


Total nitrogen

INDICATOR TYPE: Core
INDICATOR CATEGORY: State
BSAP SEGMENT: Eutrophication
MSFD CRITERIA: D5C1



Total nitrogen (TN)

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1 Key message

The core indicator evaluates average total nitrogen (TN) concentration in surface waters (0 – 10 m) during the entire year (January - December) for the assessment period 2016-2021.

Of the 19 open sea assessment units three sub-basins, the Kattegat, Great Belt and Kiel Bay, achieved good status with TN concentrations below defined threshold values, which reflect good conditions. (Key message figure 1). TN concentrations are still at elevated levels in 16 sub-basins. Improving trends since the 1990s, meaning decreasing TN concentrations, were recorded in 13 out of 19 open-sea assessment units, while deteriorating trends, i.e. increasing TN concentrations, were identified in four sub-basins (Bornholm Basin, Pomeranian Bay, Gdansk Basin and Eastern Gotland Basin). In the remaining two assessment units no significant trend was observed and TN concentrations have generally remained at the level of the 1990s with considerable multi-year variability in the Arkona Basin and Western Gotland Basin.

When comparing the latest two assessments of HOLAS II and HOLAS 3 no status change was observed. Improving trends could not be detected between the current and the previous assessment, while two sub-basins showed a deteriorating status (Eastern Gotland Basin, Gulf of Finland Western). In the majority of sub-basins the status was more or less stable. In seven sub-basins, the TN indicator was applied for the first time, either due to commonly agreed threshold values or as a result of new subdivisions in the eutrophication assessment for the Pomeranian Bay, which was separated from the Bornholm Basin, and the subdivision of the Gulf of Finland into a western and an eastern part.

Concerning the coastal waters TN was assessed in Estonian, Finnish, German, Polish and Swedish waters. In coastal water assessment units the threshold values set for total nitrogen mostly failed to achieve good status. Good status was only observed in some assessment units of Estonian, Finnish, German, Polish and Swedish coastal waters (Annex Table 1). There were a number of cases where a good status of coastal water bodies was assessed adjacent to open sea basins that had a moderate or worse status. This could be due to a lack of alignment of threshold values between coastal waters and open sea basins.

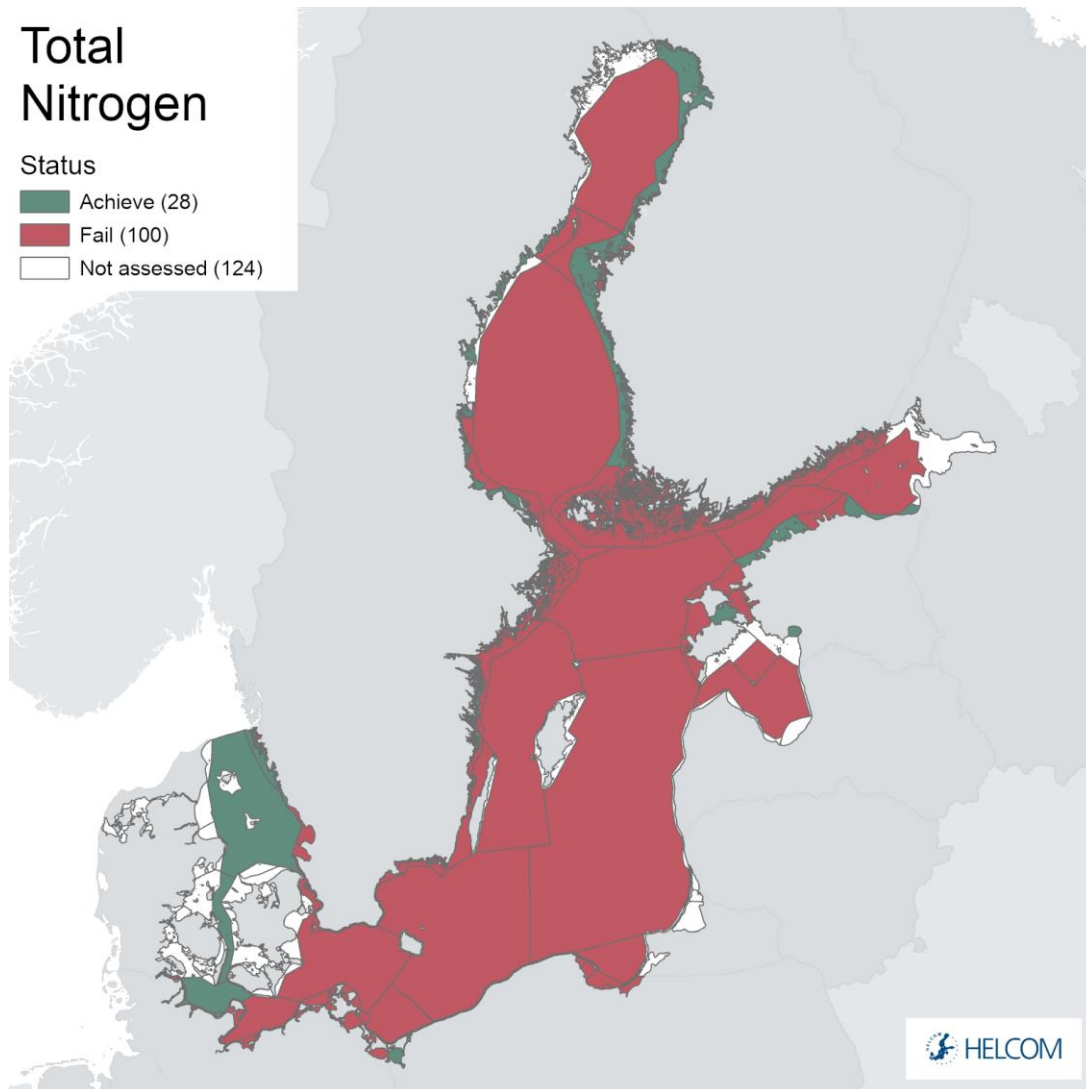


Figure 1. Status evaluation of the indicator ‘Total nitrogen’ - annual monitoring. The evaluation is carried out using Scale 4 HELCOM assessment units (defined in the [HELCOM Monitoring and Assessment Strategy Annex 4](#)). Please note that in coastal areas the evaluation is based on annual data, summer data and winter data, as reported by HELCOM Contracting Parties, and these details are defined in Results table 2. See Results section below for details. **See ‘data chapter’ for interactive maps and data at the HELCOM Map and Data Service.**

The confidence in the indicator TN status evaluation was high in 10 basins, moderate in eight basins and low in one basin (see Figure 7). Low confidence was caused by insufficient temporal and spatial sampling.

The indicator is applicable in all open sea assessment units and coastal areas. In HOLAS II, the indicator was not operational in all assessment units due to the lack of agreed threshold values in some areas. However, this was successfully resolved and thresholds were agreed so that all open sea assessment units could be assessed for HOLAS 3. The indicator period and method of calculation varies between open sea and coastal areas, and thus the threshold or assessment concentrations are not directly comparable between the open sea and the coast, nor between all coastal assessment units where

nationally binding thresholds values may have been set in line with the national assessments under the Water Framework Directive.

1.1 Citation

The data and resulting data products (e.g. tables, figures and maps) available on the indicator web page can be used freely given that it is used appropriately and the source is cited. The indicator should be cited as follows:

HELCOM (2023). Total nitrogen (TN). HELCOM core indicator report. Online. [Date Viewed], [Web link].

ISSN 2343-2543.

2 Relevance of the indicator

Eutrophication is caused by excessive inputs of nutrients (nitrogen and phosphorus) resulting from various human activities. High concentrations of nutrients and the ratios of these nutrients (e.g. N:P stoichiometric ratios) form the preconditions for algal growth, reduced water clarity and increased oxygen consumption. Long-term nutrient data are key parameters for quantifying the effects of anthropogenic activities and evaluating the success of measures undertaken since they directly link to increased nutrient inputs.

Eutrophication assessment

The status of eutrophication is assessed using several core indicators. Each indicator focuses on one important aspect of the complex issue. In addition to providing an indicator-based evaluation of total nitrogen, this indicator contributes to the overall eutrophication assessment along with the other eutrophication core indicators.

2.1 Ecological relevance

Role of total nitrogen (TN) in the ecosystem

Marine eutrophication is mainly caused by nutrient enrichment, leading to increased production of organic matter in the Baltic Sea, with subsequent effects on water transparency, phytoplankton communities, benthic fauna and vegetation, as well as oxygen conditions. Phytoplankton as well as benthic vegetation need nutrients, mainly nitrogen and phosphorus, for growth. Adding total nutrients alongside inorganic nutrients as core indicators strengthens the link from nutrient concentrations in the sea to nutrient enrichment. In particular these parameters allow to take account of climate change in the eutrophication assessment since higher temperatures will lead to year-round phytoplankton proliferation and / or possible changes in zooplankton communities.

In a simplified conceptual model for nitrogen and phosphorus nutrients (Relevance figure 1), flows between the different components are illustrated. To get a good understanding of the trend in nutrient concentrations in the marine environment the assessment of both, total and dissolved nutrients, is important. In contrast to dissolved inorganic nitrogen (DIN), total nitrogen is a parameter not subject to strong seasonal fluctuations and reflects a more or less stable situation during the year, allowing a reliable annual average to be calculated for surface water (0-10 m). Total nitrogen comprises dissolved inorganic nitrogen components and nitrogen already bound in organic matter, including algae and bacteria. A significant portion of TN is refractory. A simplified assumption is that nitrogen stays in the system, and is basically converted between the inorganic dissolved and the organic reservoir (without taking sedimentation into account). Thus, an approximately stable situation can be assumed over the year and a reliable annual average for the surface water (0-10 m) can be calculated.

