



Baltic Marine Environment Protection Commission

Making the HELCOM eutrophication assessment
operational (EUTRO-OPER)
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EUTRO-OPER 3-2014

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Background

In the project description, EUTRO-OPER is tasked to prepare a proposal for harmonization of the coastal and open sea assessments concerning eutrophication. As preparation for preparing the proposal, EUTRO-OPER 2-2014 decided to test HEAT as well as targets and classification at coastal areas. This work was seen also to feed as back-ground information into developing further specifications for HEAT 3.0 and preparing a proposal for measuring distance-to-target of setting sub-class boundaries also for adjacent open-sea sub-basins (EUTRO-OPER subtask 1c.i).

Action required

The Meeting is invited to discuss the first results of testing HEAT assessment tool on coastal areas, and agree on how to proceed with the work.

Plan for testing HEAT on Baltic Sea Coastal waters (EUTRO-OPER subtask 3c.i)

Lead: Sweden

Report structure:

Chapter 1: Method description

Chapter 2: Results presented per testing site

Chapter 3: Compilation / results / discussion

For each test site:

- a) Compare WFD and HEAT 3.0 class boundaries along a transect from coast to open sea, continuing the work started in CORE EUTRO on GES targets (see Fig. 1 and Table 1 for example).

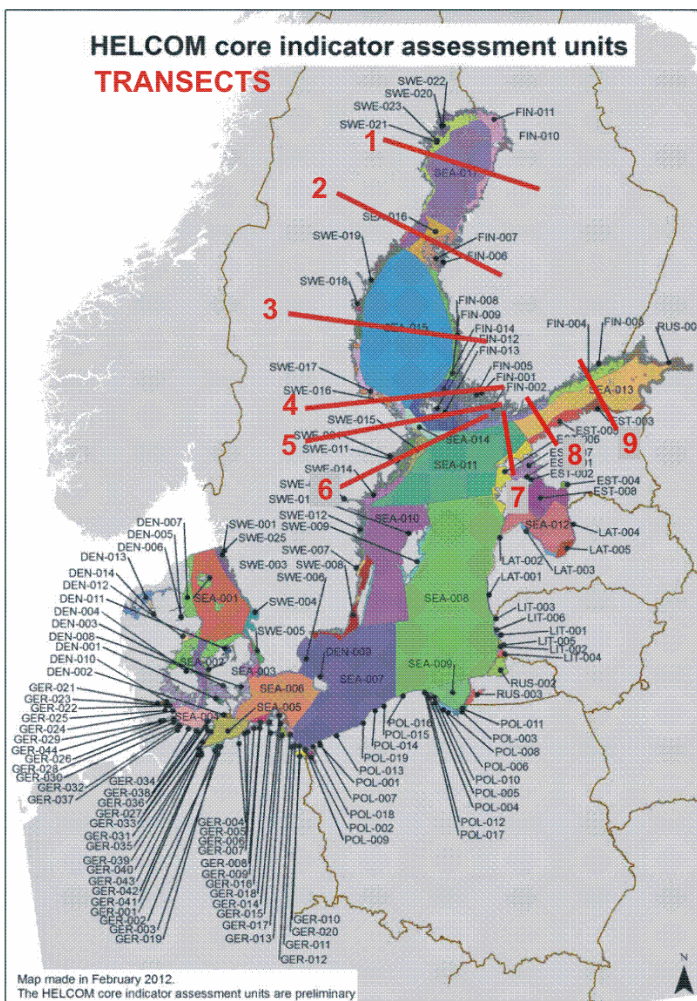


Figure 1. Example. Transects used for comparing WFD and TARGREV targets for GES bilaterally between Sweden and Finland under CORE-EUTRO (from Doc. 3-3, CORE-EUTRO 7-2012).

Table 1. Example. Comparison of summer chlorophyll a targets along selected transects produced in bilateral work between Sweden and Finland under CORE-EUTRO (from Doc. 3-3, CORE-EUTRO 7-2012). The GES targets for the Swedish (SWE), Estonian (EST), Åland (ÅLA) and Finnish (FIN) coastal assessment units as well as the EUTRO and TARGREV (open sea) targets are. na = target not available. The transects 1-9 are shown in Fig. 1.

