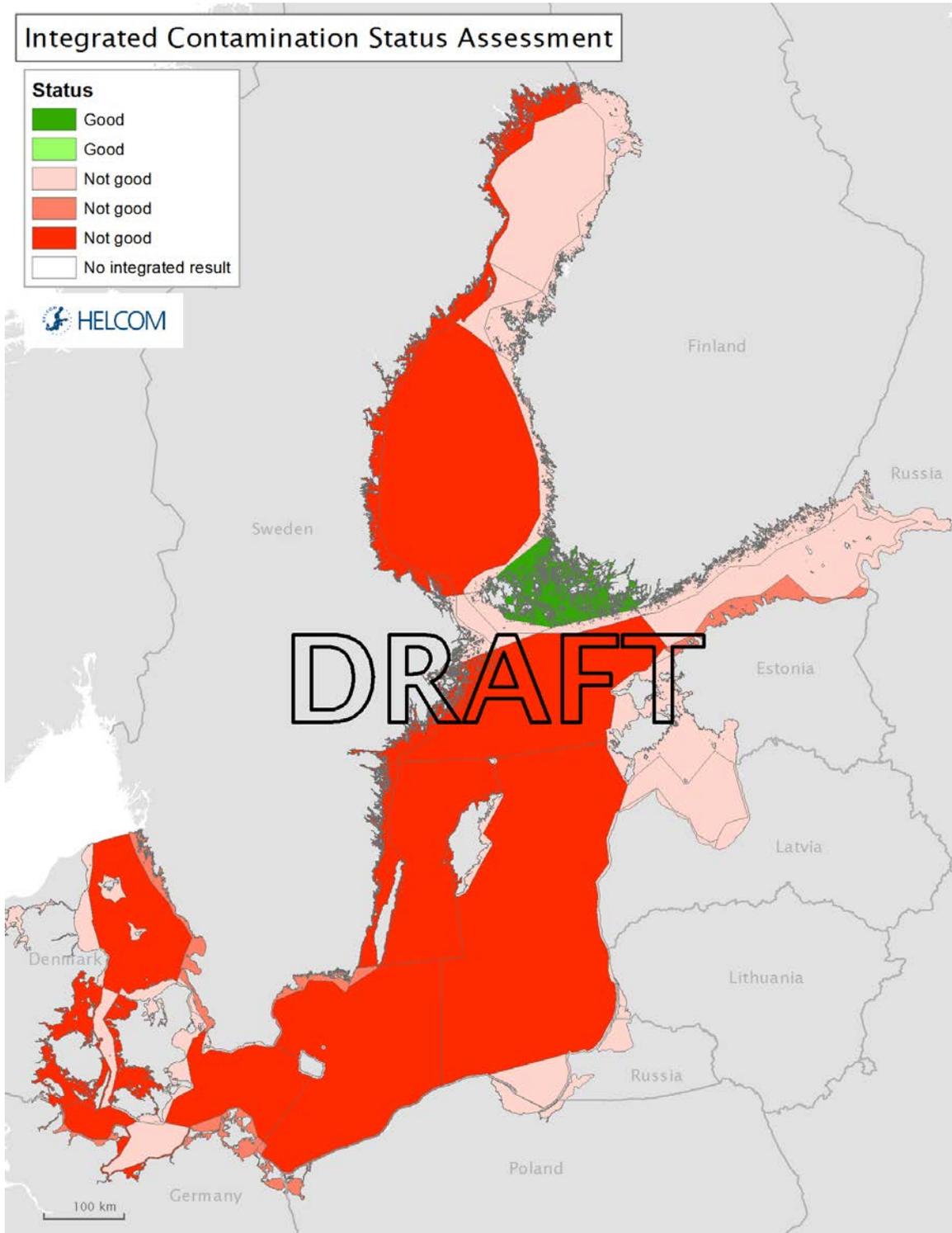


Figure 3. DRAFT integrated assessment of contamination status on HELCOM assessment unit scale 3, including the indicator result for the core indicator 'Radioactive substances Cesium-137 in fish and surface waters' which is calculated on scale 2 and included in the integration by assigning the same values both the open sea and the coastal assessment units in sub-basin. This result is provided as a discussion base. The figure is a draft and subjected to change before publishing, e.g. the coastal and territorial waters of Denmark (0-12 nautical miles) will be made blank before any results are published, and no assessments will be presented for the Kattegat and Sound areas.