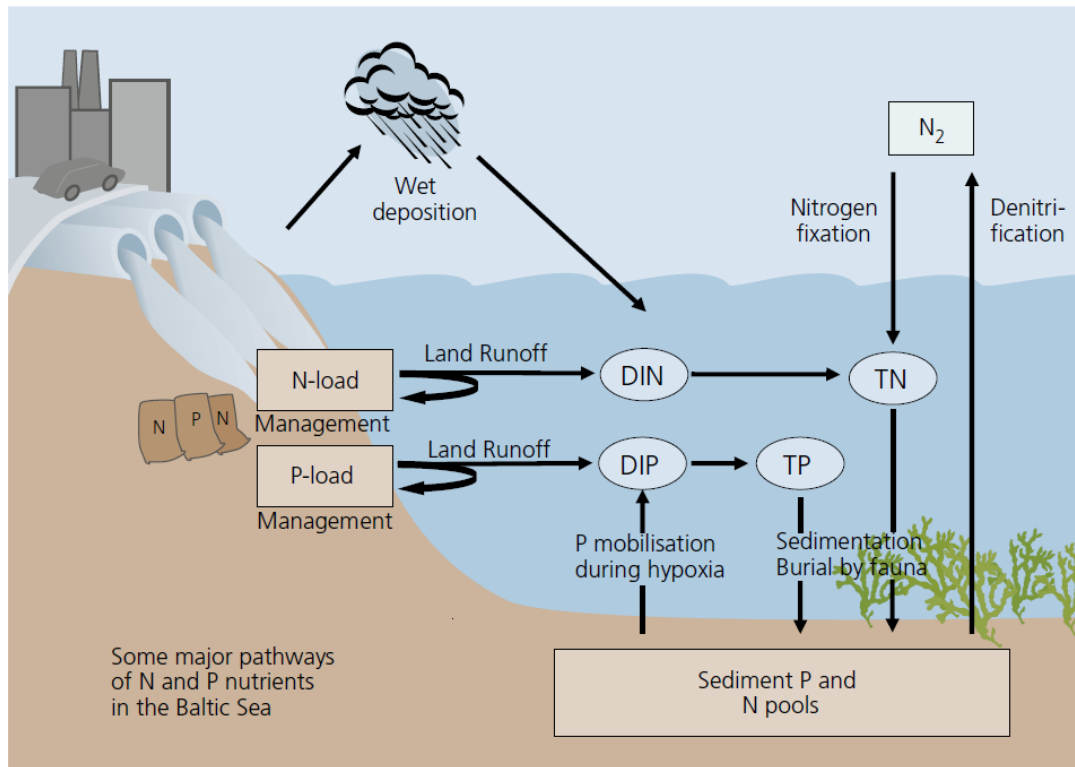


Figure 2. Simplified conceptual model for N and P nutrients in the Baltic Sea, where DIN = Dissolved inorganic nitrogen, TN = Total nitrogen, DIP = Dissolved inorganic phosphorus and TP = Total phosphorus. Flows along arrows into the blue sea area tend to increase concentrations, and flows along arrows out from the sea act in the opposite direction. Management refers to nutrient load reductions.

2.2 Policy relevance

Eutrophication is one of the thematic segments of the HELCOM Baltic Sea Action Plan (BSAP). HELCOM BSAP has a strategic goal of a Baltic Sea unaffected by eutrophication (HELCOM 2021). Eutrophication is defined in the BSAP as a condition in an aquatic ecosystem where high nutrient concentrations stimulate the growth of algae, which leads to imbalanced functioning of the system. Elevated nutrient concentrations in the water column are caused by increased anthropogenic nutrient loads from land and air. The goal for eutrophication is broken down into five ecological objectives, of which one is “concentrations of nutrients close to natural levels”. The BSAP management objective is to “minimize inputs of nutrients from human activities”.

The EU Marine Strategy Framework Directive (2008/56/EC) requires that “human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters” (Descriptor 5). ‘Nutrients in the water column’ (including TN) are one of the criteria elements in MSFD GES Decision ((EU) 2017/848) for assessing eutrophication under the criterion ‘D5C1 – Nutrient concentrations are not at levels that indicate adverse eutrophication effects’.

The EU Water Framework Directive (2000/60/EC) requires good ecological status in the European coastal waters. Good ecological status is defined in Annex V of the Water

Framework Directive, in terms of the quality of the biological community, the hydrological and the chemical characteristics, including nitrogen concentration.

Table 1. Eutrophication links to policy.

	Baltic Sea Action Plan (BSAP)	Marine Strategy Framework Directive (MSFD)
Fundamental link	<p>Segment: Eutrophication Goal: “Baltic Sea unaffected by eutrophication”</p> <ul style="list-style-type: none"> • Ecological objective: “Concentrations of nutrients close to natural levels”, “Clear waters”, “Natural level of algal blooms”, “Natural distribution and occurrence of plants and animals”, and “Natural oxygen levels”. • Management objective: “Minimize inputs of nutrients from human activities” • The achievement of regional nutrient input targets – Maximum Allowable Inputs (MAI) and Nutrient Input Ceilings (NIC) – for all sub-basins, as identified in this BSAP, is the key prerequisite for achieving the ecological objectives. 	<p>Descriptor 5 Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters - Macrofaunal communities of benthic habitats.</p> <ul style="list-style-type: none"> • Criteria D5C1 Nutrient concentrations are not at levels that indicate adverse eutrophication effects. The threshold values are as follows: (a) in coastal waters, the values set in accordance with Directive 2000/60/EC; (b) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation. • Feature – Eutrophication. • Element of the feature assessed – DIN, DIP, TN and TP.
Complementary link	<p>Segment: Sea-based activities Goal: “Environmentally sustainable sea-based activities”</p> <ul style="list-style-type: none"> • Ecological objective: “No or minimal disturbance to biodiversity and the ecosystem”. • Management objective: “Minimize the input of nutrients, hazardous substances and litter from sea-based activities”, “Minimize 	<p>Descriptor 6 Benthic habitats - Benthic broad habitat types.</p> <ul style="list-style-type: none"> • Criteria D6C5 The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of

	<p>harmful air emissions”, and “Zero discharges from offshore platforms”.</p> <p>Segment: Biodiversity Goal: “Baltic Sea ecosystem is healthy and resilient”</p> <ul style="list-style-type: none"> • Ecological objective: “Natural distribution, occurrence and quality of habitats and associated communities”. • Management objective: “Minimize disturbance of species, their habitats and migration routes from human activities”. 	<p>the habitat type in the assessment area.</p> <ul style="list-style-type: none"> • Feature – Benthic habitats. • Element of the feature assessed – Benthic broad habitat types. <p>Descriptor 1 Species groups of birds, mammals, reptiles, fish and cephalopods</p> <ul style="list-style-type: none"> • Criteria D1C6 The condition of the habitat type, including its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), is not adversely affected due to anthropogenic pressures. • Feature – Pelagic broad habitats. • Element of the feature assessed – Trophic guilds.
<p>Other relevant legislation:</p>	<p>EU Water Framework Directive</p> <p>UN Sustainable Development Goal 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) is most clearly relevant, though SDG 12</p>	

2.3 Relevance for other assessments

This indicator is utilised in the integrated assessment of eutrophication (HEAT tool).

3 Threshold values

Status is evaluated in relation to scientifically based and commonly agreed sub-basin specific threshold values, which define the concentration that should not be exceeded (Table 2 and Table 3).

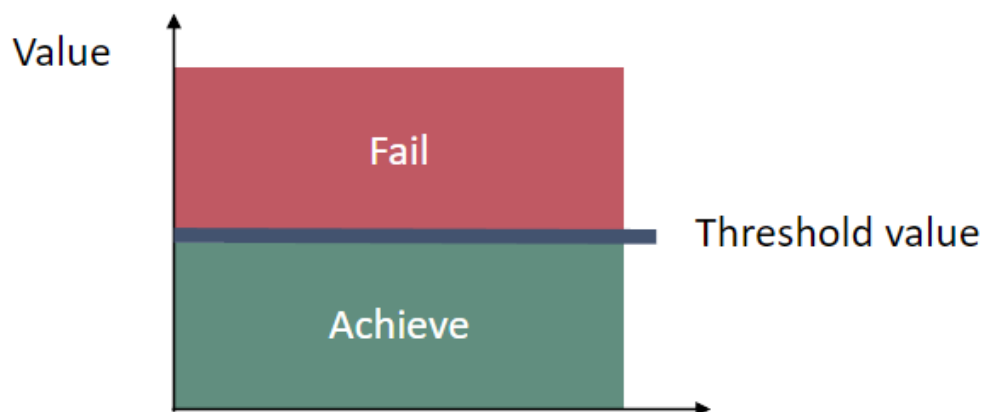


Figure 3. Schematic representation of the threshold values applied in the TN core indicator, the threshold values are assessment unit specific (see Table 2).

3.1 Setting the threshold value(s)

Indicator threshold values were based on the results obtained in the TARGREV project (HELCOM 2013), also taking advantage of the work carried out during the EUTRO PRO process (HELCOM 2009) and national work for EU WFD. The final threshold values were set through an expert evaluation process done via intersessional activity to develop core eutrophication indicators (HELCOM CORE EUTRO), and the threshold values were adopted by the HELCOM Heads of Delegations 39/2012. The threshold values were principally not changed since HOLAS II, but for the new assessment units Pomeranian Bay and the split of the Gulf of Finland into an eastern and western assessment unit new thresholds were derived using the HOLAS II thresholds as a basis and adopted by HELCOM HOD 61-2021. The newly agreed threshold values for Kiel Bay, Bay of Mecklenburg and Arkona Basin are based on a national modelling approach and in line with the general approach in the eutrophication assessment to choose the most precautionary target.