CHLA		SWE	Open		ÅLA	FIN
Transect	Basin	WFD	EUTRO	TARGREV	WFD	WFD
1	Bothnian Bay	2,00	1,95	1,61		2,20
2	The Quark	2,00	1,95	2,01		2,20
3	Bothnian Sea	2,00	1,50	1,52		2,10
4		2,00			1,85	2,30
5	Ålands hav	1,80	1,58	1,52	1,85	
6	N Baltic Proper	2,00	1,65	1,76	2,23	2,30
7		EST				2,30
8		na				2,30
9	Gulf of Finland	3,00	1,80	4,03		2,50
		na				

- b) Illustrate the differences in WFD, HEAT 1.0 and HEAT 3.0 (in a table, see Table 2 for example). Repeat (another table), with actual concentrations / values.

Table 2. A suggestion of the table, including EQR values for the different class boundaries.

WFD Category	MSFD Criteria	Indicator	National WFD					HEAT 1.0					HEAT 3.0					
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	
1	2	Chl-a																
1	2	Biovolume																
2	2	Macrovegetation																
3	3	BQI																
4	1	DIN (win)																
4	1	DIP (win)																
4	1	TN (win)																
4	1	TP (win)																
4	1	TN (sum)																
4	1	TP (sum)																
4	2	Secchi (sum)																
4	3	Oxygen (aut)																

- c) HEAT: test vs 3.0 and 1.0

- An Excel book with the official WFD assessment (EQR values, class boundaries; assessed status), Expert judgement (y/n). One Excel sheet per water body and one for the whole water type. (se ex)
- Make a HEAT 1.0 template. Each sheet is a water body in the water type (test site) plus one for the whole water type.
- Repeat for HEAT 3.0

Report / explain differences in assessment at Category and Criteria levels

Describe method/problems in generating an assessment for the water type in contrast to the water bodies. How to deal with distance to target at water body / water type level: consistency for Programmes of Measures under WFD resp. MSFD.

Test sites

A questionnaire was sent to the Contracting Parties, via their EUTRO-OPER and MONAS contacts, to join the testing of HEAT in coastal waters either by contributing to the work, or simply by choosing 1-3 test sites and sending WFD status and target information of these. Test sites were named by Estonia, Finland, Latvia, Poland and Sweden (Table 3).

Table 3. Test sites reported by the Contracting Parties.

Denmark	
Estonia	<ol style="list-style-type: none"> 1. EST 005 2. EST 008
Finland	<ol style="list-style-type: none"> 1. Outer coastal waters of the Bothnian Bay (5 WB) 2. Quark (1 WB) 3. Archipelago & GoF (4 WB)
Latvia	<ol style="list-style-type: none"> 1. LAT 001
Lithuania	
Poland	<p>i) Transect in the Gdańsk Basin (SEA - 009):</p> <ol style="list-style-type: none"> 1. Vistula Lagoon (PL TW I WB 1), 2. Puck Lagoon (PL TW II WB 2), 3. Internal Gulf of Gdańsk (PL TW IV WB 4), 4. Gdańsk Deep; <p>ii) Transect along the central Polish coast (SEA – 007):</p> <ol style="list-style-type: none"> 5. Jarosławiec-Sarbinowo (PL CW III WB 7), 6. Shallow (20 m) coastal area, 7. Bornholm Deep; <p>iii) Transect in the Pomeranian Bay (SEA – 007):</p> <ol style="list-style-type: none"> 8. Szczecin Lagoon (PL TW I WB 8), 9. Świna/Oder mouth (PL TW V WB 7), 1. 10. Open Pomeranian Bay.
Sweden	<ol style="list-style-type: none"> 1. Water type 7: Arkona - Hanö Bukt 2. Water type 23: Outer Bothnian Bay 3. Water type 4: Kattegat 2. 4. Water type 14: Western Gotland Basin - Östergötland - Norrköping

Testing HEAT in Polish coastal waters

Besides naming testing sites and sending WFD information, Poland contributed to the work on three transects crossing the Polish waters from coast to open sea (Fig. 2).