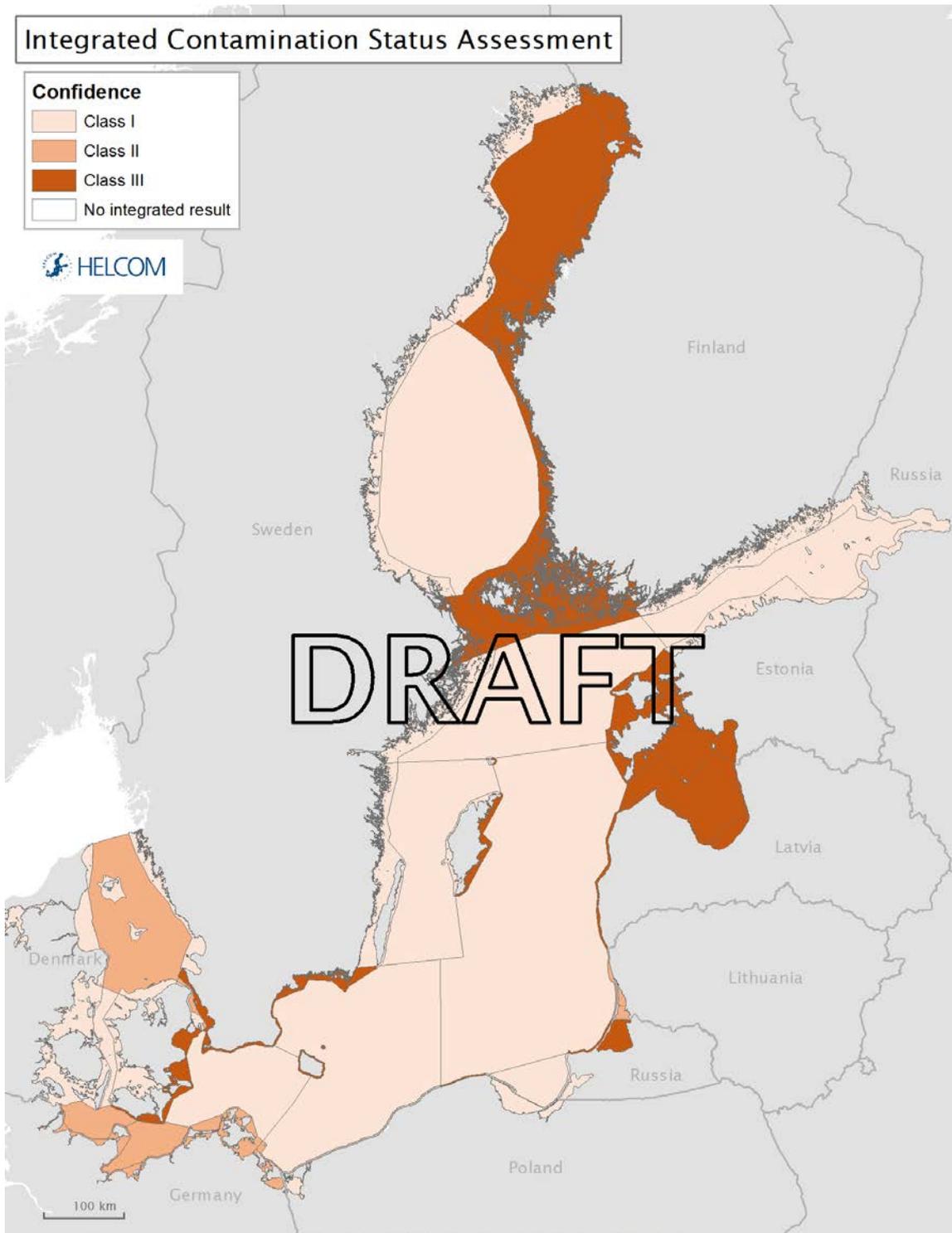


Figure 4. DRAFT confidence assessment for the contamination status on HELCOM assessment unit scale 3, including the indicator result for the core indicator 'Radioactive substances Cesium-137 in fish and surface waters' which is calculated on scale 2 and included in the integration by assigning the same values both the open sea and the coastal assessment units in sub-basin. This result is provided as a discussion base. The figure is a draft and subjected to change before publishing, e.g. the coastal and territorial waters of Denmark (0-12 nautical miles) will be made blank before any results are published, and no assessments will be presented for the Kattegat and Sound areas.

Table 2. Core indicator result for 'Radioactive substances: Cs-137 in fish and seawater' calculated on assessment unit level 2.