Table 2. Assessment unit specific threshold values for total nitrogen.

HELCOM_ID	Assessment unit (open sea)	Threshold value [$\mu\text{mol l}^{-1}$]
SEA-001	Kattegat	17.4
SEA-002	Great Belt	21.0
SEA-003	The Sound	17.3
SEA-004	Kiel Bay	16.4
SEA-005	Bay of Mecklenburg	16.7
SEA-006	Arkona Basin	19.5
SEA-007	Bornholm Basin	16.05
SEA-007B	Pomeranian Bay	23.8
SEA-008	Gdansk Basin	18.8
SEA-009	Eastern Gotland Basin	16.5
SEA-010	Western Gotland Basin	15.1
SEA-011	Gulf of Riga	28.0
SEA-012	Northern Baltic Proper	16.2
SEA-013A	Gulf of Finland Western	18.7
SEA-013B	Gulf of Finland Eastern	22.3
SEA-014	Åland Sea	15.6
SEA-015	Bothnian Sea	15.7
SEA-016	The Quark	17.3
SEA-017	Bothnian Bay	16.9

4 Results and discussion

The results of the indicator evaluation that underlying the key message map and information are provided below.

4.1 Status evaluation

Current status of the Baltic Sea TN concentration

TN concentrations below the threshold were achieved in three western assessment units, the Kattegat, Great Belt and Kiel Bay (Figure 4 and Table 3). Accordingly, the scaled Ecological quality ratio (EQRs) was 0.67 for Kattegat, 0.72 for Kiel Bay and 0.80 for Great Belt, resulting in achieving good status. In the remaining 16 sub-basins, achieving the threshold value failed, resulting in a not good status. Two assessment units showed TN concentrations exceeding the threshold value by more than 50%, the Eastern Gotland Basin and the Pomeranian Bay with EQRs values below 0.30, but still above 0.20, indicating poor status. Pomeranian Bay is heavily influenced by nitrogen inputs from the river Odra. Another four sub-basins with TN concentrations between 30% and 40% above the threshold value were Bornholm Basin, Gdansk Basin, Western Gotland Basin and Northern Baltic Proper with EQRs values of 0.33 to 0.38 reflecting a poor status. In the Gulf of Finland Western the threshold was exceeded by 25% resulting in a moderate status classification based on the EQRs value of 0.42. A minor exceedance of the threshold for TN between 10% and 15% was found in the Åland Sea and the Gulf of Finland Eastern with respective EQRs values of 0.49 and 0.50 indicating a moderate status. In seven sub-basins (The Sound, Bay of Mecklenburg, Arkona Basin, Gulf of Riga, Bothnian Sea, The Quark and Bothnian Bay), a very minor exceedance of the threshold value for TN below 10% was observed with EQRs values between 0.52-0.59, indicating a still moderate status, but very close to the threshold value. All EQRs values were related to the good/moderate boundary of 0.6 to evaluate if TN concentrations were below or above the threshold.

The variability of the TN concentrations between the individual assessment years is shown in Figure 5. The variability was largest in the Pomeranian Bay, indicating the strong influence of the Odra river plume. In general, smaller assessment units that are more strongly influenced by riverine nutrient inputs and have higher TN concentrations, show a larger variability between the years. In Kiel Bay, TN concentrations exceeded the threshold value in 2021, but were well below the threshold in all other years.

Total Nitrogen

EQRS Status

High (4)
Good (24)
Moderate (51)
Poor (28)
Bad (21)
Not assessed (124)

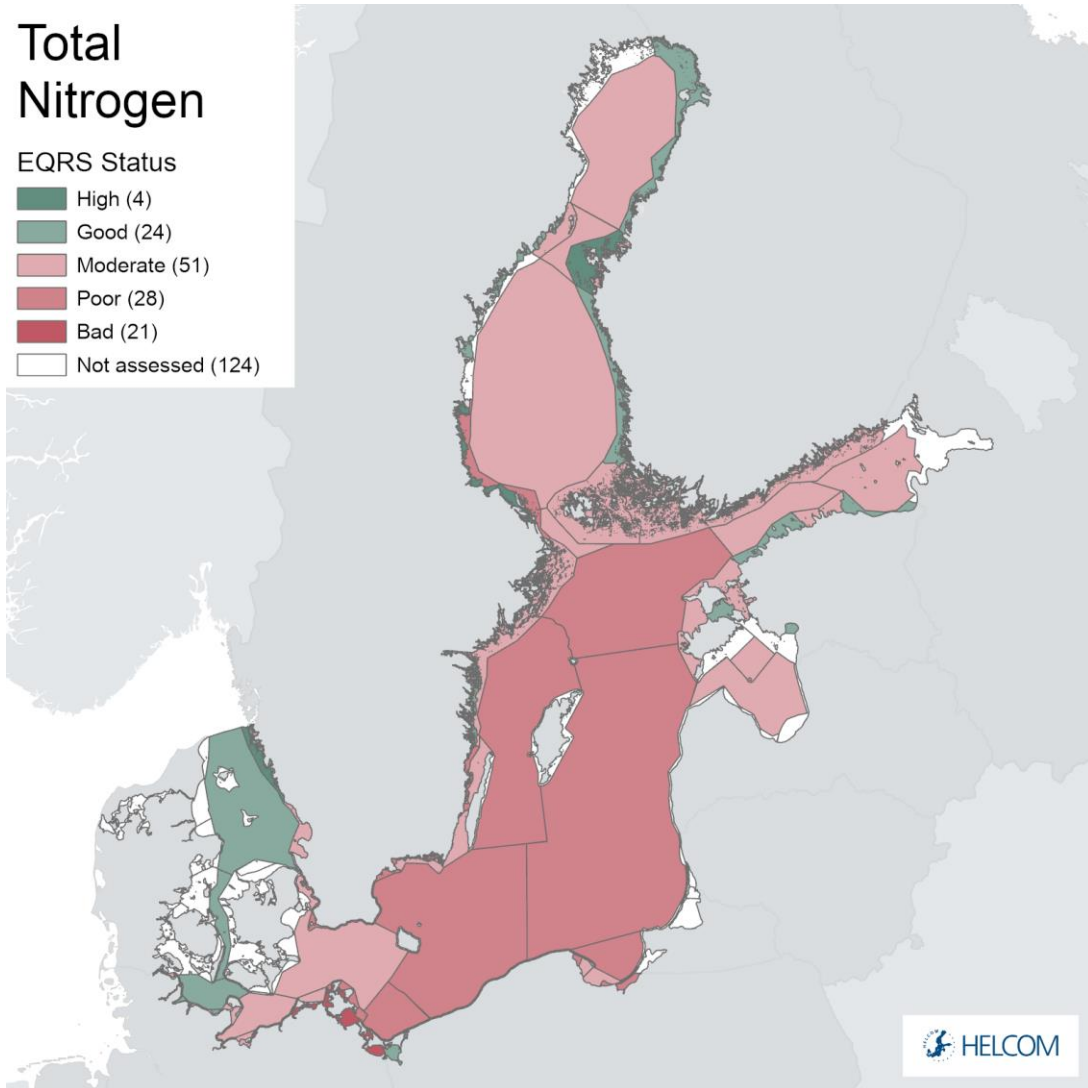


Figure 4. Detailed eutrophication assessment with the ecological quality ratio scaled (EQRS). EQRS of total nitrogen being split into 5 classes to show a more differentiated picture than the 2-class division used in the key message figures. EQRS is calculated as the ratio of the average concentration during assessment period and the reference value, decreasing along with increasing eutrophication. When $EQRS \geq 0.6$ good status is achieved.