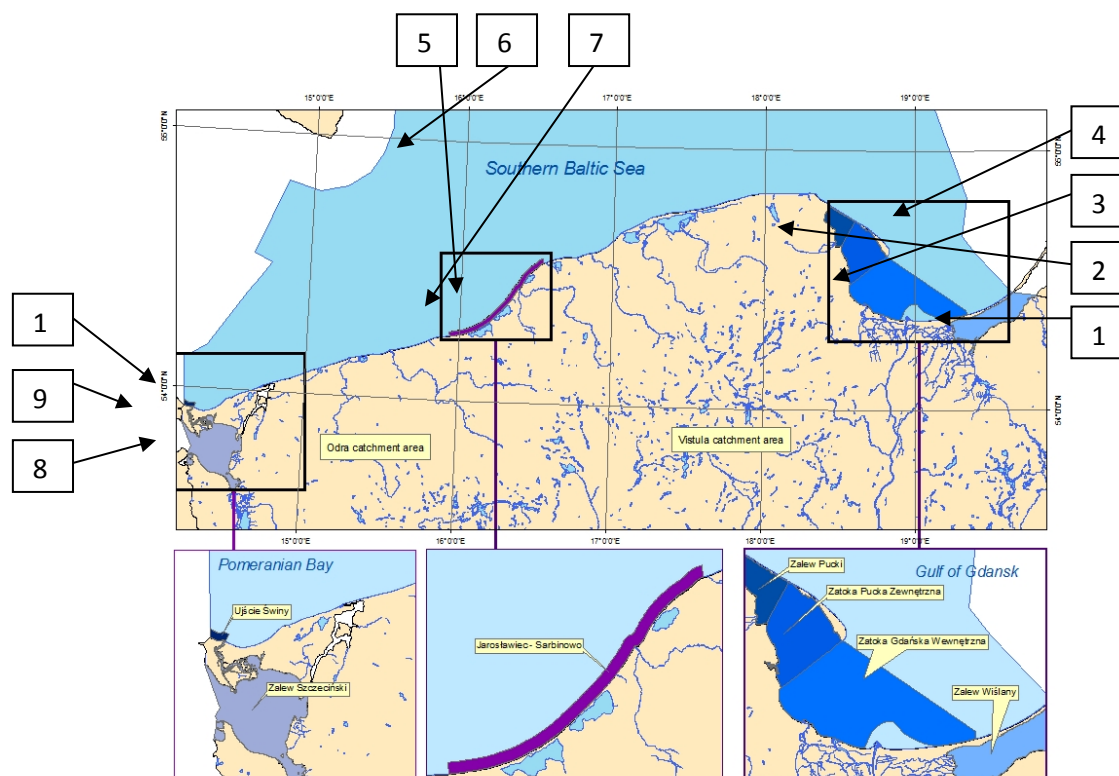


Figure 2. Location of selected transitional and coastal water bodies and transects to off-shore regions of the southern Baltic Proper and the Bornholm Basin

Firstly for task a), the chlorophyll-a targets developed under the WFD-, TARGREV- and EUTRO-PRO –processes were compared (Table 4).

Table 4. Comparison of summer (VI-IX) chlorophyll- a targets along the selected transects

Transect	Water body	WFD target [mg m^{-3}]	TARGREV [mg m^{-3}]	EUTRO PRO
Gdańsk Basin (SEA – 009)	Vistula Lagoon	42.20	na	23.2**
	Puck Lagoon	2.17	na	-
	internal Gulf of Gdańsk	3.76	na	3.76
	Gdańsk Deep	2.64	2.19	1.80
central Polish coast (SEA – 007)	Jarosławiec-Sarbinowo	1.90	na	1.90
	Bornholm Deep	1.80	2.20	1.80
Pomeranian Bay (SEA - 007)	Szczecin Lagoon	20.0*	na	-
	Świna/Oder mouth	7.50	na	7.50
	open Pomeranian Bay	3.15	2.20	3.15

na – not applicable

*annual mean value, there is no reference value nor target set yet for the Szczecin Lagoon summer (VI-IX) chlorophyll-a concentrations

**in EUTRO PRO annual mean values were applied, new classification scheme (including chlorophyll-a (VI-IX) in coastal lagoons) was developed for MSFD implementation

Secondly, for task b), the assessments conducted using WFD-, HEAT 1.0 and HEAT 3.0 methodology were compared for along the three transects (Table 5).