Assessment unit (Scale 2)	Substance	Matrix	Unit	Threshold Indicator			Status water	Matrix	Unit	Threshold Indicator (herring)			Status herring	Matrix	Unit	Threshold Indicator (flatfish)			Status flatfish
				value	value	CR				value	value	CR				value	value	CR	
Aland Sea								biota	Bq/kg ww	2,5	4,4	1,8	subGES						
Arkona Basin	Cs-137	water	Bq/m3	15	26,4	1,8	subGES	biota	Bq/kg ww	2,5	1,4	0,6	GES	biota	Bq/kg ww	2,9	2,7	0,9	GES
Bay of Mecklenburg	Cs-137	water	Bq/m3	15	26,7	1,8	subGES	biota	Bq/kg ww	2,5	0,7	0,3	GES						
Bornholm Basin	Cs-137	water	Bq/m3	15	25,8	1,7	subGES	biota	Bq/kg ww	2,5	4,1	1,6	subGES	biota	Bq/kg ww	2,9	3,6	1,2	subGES
Bothnian Bay	Cs-137	water	Bq/m3	15	21,1	1,4	subGES	biota	Bq/kg ww	2,5	5,3	2,1	subGES						
Bothnian Sea	Cs-137	water	Bq/m3	15	31,0	2,1	subGES	biota	Bq/kg ww	2,5	5,8	2,3	subGES						
Eastern Gotland Basin	Cs-137	water	Bq/m3	15	28,7	1,9	subGES	biota	Bq/kg ww	2,5	3,6	1,4	subGES	biota	Bq/kg ww	2,9	3,8	1,3	subGES
Gdansk Basin	Cs-137	water	Bq/m3	15	24,4	1,6	subGES	biota	Bq/kg ww	2,5	3,5	1,4	subGES	biota	Bq/kg ww	2,9	3,5	1,2	subGES
Great Belt	Cs-137	water	Bq/m3	15	21,1	1,4	subGES												
Gulf of Finland	Cs-137	water	Bq/m3	15	19,6	1,3	subGES	biota	Bq/kg ww	2,5	3,5	1,4	subGES						
Gulf of Riga	Cs-137	water	Bq/m3	15	20,0	1,3	subGES												
Kattegat	Cs-137	water	Bq/m3	15	18,4	1,2	subGES	biota	Bq/kg ww	2,5	0,7	0,3	GES	biota	Bq/kg ww	2,9	0,4	0,1	GES
Kiel Bay	Cs-137	water	Bq/m3	15	22,4	1,5	subGES	biota	Bq/kg ww	2,5	0,8	0,3	GES	biota	Bq/kg ww	2,9	0,8	0,3	GES
Northern Baltic Proper	Cs-137	water	Bq/m3	15	26,9	1,8	subGES												
The Quark	Cs-137	water	Bq/m3	15				biota	Bq/kg ww	2,5	5,3	2,1	subGES						
The Sound	Cs-137	water	Bq/m3	15	24,3	1,6	subGES												
Western Gotland Basin	Cs-137	water	Bq/m3	15	27,2	1,8	subGES	biota	Bq/kg ww	2,5	3,9	1,5	subGES						

Aggregating scale 4 units to larger scale 3 units as relevant for the hazardous substances indicator results

The core indicator results have been calculated on HELCOM assessment unit scale 4 (Document 3). In this document the results have been associated to the relevant assessment unit on scale 3, after which an integration is done using the CHASE tool.

The the association of assessment units on scale 4 to scale 3 was done using visual inspection and manual editing in ArcGIS and Excel. For scale 4 assessment units for which the borders are inconsistent with the borders of the scale 3 unit, the association is done manually so that the scale 4 unit is associated to the scale 3 unit in which most of the scale 4 unit-area is located. The units for which a hazardous substances indicator evaluation is available and there is a spatial inconsistency between scale 4 and 3 are listed in Table 3. An example of an inconsistency is illustrated in Figure 5.

For the full association table, please refer to **Attachment 1** sheet ‘Coastal AU4->AU3’.

Table 3. List of scale 4 assessment units for which a hazardous substances core indicator result is available (Document 3) and there is an inconsistency to the scale 3 unit to which the scale 4 unit is associated, marked in grey.