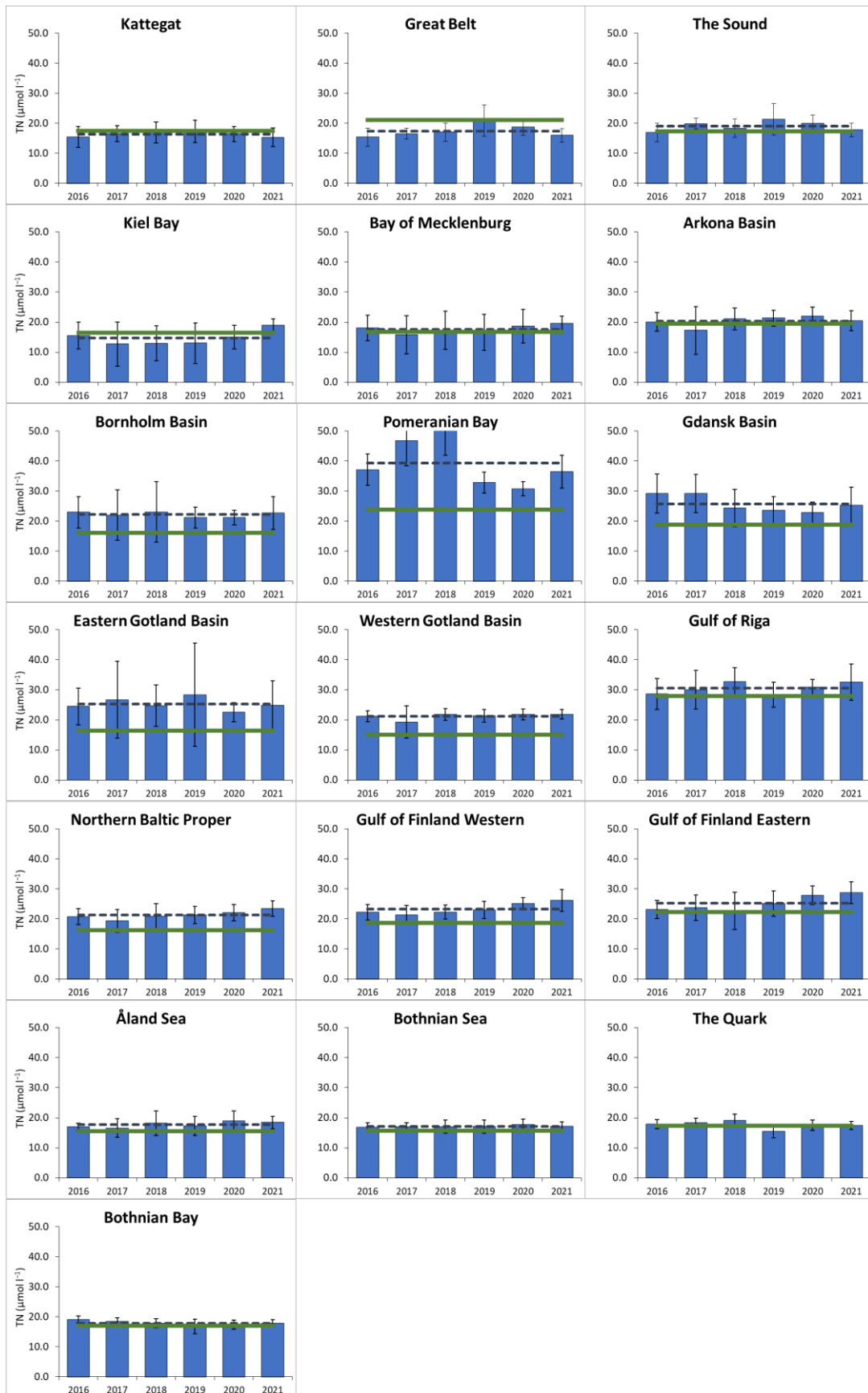


Figure 5. Average annual surface total nitrogen concentrations (dashed dark blue line; average for 2016-2021) in $\mu\text{mol L}^{-1}$ and threshold levels as agreed by HELCOM HOD 39-2012 or HELCOM HOD in 2022 via correspondence (green line) for assigned Assessment Units (AU).

Table 3. Threshold values, present concentration (as average 2016-2021), Ecological quality ratio scaled (EQRS) and status of total nitrogen in the open-sea basins. EQRS is calculated as the ratio of the average concentration during the assessment period and the reference value. Please note that coastal areas shown are from national reporting and can reflect annual or summer data (see Table 4 for details).

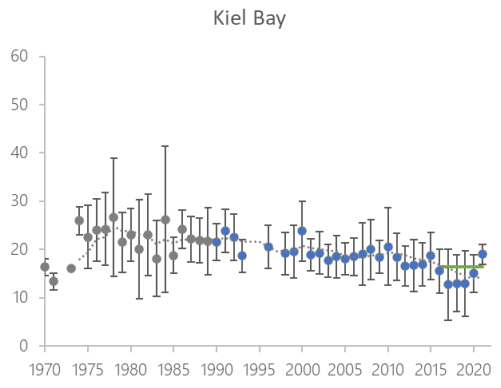
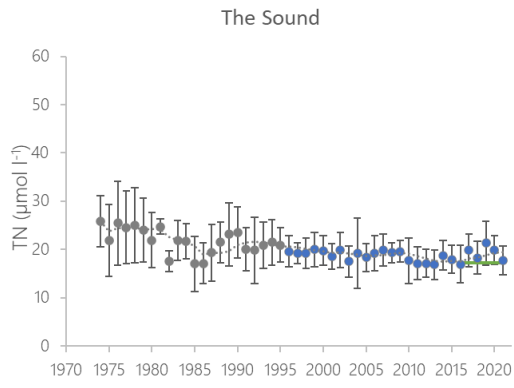
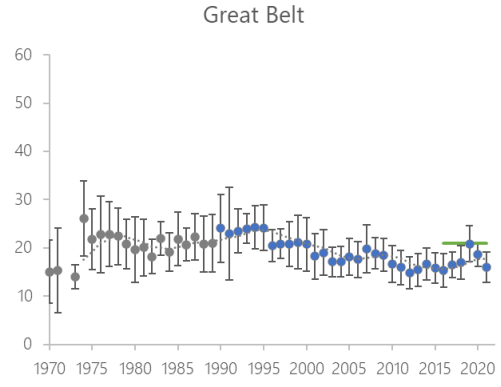
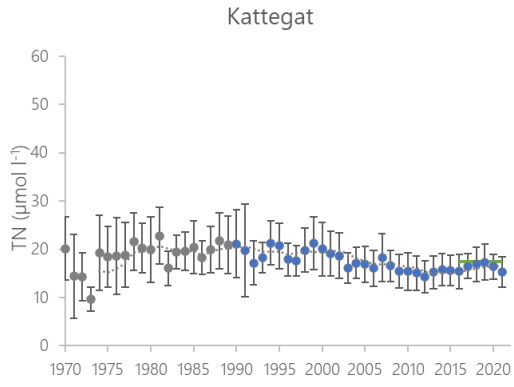
Assessment unit (open sea)	Threshold value ($\mu\text{mol l}^{-1}$)	Average 2016-2021 ($\mu\text{mol l}^{-1}$)	Ecological quality ratio (scaled) (EQRS)	STATUS (fail/achieve threshold value)
Kattegat	17.4	16.30	0.67	Achieve
Great Belt	21.0	17.36	0.80	Achieve
The Sound	17.3	19.00	0.52	Fail
Kiel Bay	16.4	14.70	0.72	Achieve
Bay of Mecklenburg	16.7	17.62	0.56	Fail
Arkona Basin	19.5	20.36	0.57	Fail
Bornholm Basin	16.05	22.13	0.34	Fail
Pomeranian Bay	23.8	39.30	0.27	Fail
Gdansk Basin	18.8	25.70	0.35	Fail
Eastern Gotland Basin	16.5	25.28	0.28	Fail
Western Gotland Basin	15.1	21.24	0.33	Fail
Gulf of Riga	28.0	30.55	0.52	Fail
Northern Baltic Proper	16.2	21.26	0.38	Fail
Gulf of Finland Western	18.7	23.31	0.42	Fail
Gulf of Finland Eastern	22.3	25.16	0.50	Fail
Åland Sea	15.6	17.73	0.49	Fail
Bothnian Sea	15.7	17.12	0.52	Fail
The Quark	17.3	17.62	0.59	Fail
Bothnian Bay	16.9	17.87	0.55	Fail