For the purpose of Initial Assessment the assessment was conducted in the following way:

- i) The assessment of each indicator was completed in 5-class classification scheme (as for WFD) in the following order: 1 – bad status, 2 – poor status, 3 – moderate status, 4 – good status and 5 – high status. The border between GES and subGES was set at the good/moderate border.
- ii) If the assessed area consisted of a number of water bodies or areas with differing reference conditions and classification schemes (e.g. the profile in the Pomeranian Bay consists of 3 water units: Szczecin Lagoon, Świna/Oder mouth and open Pomeranian Bay), the classification of indicators was carried out separately for each unit and the resulting EQR/class values were translated into the digital form 1, 2, 3, 4 and 5, according to the classification result. Hence the result e.g. for the DIP classification in 3 unit could be: Szczecin Lagoon – 1, Świna/Oder mouth – 1, open Pomeranian Bay – 3.

The final classification result was calculated as a simple average of class values, that is in the given example the DIP classification in the Pomeranian Bay profile would be $1+1+3=5$, $5/3=1.7$ – poor status = subGES.

Table 5 i). Illustration of differences in WFD, HEAT 1.0 and HEAT 3.0 classification schemes in the transect Gdańsk Basin (SEA – 009). **Note!** national nutrient WFD classification values are given in [mg/dm³] while all other nutrient values are in [µmol/dm³]

1. Vistula Lagoon(PL TW I WB 1)

WFD cat.	MSFD crit.	Indicator	national WFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a (VI-IX)											<25.63	42.20	51.74	63.80	>63.80
1	2	Chlorophyll-a (a.m.)	<15.0	23.2	31.3	50.0	>50.0	<15.0	23.2	31.3	50.0	>50.0	<15.0	23.2	31.3	50.0	>50.0
1	2	Biovolume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91						3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
4	1	DIP (I-III)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
4	1	TN (VI-IX)											<58.4	58.4	80.0	93.4	>93.4
4	1	TN* (a.m.)	<0.65	0.65	0.98			<0.65	0.65	0.98			<0.65	0.65	0.98		
4	1	TP (VI-IX)											<3.49	3.49	4.10	5.20	>5.20
4	1	TP* (a.m.)	<0.08	0.08	1.20			<0.08	0.08	1.20			<0.08	0.08	1.20		
4	2	Secchi (VI-IX)											>0.60	0.50	0.45	0.35	<0.35
4	2	Secchi* (a.m.)	>1.0	1.0	0.75			>1.0	1.0	0.75			>1.0	1.0	0.75		
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2								>6.0	6.0	4.2		

na – not applicable because of ice cover in winter

TN*, TP* in [mg/dm³], Secchi* (a.m.), O₂* near bottom [mg/dm³] minimal concentration in summer - the national classification includes only 2 classes, TN, TP (VI-IX) in [µmol/dm³], Secchi (VI-IX); new classification scheme developed for the MSFD implementation

2. Puck Lagoon (PL TW II WB 2)

WFD cat.	MSFD crit.	Indicator	national WFD					HEAT 1.0					HEAT 3.0													
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B									
1	2	Chlorophyll-a (VI-IX)																		1.63	1.70	2.17	3.80	4.13		
1	2	Chlorophyll-a (a.m.)	<1.20	1.20	2.00	2.80	4.30														<1.20	1.20	2.00	2.80	4.30	
1	2	Biovolume	-	-	-	-	-														-	-	-	-	-	
2	2	Macrophytes (SM ₁)	>0.95	0.95	0.80	0.57	0.2														>0.95	0.95	0.80	0.57	0.2	
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91															3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	na	na	na	na	na														na	na	na	na	na	
4	1	DIP (I-III)	na	na	na	na	na														na	na	na	na	na	
4	1	TN (VI-IX)																				25.63	27.10	33.20	37.50	40.85
4	1	TN* (a.m.)	<0.20	0.20	0.30																<0.20	0.20	0.30			
4	1	TP (VI-IX)																				0.53	0.71	1.00	1.30	>1.30
4	1	TP* (a.m.)	<0.0205	0.0205	0.030																<0.0205	0.0205	0.030			
4	2	Secchi (VI-IX)	-	-	-																	4.21	3.36	3.00	2.50	>2.50
4	2	Secchi (a.m.)	-	-	-																	4.46	4.24	3.40	2.23	<2.23
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2																	>6.0	6.0	4.2		