Scale 3 – HELCOM assessment unit	Scale 4 – HELCOM assessment unit	Inconsistency
The Sound Danish Coastal waters	DEN-003	X
Arkona Basin German Coastal waters	GER-009	
	GER-013	X
Bornholm Basin German Coastal waters	GER-020	X
Kiel Bight German Coastal waters	GER-023	X
	GER-026	
	GER-028	
	GER-031	
Kattegat Swedish Coastal waters	SWE-001	
	SWE-003	
	SWE-004	X
Bornholm Basin Swedish Coastal waters	SWE-006	X
Western Gotland Basin Swedish Coastal waters	SWE-007	X
	SWE-008	X
Northern Baltic Proper Swedish Coastal waters	SWE-011	X
Western Gotland Basin Swedish Coastal waters	SWE-012	X
Northern Baltic Proper Swedish Coastal waters	SWE-015	X
Bothnian Sea Swedish Coastal waters	SWE-016	X
	SWE-018	

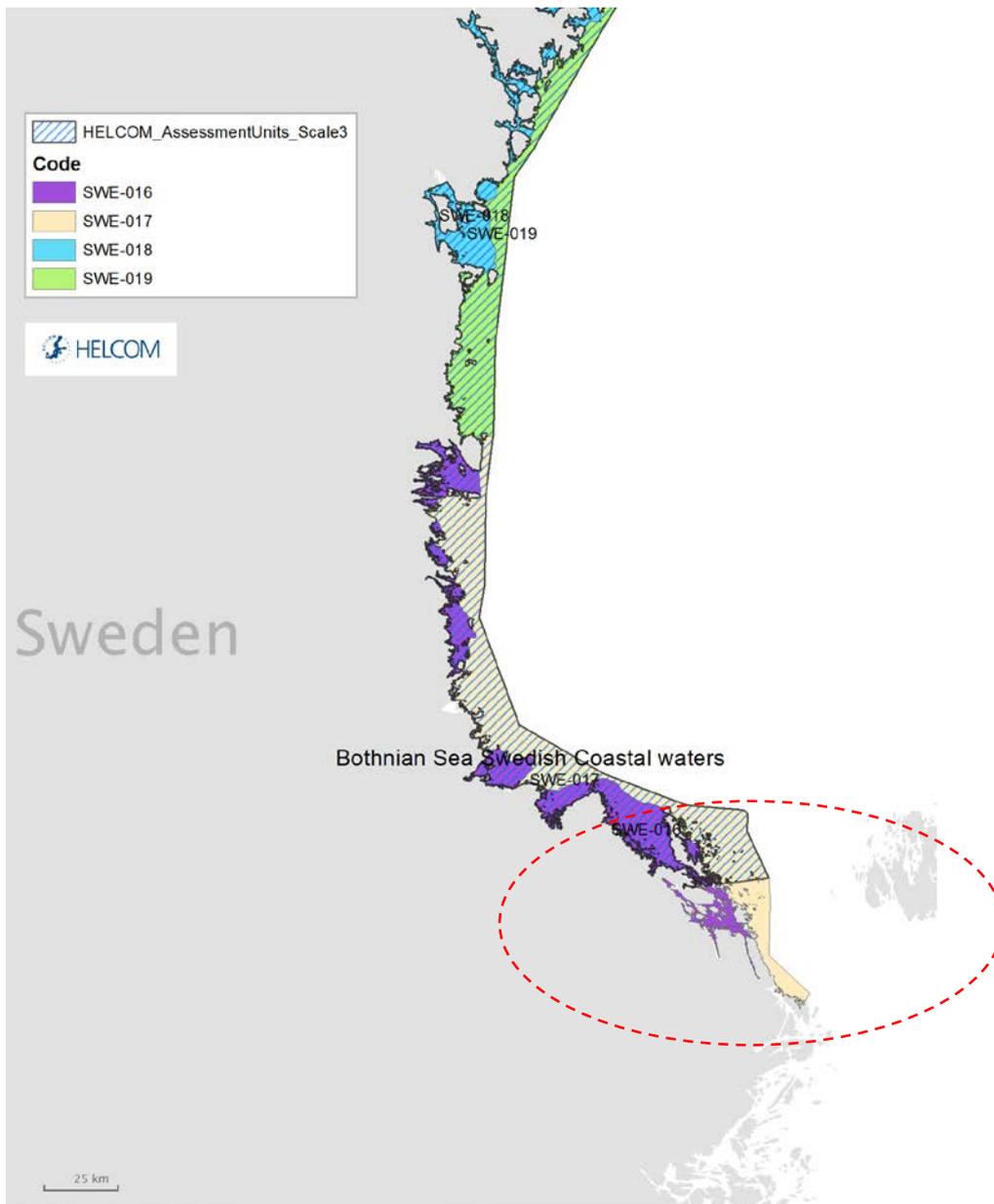


Figure 5. Example of inconsistency between a scale 4 assessment unit for which a hazardous substance core indicator evaluation is available and the scale 3 HELCOM assessment unit to which it is associated. The scale 4 assessment unit 'SWE-016' extends beyond the boundary of the scale 3 assessment unit 'Bothnian Sea Swedish Coastal waters'.