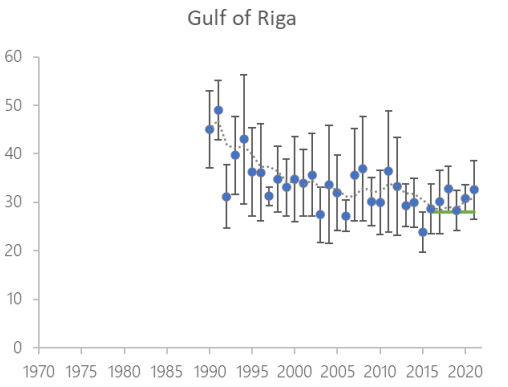
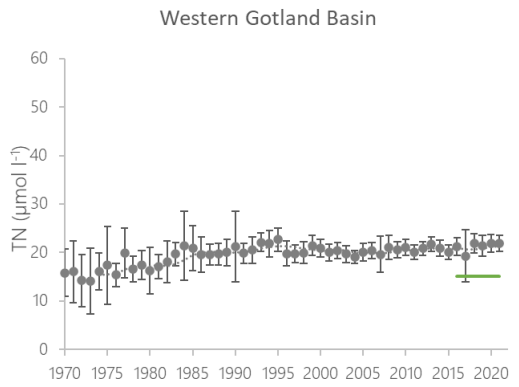
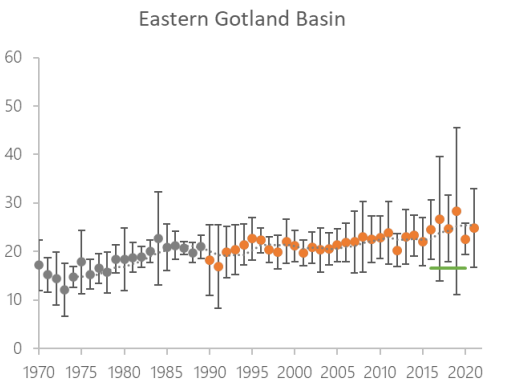
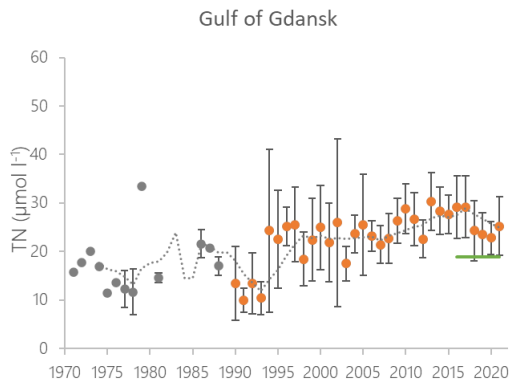
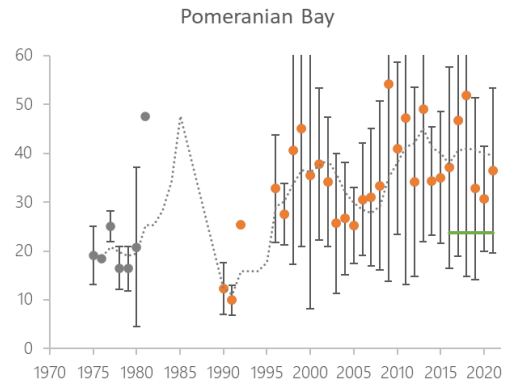
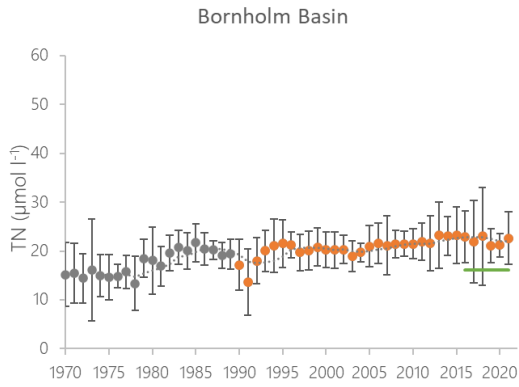
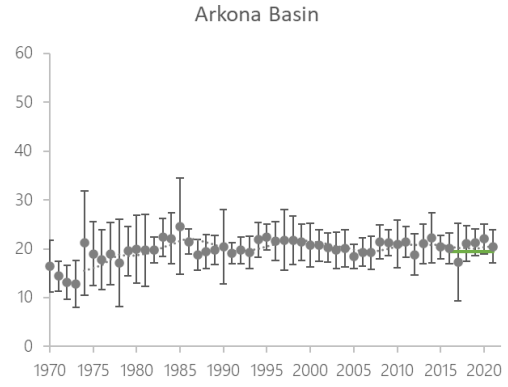
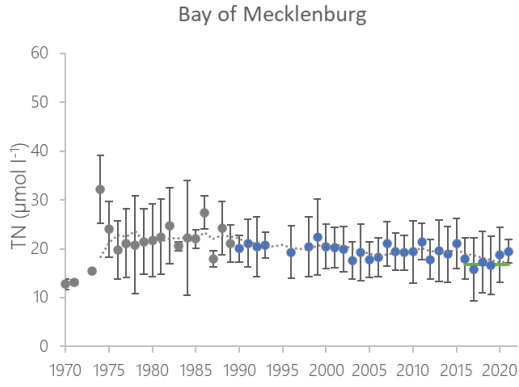
Concerning the coastal waters TN was assessed in Estonian, Finnish, German, Polish and Swedish waters. In German coastal waters five out of the 43 water bodies assessed achieved good status. In Finnish coastal waters five out of 12 water bodies were assessed as good, while in Estonian waters five out of 14 water bodies achieved good status. In Polish waters two water bodies out of 19 reached good status. In Swedish coastal waters, TN assessments were carried out for different seasons (summer and winter). Out of 19 water bodies with two potential assessment results each for summer and winter, 11 assessment results indicated good status, either for summer or winter. The majority of assessment areas in good status was achieved for total nitrogen in winter (eight assessment areas), while only three assessment areas achieved good status in summer. Only in Kattegat West Coast outer coastal waters, good status was achieved in both seasons for total nitrogen.

4.2 Trends

Long-term trends

Long-term temporal trends allow to evaluate the actual six-years assessment period in its annual changes compared to previous evaluation periods and to previous decades. Moreover, they provide an impression what can be expected for the near future and perhaps when thresholds will be met or concentrations fall below the thresholds in the future. Data of TN concentrations are presented for all assessment units for the extended time period of 50 years in Results figure 3, with the exception of the Gulf of Riga, where TN data are only available since 1990, and considerable data gaps in the Pomeranian Bay between 1980 and 1995. Significant improving trends (decreasing TN concentrations) since the 1990s were documented for the assessment units of Kattegat, Great Belt, The Sound, Kiel Bay, Bay of Mecklenburg, Gulf of Riga, Northern Baltic Proper, Gulf of Finland Western and Eastern, Åland Sea, The Bothnian Sea, The Quark and Bothnian Bay. Deteriorating trends (increasing TN concentrations) were observed in the Bornholm Basin, Pomeranian Bay, Gulf of Gdansk and the Eastern Gotland Basins, while other areas showed a relative stable situation during the recent decades in Arkona Basin and Western Gotland Basin. In the current assessment period of the last six years, a declining trend of total nitrogen can be deduced for the Bothnian Bay and the Kattegat, while increasing concentrations were detected for Bay of Mecklenburg, Northern Baltic Proper, Gulf of Finland Western and Eastern and the Åland Sea. All other assessment units showed more or less inter-annual variability without a clear tendency or trend. Kattegat, Great Belt and Kiel Bay were below the threshold and achieved good status, while Arkona Basin, Bay of Mecklenburg and The Quark were closest to the threshold, but still in not good status. All others sub-basins were above the aimed threshold values as indicated by the green line in Figure 6.





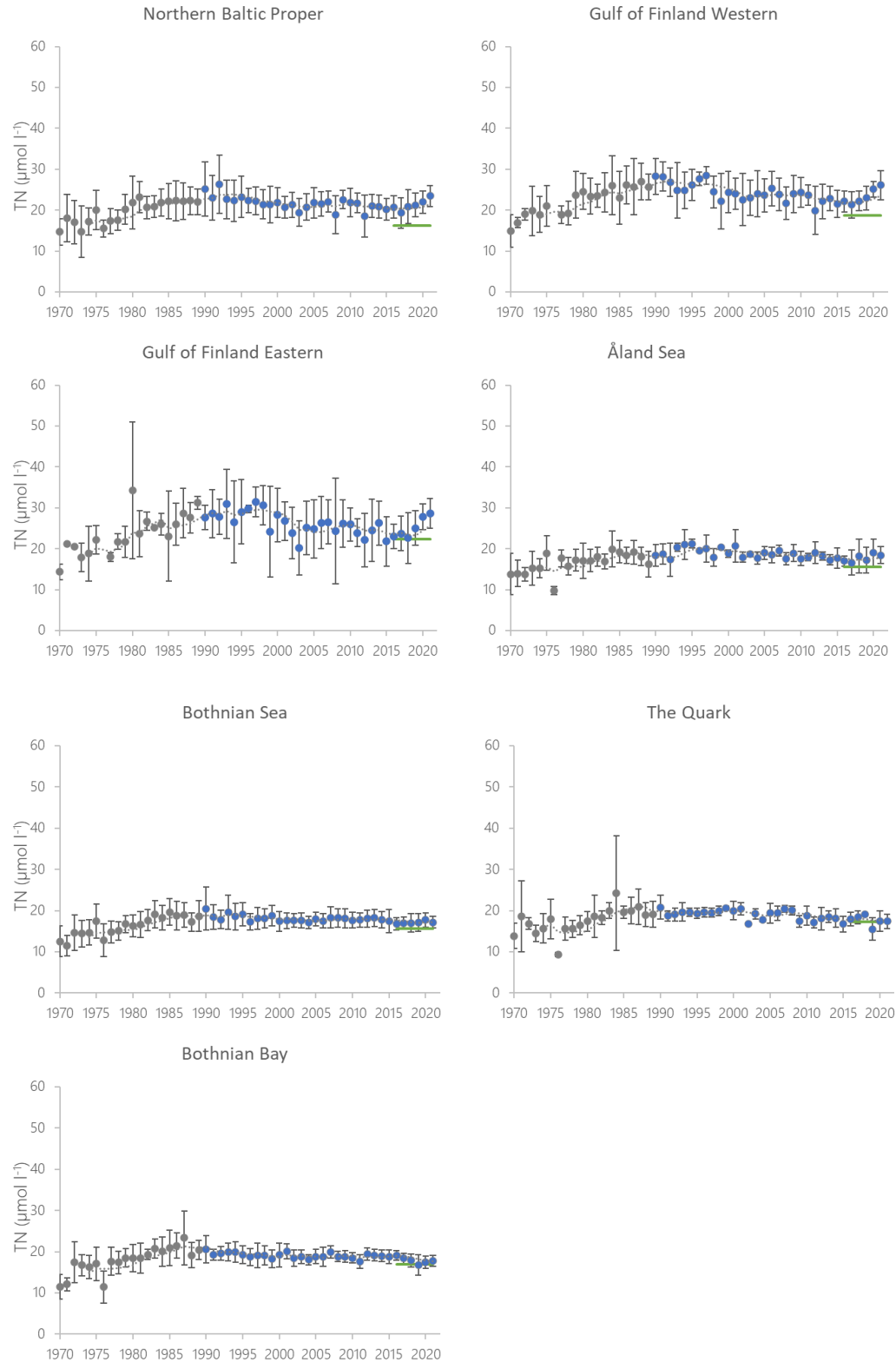


Figure 6. Temporal development of total nitrogen (TN) concentrations in the open-sea assessment units in 1970-2016. Dashed lines show the five-year moving averages and error bars the standard deviation. Green lines denote the indicator threshold. Significance of trends was assessed with Mann-Kendall non-parametric tests for the period from 1990-2021. Significant ($p < 0.05$) improving trends are indicated with blue, deteriorating trends with orange data points and those without colour were insignificant.