na – not applicable because of ice cover in winter

TN*, TP* in [mg/dm³], O₂* near bottom [mg/dm³] minimal concentration in summer - the national classification includes only 2 classes, TN, TP (VI-IX) in [µmol/dm³], Secchi (VI-IX); new classification scheme developed for the MSFD implementation

3. internal Gulf of Gdańsk (PL TW IV WB 4)

WFD cat.	MSFD crit.	Indicator	national WFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)	<1.94	1.94	3.76	5.58	7.40	<1.94	1.94	3.76	5.58	7.40	<1.94	1.94	3.76	5.58	7.40
1	2	Chlorophyll-a (a.m.)						<2.15	2.15	3.22			2.62	3.42	4.50	5.75	>5.75
1	2	Biovolume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91						3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	<0.10*	0.10*	0.15			<6.50	6.50	9.75	13.0	>13.0	<0.10*	0.10*	0.15*		
4	1	DIP (I-III)	<0.016*	0.016*	0.024*			<0.50	0.50	0.75	1.00	1.25	<0.016*	0.016*	0.024*		
4	1	TN (VI-IX)	<0.25*	0.25*	0.40*			<18.0	18.0	27.0	36.0	>36.0	<0.25*	0.25*	0.40*		
4	1	TN (a.m.)											10.45	15.84	20.00	24.00	29.10
4	1	TP (VI-IX)	<0.016*	0.016	0.024*			<0.80					<0.016*	0.016	0.024*		
4	1	TP (a.m.)											<0.42	0.42	0.54	0.60	0.81
4	2	Secchi (VI-IX)	>4.7	4.7	3.5			>5.0	5.0	3.75	3.0	<3.0	>4.7	4.7	3.5		
4	2	Secchi (a.m.)											12.0	10.6	9.5	6.7	5.0
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2								>6.0	6.0	4.2	3.0	2.0

Note: DIN*, DIP* in [mg/dm³] other values in [µmol/dm³]

4. Gdańsk Deep

WFD cat.	MSFD crit.	Indicator	national MSFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)	<1.20	1.20	1.80	2.64	4.20	<1.20	1.20	1.80	2.64	4.20			2.20		
1	2	Chlorophyll-a (a.m.)	1.35	2.02	2.63	3.40	3.80	<1.78	1.78	2.67	3.56	4.50	1.35	2.02	2.63	3.40	3.80
1	2	Biovolume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91	+	+	+	-	-	3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	<4.0	4.0	6.0	8.0	10.0	<4.0	4.0	6.0	8.0	10.0			4.20		
4	1	DIP (I-III)	<0.25	0.25	0.38	0.51	0.63	<0.25	0.25	0.38	0.51	0.63			0.36		
4	1	TN (VI-IX)	<14.0	14.0	21.0	28.0	35.0	<14.0	14.0	21.0	28.0	35.0	<14.0	14.0	21.0	28.0	35.0
4	1	TN (a.m.)	9.4	11.6	18.8	24.0	32.5	<10.1	10.1	15.5	21.0	>21.0	<9.4	11.6	18.8	24.0	32.5
4	1	TP (VI-IX)	<0.60	0.60	0.90	1.20	1.50	<0.60	0.60	0.90	1.20	1.50	<0.60	0.60	0.90	1.20	1.50
4	1	TP (a.m.)	0.41	0.48	0.60	0.81	0.95	<0.44	0.44	0.66	0.90	>0.90	0.41	0.48	0.60	0.81	0.95
4	2	Secchi (VI-IX)	>7.50	7.50	5.62	3.75	2.00	>7.50	7.50	5.62	3.75	2.00			6.5		
4	2	Secchi (a.m.)	12.25	11.00	9.22	7.67	6.50	>10.0	10.0	7.5	5.0	3.5	<12.25	11.00	9.22	7.67	6.50
4	3	Oxygen (min. VI-IX)	>4.20	4.20	2.94	2.00	1.00						>4.20	4.20	2.94	2.00	1.00

Oxygen in [cm³/dm³]

Table 5 ii). Illustration of differences in WFD, HEAT 1.0 and HEAT 3.0 classification schemes in the transect along the central Polish coast (SEA – 007). **Note!** national nutrient WFD classification values are given in [mg/dm³] while all other nutrient values are in [µmol/dm³]

5. Jarosławiec-Sarbinowo (PL CW III WB 7)

WFD cat.	MSFD crit.	Indicator	national WFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)	<1.50	1.50	1.90	2.30	3.10						<1.50	1.50	1.90	2.30	3.10
1	2	Chlorophyll-a (a.m.)															
1	2	Biovolume	-	-	-	-	-						-	-	-	-	-
2	2	Macrophytes (SM1)	>0.95	0.95	0.80	0.57	0.2						>0.95	0.95	0.80	0.57	0.2
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91						3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	<0.06*	0.06*	0.10*								<0.06*	0.06*	0.10*		
4	1	DIP (I-III)	<0.010*	0.010*	0.015*								<0.010*	0.010*	0.015*		
4	1	TN (VI-IX)	<0.20*	0.20*	0.30*								<0.20*	0.20*	0.30*		
4	1	TN (a.m.)											<13.0	13.0	19.50	26.0	32.5
4	1	TP (VI-IX)	<0.020*	0.020	0.015*								<0.020*	0.020	0.015*		
4	1	TP (a.m.)											<0.60	0.60	0.90	1.20	1.50
4	2	Secchi (VI-IX)	>7.50	7.50	5.53								>7.50	7.50	5.53	3.70	2.00
4	2	Secchi (a.m.)											<11.0	10.0	8.0	7.0	6.1
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2								>6.0	6.0	4.2	3.0	2.0

DIN*, DIP*, TN*, TP* - in [mg/dm³]

6. shallow (20 m) coastal area

WFD cat.	MSFD crit.	Indicator	national MSFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)	R	H/G	G/M	M/P	P/B	<1.50	1.50	1.90	2.30	3.10	<1.50	1.50	1.90	2.30	3.10
1	2	Chlorophyll-a (a.m.)	<1.50	1.50	1.90	2.30	3.10	<1.03	1.03	1.53	2.03	2.53	1.56	1.72	2.92	3.24	3.74
1	2	Biovolume	1.56	1.72	2.92	3.24	3.74	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	-	-	-	-	-						>0.95	0.95	0.80	0.57	0.2
3	3	Zoobenthos (B)	>0.95	0.95	0.80	0.57	0.2	10.0**	7.6**	4.6**	3.0**	1.0**	3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	3.72	3.18	2.70	1.91	<1.91	<4.00	4.00	6.00	8.00	10.00	<4.00	4.00	6.00	8.00	10.00
4	1	DIP (I-III)	<4.00	4.00	6.00	8.00	10.00	<0.35	0.35	0.43	0.61	0.78	<0.35	0.35	0.43	0.61	0.78
4	1	TN (VI-IX)	<0.35	0.35	0.43	0.61	0.78	<13.0	13.0	19.5	26.0	32.5	<13.0	13.0	19.5	26.0	32.5
4	1	TN (a.m.)	<13.0	13.0	19.5	26.0	32.5	<12.6	12.6	18.9	25.2	>25.2	<12.6	12.6	18.9	25.2	>25.2
4	1	TP (VI-IX)	<12.6	12.6	18.9	25.2	>25.2	<0.60	0.60	0.90	1.20	1.50	<0.60	0.60	0.90	1.20	1.50
4	1	TP (a.m.)	<0.60	0.60	0.90	1.20	1.50	<0.53	0.53	0.80	1.10	1.50	<0.49	0.62	0.82	0.93	1.05
4	2	Secchi (VI-IX)	<0.49	0.62	0.82	0.93	1.05	<7.50	7.50	5.53	3.70	2.00	<7.50	7.50	5.53	3.70	2.00
4	2	Secchi (a.m.)	<7.50	7.50	5.53	3.70	2.00	<8.70	8.70	6.56	4.42	3.00	<10.2	9.5	7.6	6.2	5.4
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2	3.0	2.0						>6.0	6.0	4.2	3.0	2.0