4.3 Discussion text

Assessment results for TN concentrations (as EQRS values) were compared between the latest two assessments of HOLAS II and HOLAS 3 (Table 4). One status change was observed between the two assessment periods in Kiel Bay, where good status was achieved in HOLAS 3. The majority of assessment units (16 out of 19 assessment units) showed no distinct change (within 15% change between HOLAS II and 3), with about half of the assessment units showing decreasing EQRS values (i.e. increasing TN concentrations meaning further deterioration) in the Northern Baltic Proper, Western Gotland Basin, Gulf of Riga, Gulf of Finland and The Sound, while increasing EQRS values were observed for the other half of the assessment units, indicating an improvement. In the Gdansk Basin increasing EQRS values were close to the 15% change boundary, indicating a clearly improving status for TN concentrations. In Eastern Gotland Basin a distinct negative change of about 20% was observed with decreasing EQRS values (i.e. increasing TN concentrations) of the already poor status classification. In the Bay of Mecklenburg and Kiel Bay distinct positive changes were detected between the two assessment periods, indicating improving conditions, which have already led to achieving good status in Kiel Bay.

Table 4. Comparison of TN EQRS values between HOLAS II and HOLAS 3 (coloured red or green depending on whether the assessment unit achieves or fails to achieve good status) and a description of the trend observed (distinct change when >15%).

HELCOM Assessment Unit name	HOLAS II 2011-2016 (EQRS)	HOLAS 3 2016-2021 (EQRS)	Distinct trend between current and previous assessment.
Kattegat	0.69	0.67	No distinct change
Great Belt	0.79	0.80	No distinct change
The Sound	0.56	0.52	No distinct change
Kiel Bay	0.51	0.72	Distinct improving change
Bay of Mecklenburg	0.47	0.56	Distinct improving change
Arkona Basin	0.55	0.57	No distinct change
Bornholm Basin	0.32	0.34	No distinct change
Pomeranian Bay	0.26	0.27	No distinct change
Gdansk Basin	0.31	0.35	No distinct change
Eastern Gotland Basin	0.34	0.28	Distinct deteriorating change
Western Gotland Basin	0.34	0.33	No distinct change
Gulf of Riga	0.55	0.52	No distinct change
Northern Baltic Proper	0.40	0.38	No distinct change
Gulf of Finland Western	0.46	0.42	No distinct change
Gulf of Finland Eastern	0.55	0.50	No distinct change
Åland Sea	0.48	0.49	No distinct change
Bothnian Sea	0.50	0.52	No distinct change
The Quark	0.58	0.59	No distinct change
Bothnian Bay	0.50	0.55	No distinct change

5 Confidence

The overall confidence of the indicator is based on the temporal confidence, spatial confidence and accuracy of the monitoring data for the assessment period 2016-2021 carried out in the HEAT tool. In general, the aspect of temporal coverage of monitoring data considers the confidence of the indicator in terms of its year-to-year variation and the continuity of observations during the indicator-specific assessment season, in this case the entire year from January to December. The general temporal confidence (GTC) is assessed based on the number of annual observations during the assessment period, whereas for the specific temporal confidence (STC) the number of missing months in the respective assessment season (entire year) determines the classification. The specific spatial confidence (SSC) evaluates the spatial representability of the monitoring data and is based on a gridded approach. Lastly, the accuracy confidence (ACC) indicates how certain the assessment is in relation to the variability of the data to estimate the probability of correct classification in terms of failing or achieving good status. To combine the different confidence assessments GTC and STC are averaged to an overall result for temporal confidence and this result is then averaged with SSC and subsequently combined with ACC to obtain a result for the indicator.

The overall confidence of the indicator status evaluation in open sea areas, based on the spatial and temporal coverage of data and the accuracy of the classification results was high in the Kattegat, Kiel Bay, Bay of Mecklenburg, Arkona and Bornholm Basin, Western and Eastern Gotland Basin, Gulf of Riga, Northern Baltic Proper and Gulf of Finland Western. The overall confidence was moderate in Great Belt and The Sound, Pomeranian Bay, Gdansk Basin, Gulf of Finland Eastern, Bothnian Sea, The Quark and Bothnian Bay. Only in Åland Sea the overall confidence was low (see results figure 4). Looking at the different components of the overall confidence assessment separately (results figure 5), the accuracy of the assessment was high for all assessment units indicating correct classifications with a probability >90%. Selected assessment units showed a moderate to low temporal confidence and the spatial confidence was overall assessed to be worst, with a larger number of assessment units showing a moderate or low spatial confidence, necessitating an increase and better spread of monitoring stations (see Figure 8). High spatial confidence was only achieved in the Kattegat, Bay of Mecklenburg, Arkona Basin, Gulf of Riga and Gulf of Finland Western.

Confidence was assessed in all open sea assessment units, but not in coastal waters.

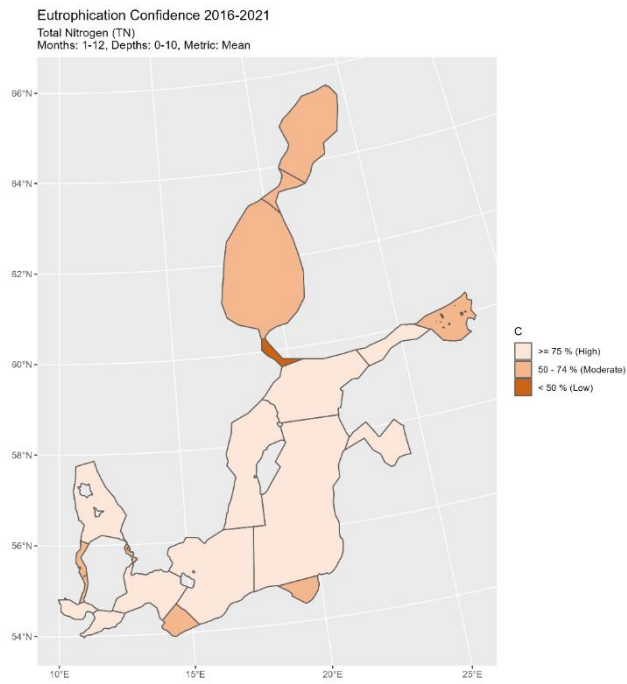


Figure 7. Overall indicator confidence (C), determined combining information on data availability and the accuracy of the classification for failing or achieving good status. Low indicator confidence calls for increase in monitoring.

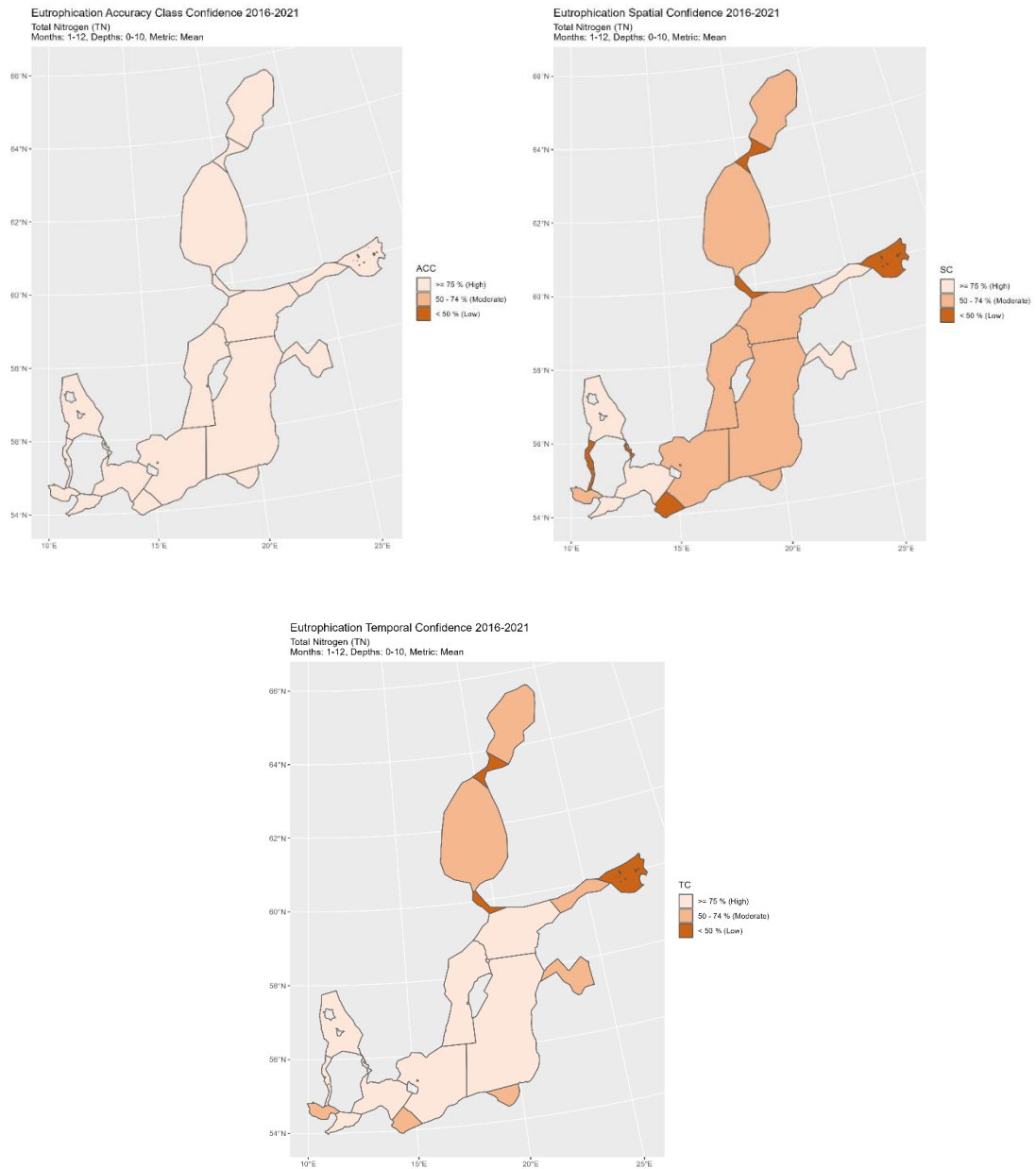


Figure 8. Confidence maps for accuracy class confidence (ACC), spatial confidence (SC) and temporal confidence (TC).