Zoobenthos** - BQI, in EUTRO the Swedish index BQI was used for zoobenthos assessment (Osowiecki&Łysiak-Pastuszak, 2008)

7. Bornholm Deep

WFD cat.	MSFD crit.	Indicator	national MSFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)	1.20	1.20	1.80	2.70	4.05								1.80		
1	2	Chlorophyll-a (a.m.)	0.55	0.83	1.14	2.00	2.50						0.55	0.83	1.14	2.00	2.50
1	2	Biovolume	-	-	-	-	-						-	-	-	-	-
2	2	Macrophytes (SM1)	na	na	na	na	na						na	na	na	na	na
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91						3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	<2.50	2.50	3.75	5.00	6.25								2.50		
4	1	DIP (I-III)	<0.34	0.34	0.51	0.68	0.85								0.32		
4	1	TN (VI-IX)	<14.0	14.0	21.0	28.0	35.0						<14.0	14.0	21.0	28.0	35.0
4	1	TN (a.m.)	7.0	9.7	14.4	19.3	22.8						7.0	9.7	14.4	19.3	22.8
4	1	TP (VI-IX)	<0.60	0.60	0.90	1.20	1.80						<0.60	0.60	0.90	1.20	1.80
4	1	TP (a.m.)	0.35	0.42	0.59	0.78	1.05						0.35	0.42	0.59	0.78	1.05
4	2	Secchi (VI-IX)	<9.00	9.00	6.75	5.50	3.75						<9.00	9.00	6.75	5.50	3.75
4	2	Secchi (a.m.)	15.5	13.0	11.5	9.5	8.0						15.5	13.0	11.5	9.5	8.0
4	3	Oxygen (min. VI-IX)	<4.20	4.20	2.94	2.00	1.00						<4.20	4.20	2.94	2.00	1.00

Table 5 iii). Illustration of differences in WFD, HEAT 1.0 and HEAT 3.0 classification schemes in the transect in the Pomeranian Bay (SEA – 007). **Note!** national nutrient WFD classification values are given in [mg/dm³] while all other nutrient values are in [µmol/dm³]

8. Szczecin Lagoon (PL TW I WB 8)

WFD cat.	MSFD crit.	Indicator	national WFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)															
1	2	Chlorophyll-a (a.m.)	<10.0	10.0	20.0	30.0	40.0	<7.50	7.50	11.25	15.00	18.25	<10.0	10.0	20.0	30.0	40.0
1	2	Biovolume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91						3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
4	1	DIN (a.m.)	<0.70	0.70	1.05			<50.0*	50.0*	75.0*	100.0*	125.0*					
4	1	DIP (I-III)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
4	1	DIP (a.m.)	<0.06	0.06	0.09			<1.94*	1.94*	2.86*	3.78*	4.70*	<0.06	0.06	0.09		
4	1	TN (VI-IX)															
4	1	TN (a.m.)	<1.25	1.25	1.90			<89.3*	89.3*	133.9*	178.6*	>178.6	<1.25	1.25	1.90		
4	1	TP (VI-IX)															
4	1	TP (a.m.)	<0.10	0.10	0.15			<3.23*	3.23*	4.85*	5.47*	7.10*	<0.10	0.10	0.15		
4	2	Secchi (VI-IX)															
4	2	Secchi (a.m.)	>2.5	2.5	1.90			>2.50	2.50	1.90	1.50	1.00	>2.50	2.50	1.90	1.50	1.00
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2								>6.0	6.0	4.2	3.00	2.00

DIP*, DIN*, TP*, TN*- in [µmol/dm³]

9. Świna/Oder mouth (PL TW V WB 7)