6 Drivers, Activities, and Pressures

For HOLAS 3 initial work has been carried out to explore Drivers (and driver indicators) to evaluate how such information can be utilised within such management frameworks as DAPSIM. Although it is recognised as only addressing a small portion of the drivers (via proxies) of relevance for eutrophication wastewater treatment (Drivers and driver indicators for Wastewater Treatment) and agriculture (Drivers and driver indicators for Agricultural Nutrient Balance) have been explored in these pilot studies for HOLAS 3.

Nutrient concentrations in the water column are affected by increased anthropogenic nutrient loads from land and air. Diffuse sources constitute the highest proportion of total nitrogen (nearly 50%) inputs to the Baltic Sea (HELCOM 2022). For total nitrogen, atmospheric deposition on the sea has the second highest share (24%) followed by natural background loads (20%) and point sources (9%). The importance of the four sources varies between the different sub-basins. Point sources include activities such as municipal wastewater treatment plants, industrial plants and aquacultural plants and diffuse sources consist of natural background sources, and anthropogenic sources as agriculture, managed forestry, scattered dwellings, storm water etc.

A significant reduction of nutrients input has been achieved for the whole Baltic Sea. The normalized total input of nitrogen was reduced by 12% between the reference period (1997-2003) and 2020 (HELCOM 2023). The maximum allowable input (MAI) of nitrogen in this period was fulfilled in the Bothnian Bay, Bothnian Sea, Danish Straits and Kattegat. This has, however, not yet resulted in a good status of total nitrogen concentrations in these basins, as demonstrated in this indicator assessment, indicating the delay in recovery processes from eutrophication and possibly the effects of internal nitrogen loads (Gustafsson *et al.* 2012).

Further developing an overview of such components and the relevant data to be able to better quantify the linkages within a causal framework provide the opportunity for more informed management decisions, for example targeting of measures, and can thereby support the achievement of Good Environmental Status. This indicator itself addresses the inputs of nutrients to the Baltic Sea (i.e. pressures) and a number of status indicators exist, thus an improved understanding of the relevant components related to drivers and activities (their data sources and how to evaluate them) can significantly improve the overall understanding of eutrophication and appropriate management of the issue.

Table 5. Brief summary of relevant pressures and activities with relevance to the indicator.

	General	MSFD Annex III, Table 2a
Strong link		Substances, litter and energy - Input of nutrients – diffuse sources, point sources, atmospheric deposition
Weak link		

7 Climate change and other factors

The current knowledge of the effects of climate change to eutrophication is summarized in the HELCOM climate change fact sheet (HELCOM and Baltic Earth 2021). The effect of climate change to the nutrient pools is not yet separable from the other pressures, and the future nutrient pools will dominantly be affected by the development of nutrient loading. The phytoplankton growth season has already prolonged due to changes in cloud cover and stratification. Climate change is, with medium confidence, considered to increase the stratification, further deteriorate near-bottom oxygen conditions, and increase the internal nutrient loading (Gustafsson *et al.* 2012). Climate change also leads to a higher variability in riverine nutrient inputs, with an increase of floods and droughts. Such extreme events might have a direct impact on the nutrient concentrations in the Baltic Sea.

8 Conclusions

The status evaluation fails to achieve good status in all assessed sub-basins except for Kattegat, Great Belt and Kiel Bay.

8.1 Future work or improvements needed

A better harmonisation of the thresholds for TN between coastal waters and the open Baltic Sea Basins might be necessary in the future, in particular in areas where coastal waters are already assessed as achieving good status while the open basins still fail to achieve good status, since such a gradient would not be expected to occur assuming that high nutrient concentrations are mainly caused by riverine nutrient inputs. In addition, a better understanding needs to be developed on how nutrient concentrations react to ongoing climate change and how they are influenced by extreme hydrological events (floods, droughts). Lastly, the interlinkages between nitrogen inputs and nitrogen concentrations in the sea also need to be better understood.

9 Methodology

9.1 Scale of assessment

The core indicator is applicable in the 19 open sea assessment units (at least one nautical mile seawards from the baseline). In the coastal units, the indicator is assessed using comparable indicators developed nationally for the purposes of assessments under the EU Water Framework Directive.

The assessment units are defined in the [HELCOM Monitoring and Assessment Strategy Annex 4](#).

9.2 Methodology applied

For the open sea assessment, this core indicator is updated using data reported by Contracting Parties to the HELCOM COMBINE database hosted by ICES, using the algorithms developed for the eutrophication assessment work flow. The values are achieved using indicators specifications shown in Table 6 ([see HELCOM Eutrophication assessment manual](#)).

Table 6. Specifications for the TN indicator.

Indicator	Total nitrogen (TN)
Response to eutrophication	Positive
Parameters	Total nitrogen concentration ($\mu\text{mol l}^{-1}$)
Data source	Monitoring data provided by the HELCOM Contracting Parties, and kept in the HELCOM COMBINE database, hosted by ICES (www.ices.dk)
Assessment period (test assessment)	2016-2021
Assessment season	Annual / Summer (June-September)
Depth	Surface = average in the 0 - 10 m layer
Removing outliers	No outliers removed
Removing close observations	No close observations removed
Indicator level	average of annual/seasonal average values (mostly average = arithmetic mean, in some Contracting Parties the median is used instead to assess status versus threshold)
Eutrophication Quality Ratio (EQR)	$\text{EQR} = \text{BEST} / \text{ES},$ where $\text{BEST} = \text{ET} / (1 + \text{ACDEV} / 100)$ $\text{ET} = \text{threshold (table 1)}$ $\text{ACDEV} = \text{acceptable deviation: 50 \% for TN.}$ The final EQR values are scaled after normalisation to five classes of 0.2 width and a Scaled Eutrophication Quality Ratio is obtained (EQRS).
Indicator confidence	The confidence assessment for eutrophication indicators is included in HEAT, and includes aspects of temporal, spatial and accuracy confidence. The general methodology of the confidence assessment

is described in Document 4.2 of IN-Eutrophication 16-2020 and updates are described in documents 4J-80 of State & Conservation 14-2021 and 4-2 of EG-EUTRO 20-2021. The R-code is available via <https://github.com/ices-tools-prod/HEAT>.

The aspect of temporal coverage of monitoring data considers the confidence of the indicator in terms of its year-to-year variation and the continuity of observations during the indicator-specific assessment season (annual/summer). The general temporal confidence (GTC) is assessed based on the number of annual observations during the assessment period, whereas for the specific temporal confidence (STC) the number of missing months in the respective assessment season (annual/summer) determines the classification. The specific spatial confidence (SSC) evaluates the spatial representability of the monitoring data and is based on a gridded approach. Lastly, the accuracy confidence (ACC) indicates how certain the assessment is in relation to the variability of the data to estimate the probability of correct classification for failing or achieving good status. To combine the different confidence assessments GTC and STC are averaged to an overall result for temporal confidence and this result is then averaged with SSC and subsequently combined with ACC to obtain a result for the indicator. The evaluation criteria for general and specific temporal confidence are given in the table below.

Confidence class	Evaluation criteria for general temporal confidence	Evaluation criteria for specific temporal confidence
High (100)	The evaluation is based on > 20 annual observations during the given assessment period	0 missing months per year
Medium (50)	The evaluation is based on 7 - 20 annual observations	1 missing month per year
Low (0)	The evaluation is based on < 7 annual observations	≥ 2 missing months per year

If the specific temporal confidence is high (100) for at least half of the assessed years, it is set as high (100) for the assessment period. The total temporal confidence is the average of the general and specific temporal confidence aspects.

The evaluation criteria for spatial confidence are given in the table below.

Confidence class	Evaluation criteria for spatial confidence
High (100)	Sampled grid cells cover > 70 % of the assessment-unit area
Medium (50)	Sampled grid cells cover 50-70 % of the assessment-unit area

	Low (0)	Sampled grid cells cover < 50 % of the assessment-unit area
	The accuracy aspect assesses the probability of correct classification (the classification being below or above the threshold for good status).	
	The evaluation criteria for accuracy aspect are given in table below.	
	Confidence class	Evaluation criteria for spatial confidence
High (100)	GES has been/ not been achieved by $\geq 90\%$ probability	
Medium (50)	GES has been/ not been achieved by 70 - < 90% probability	
Low (0)	GES has been/ not been achieved by < 70% probability	
Indicator threshold value confidence	MODERATE	

9.3 Monitoring and reporting requirements

Monitoring methodology

Monitoring of nitrogen concentrations by the Contracting Parties of HELCOM is described on a general level in the HELCOM Monitoring Manual in the [sub-programme Nutrients](#).

Monitoring guidelines specifying the [sampling strategies for total nitrogen](#) are adopted and published.

Current monitoring

The monitoring activities relevant to the indicator, as currently carried out by HELCOM Contracting Parties, are described in the HELCOM Monitoring Manual [sub-programme Nutrients](#) monitoring concepts table.

Description of optimal monitoring

Regional monitoring of total nitrogen is considered sufficient to support the indicator evaluation. Increased temporal and spatial monitoring in certain areas would further improve the confidence in future assessments.

10 Data

The data and resulting data products (e.g. tables, figures and maps) available on the indicator web page can be used freely given that it is used appropriately and the source is cited.