WFD cat.	MSFD crit.	Indicator	national WFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)						<4.40	4.40	6.60	7.50	10.0					
1	2	Chlorophyll-a (a.m.)	<5.0	5.0	7.50	15.0	25.0	<3.00	3.00	4.50	6.00	7.50	<5.0	5.0	7.50	15.0	25.0
1	2	Biovolume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
3	3	Zoobenthos (B)															
4	1	DIN (I-III)						<15.0*	15.0*	22.5*	30.0*	>30.0*	<0.12	0.12	0.18		
4	1	DIN (a.m.)	<0.12	0.12	0.18												
4	1	DIP (I-III)						<0.70*	0.70*	1.05*	1.40*	>1.40*	<0.022	0.022	0.035		
4	1	DIP (a.m.)	<0.022	0.022	0.035												
4	1	TN (VI-IX)						<18.0*	18.0*	27.0*	36.0*	>36.0*	<0.35	0.35	0.53		
4	1	TN (a.m.)	<0.35	0.35	0.53												
4	1	TP (VI-IX)						<0.90*	0.90*	1.35*	1.80*	>1.80*	<0.031	0.031	0.045		
4	1	TP (a.m.)	<0.031	0.031	0.045												
4	2	Secchi (VI-IX)						>3.00	3.00	2.25	1.50	<1.50	>5.0	5.0	3.75	3.00	<3.00
4	2	Secchi (a.m.)	>5.0	5.0	3.75			>5.00	5.00	3.75	3.00	<3.00	>6.0	6.0	4.2	3.00	<2.00
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2												

10. open Pomeranian Bay

WFD cat.	MSFD crit.	Indicator	national MSFD					HEAT 1.0					HEAT 3.0				
			R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B	R	H/G	G/M	M/P	P/B
1	2	Chlorophyll-a(VI-IX)	<2.10	2.10	3.15	4.20	6.25	<2.10	2.10	3.15	4.20	6.25			1.80		
1	2	Chlorophyll-a (a.m.)	<1.90	2.53	4.20	5.05	8.30	<1.94	1.94	2.91	3.88	>3.88	<1.90	2.53	4.20	5.05	8.30
1	2	Biovolume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	Macrophytes (SM1)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
3	3	Zoobenthos (B)	3.72	3.18	2.70	1.91	<1.91	10.0**	7.6**	4.6**	3.0**	1.0**	3.72	3.18	2.70	1.91	<1.91
4	1	DIN (I-III)	<9.0	9.0	13.5	18.0	>18.0	<9.0	9.0	13.5	18.0	>18.0			2.50		
4	1	DIP (I-III)	<0.47	0.47	0.71	0.95	>0.95	<0.47	0.47	0.71	0.95	>0.95			0.32		
4	1	TN (VI-IX)	<13.0	13.0	19.5	26.0	>26.0	<13.0	13.0	19.5	26.0	>26.0	<13.0	13.0	19.5	26.0	>26.0
4	1	TN (a.m.)	<19.7	20.7	26.3	30.6	>36.2	<15.3	15.3	23.0	30.6	>30.6	<19.7	20.7	26.3	30.6	>36.2
4	1	TP (VI-IX)	<0.90	0.90	1.35	1.80	>1.80	<0.90	0.90	1.35	1.80	>1.80	<0.90	0.90	1.35	1.80	>1.80
4	1	TP (a.m.)	<0.72	0.76	0.91	1.06	>1.20	<0.74	0.74	1.11	1.48	>1.48	<0.72	0.76	0.91	1.06	>1.20
4	2	Secchi (VI-IX)	>6.00	6.00	4.50	3.00	<3.00	>6.00	6.00	4.50	3.00	<3.00	>6.00	6.00	4.50	3.00	<3.00
4	2	Secchi (a.m.)	>5.50	5.50	4.13	2.75	<2.75	>5.50	5.50	4.13	2.75	<2.75	>5.50	5.50	4.13	2.75	<2.75
4	3	Oxygen (min. VI-IX)	>6.0	6.0	4.2	3.00	2.00						>6.0	6.0	4.2	3.00	2.00