[Result: Total nitrogen \(TN\)](#)

Data source: The average for 2016-2021 was estimated using monitoring data provided by the HELCOM Contracting Parties, and kept in the HELCOM COMBINE database, hosted by ICES (www.ices.dk). Nominated members of HELCOM STATE & CONSERVATION group were given the opportunity to review the data, and to supply any missing monitoring observations, in order to achieve a complete dataset.

Description of data: The data include total nitrogen observations, determined as explained in the HELCOM monitoring manual. Measurements made at the depth of 0-10 m from the surface were used in the assessment.

Geographical coverage: The observations are distributed in the sub-basins according to the HELCOM monitoring programme, added occasionally with data from research cruises.

Temporal coverage: The raw data includes observations throughout the year, during the assessment period 2016-2021. For the summer average, observations taken during June-September were included only.

Data aggregation: The 2016-2021 averages for each sub-basin were produced as inter-annual estimates using observations from all months / June-September.

11 Contributors

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12 Archive

This version of the HELCOM core indicator report was published in April 2023:

The current version of this indicator (including as a PDF) can be found on the [HELCOM indicator web page](#).

[Total nitrogen \(TN\) HELCOM core indicator 2018](#) (pdf)

[HOLAS II component - Core indicator report – web-based version July 2017](#) (pdf)

[Nutrient concentrations 2003-2007 - HELCOM Core Indicator Report](#) (pdf)

13 References

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HELCOM (2023) “Inputs of Nutrients to the Sub-Basins (2023). HELCOM Core Indicator Report. Online.” 2023.

HELCOM and Baltic Earth (2021) Climate Change in the Baltic Sea. 2021 Fact Sheet. Baltic Sea Environment Proceedings N°180. <https://doi.org/ISSN:0357-2994>.

14 Other relevant resources

HELCOM: First version of the 'State of the Baltic Sea' report – June 2017, Baltic Marine Environment Protection Commission – HELCOM, Helsinki, Finland, 197, 2017.

[Eutrophication status of the Baltic Sea 2007-2011 - A concise thematic assessment](#) (2014)

[Approaches and methods for eutrophication target setting in the Baltic Sea region](#) (2013)

[HELCOM core indicators. Final report of the HELCOM CORESET project](#) (2013)

[Eutrophication in the Baltic Sea. An integrated thematic assessment of the effects of nutrient enrichment in the Baltic Sea region](#) (2009)

[Development of tools for assessment of eutrophication in the Baltic Sea](#) (2006)

The table below provides an overview of coastal data.

Annex providing an overview of additional coastal evaluations reported by Contracting Parties

Annex table 1. Results for national coastal Total Nitrogen indicators by coastal WFD water type/water body. The table includes information on the assessment unit (CODE, defined in the [HELCOM Monitoring and Assessment Strategy Annex 4](#)) and description, assessment period (start year and/or end year), threshold value (ET) in $\mu\text{mol/l}$ with exceptions of **3002 and 7003-7004 indicator** being measured in mg/l . Average concentration during assessment period (ES) in $\mu\text{mol/l}$ with exceptions of **3002 and 7003-7004 indicator** being measured in mg/l and standard deviation (SD), Ecological Quality Ratio (EQR) and Ecological Quality Ratio Scaled (EQRS). EQRS shows the present concentration in relation to the reference value, decreasing along with increasing eutrophication. EQRS_class estimates the ecological status based on the EQRS value.

IndicatorID	Name	Period	Unit ID	HELCOMID	HELCOM ID description	Assessment Unit	ET	ES	SD	EQR	EQRS	EQRS Class
1002	Total Nitrogen	20162020	1001	GER-001	mesohaline inner coastal waters, Wismarbucht, Suedteil	Bay of Mecklenburg	22.50	33.90	NA	0.44	0.28	Poor
1002	Total Nitrogen	20162020	1002	GER-002	mesohaline inner coastal waters, Wismarbucht, Nordteil	Bay of Mecklenburg	22.50	24.80	NA	0.60	0.51	Moderate
1002	Total Nitrogen	20162020	1003	GER-003	mesohaline inner coastal waters, Wismarbucht, Salzhaff	Bay of Mecklenburg	22.50	71.48	NA	0.21	0.11	Bad
1002	Total Nitrogen	20162020	1004	GER-004	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Travemuende bis Warnemuende	Bay of Mecklenburg	19.50	20.72	NA	0.63	0.54	Moderate
1002	Total Nitrogen	20162020	1005	GER-005	mesohaline inner coastal waters, Unterwarnow	Bay of Mecklenburg	17.70	76.33	NA	0.15	0.08	Bad
1002	Total Nitrogen	20162020	1006	GER-006	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Warnemuende bis Darss	Bay of Mecklenburg	19.50	27.46	NA	0.47	0.33	Poor

1002	Total Nitrogen	20162020	1007	GER-007	oligohaline inner coastal waters, Ribnitzer See / Saaler Bodden	Arkona Basin	38.10	204.97	NA	0.12	0.06	Bad
1002	Total Nitrogen	20162020	1008	GER-008	oligohaline inner coastal waters, Koppelstrom / Bodstedter Bodden	Arkona Basin	38.10	157.28	NA	0.16	0.08	Bad
1002	Total Nitrogen	20162020	1009	GER-009	mesohaline inner coastal waters, Barther Bodden, Grabow	Arkona Basin	17.70	92.84	NA	0.13	0.07	Bad
1002	Total Nitrogen	20162020	1010	GER-010	mesohaline open coastal waters, Prerowbucht/ Darsser Ort bis Dornbusch	Arkona Basin	18.00	22.18	NA	0.54	0.42	Moderate
1002	Total Nitrogen	20162020	1011	GER-011	mesohaline inner coastal waters, Westruegensche Bodden	Arkona Basin	17.70	48.40	NA	0.24	0.13	Bad
1002	Total Nitrogen	20162020	1012	GER-012	mesohaline inner coastal waters, Strelasund	Arkona Basin	17.70	43.22	NA	0.27	0.14	Bad
1002	Total Nitrogen	20162020	1013	GER-013	mesohaline inner coastal waters, Greifswalder Bodden	Arkona Basin	17.70	40.45	NA	0.29	0.15	Bad
1002	Total Nitrogen	20162020	1014	GER-014	mesohaline inner coastal waters, Kleiner Jasmunder Bodden	Arkona Basin	17.70	146.37	NA	0.08	0.04	Bad
1002	Total Nitrogen	20162020	1015	GER-015	mesohaline open coastal waters, Nord- und Ostruegensche Gewaesser	Arkona Basin	18.00	24.54	NA	0.49	0.35	Poor

1002	Total Nitrogen	20162020	1016	GER-016	oligohaline inner coastal waters, Peenestrom	Bornholm Basin	38.10	109.06	NA	0.23	0.12	Bad
1002	Total Nitrogen	20162020	1017	GER-017	oligohaline inner coastal waters, Achterwasser	Bornholm Basin	38.10	122.03	NA	0.21	0.11	Bad
1002	Total Nitrogen	20162020	1018	GER-018	mesohaline open coastal waters, Pommersche Bucht, Nordteil	Arkona Basin	18.00	31.15	NA	0.39	0.20	Poor
1002	Total Nitrogen	20162020	1019	GER-019	mesohaline open coastal waters, Pommersche Bucht, Südteil	Bornholm Basin	18.00	45.03	NA	0.27	0.14	Bad
1002	Total Nitrogen	20162020	1020	GER-020	oligohaline inner coastal waters, Kleines Haff	Bornholm Basin	38.10	98.02	NA	0.26	0.14	Bad
1002	Total Nitrogen	20132018	1021	GER-021	mesohaline inner coastal waters, Flensburg Innenfoerde	Kiel Bay	19.70	19.65	NA	0.67	0.60	Good
1002	Total Nitrogen	20132018	1023	GER-023	meso- to polyhaline open coastal waters, seasonally stratified, Flensburger Aussenfoerde	Kiel Bay	15.00	17.59	NA	0.57	0.46	Moderate
1002	Total Nitrogen	20132018	1024	GER-024	mesohaline open coastal waters, Aussenschlei	Kiel Bay	14.30	12.67	NA	0.75	0.72	Good
1002	Total Nitrogen	20132018	1025	GER-025	mesohaline inner coastal waters, Schleimuende	Kiel Bay	19.70	65.16	NA	0.20	0.11	Bad
1002	Total Nitrogen	20132018	1026	GER-026A	A.mesohaline inner coastal waters, Mittlere Schlei	Kiel Bay	37.10	118.78	NA	0.21	0.11	Bad

1002	Total Nitrogen	20132018	1027	GER-026B	B.mesohaline inner coastal waters, Mittlere Schlei	Kiel Bay	37.10	118.78	NA	0.21	0.11	Bad
1002	Total Nitrogen	20132018	1029	GER-028	mesohaline open coastal waters, Eckerfoerder Bucht, Rand	Kiel Bay	14.30	18.90	NA	0.50	0.37	Poor
1002	Total Nitrogen	20132018	1030	GER-029	meso- to polyhaline open coastal waters, seasonally stratified, Eckerfoerderbucht, Tiefe	Kiel Bay	15.00	14.91	NA	0.67	0.61	Good
1002	Total Nitrogen	20132018	1032	GER-031	meso- to polyhaline open coastal waters, seasonally stratified, Kieler Aussenfoerde	Kiel Bay	15.00	16.42	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1033	GER-032	mesohaline inner coastal waters, Kieler Innenfoerde	Kiel Bay	19.70	22.89	NA	0.57	0.47	Moderate
1002	Total Nitrogen	20132018	1034	GER-033	mesohaline open coastal waters, Probstei	Kiel Bay	14.30	16.32	NA	0.58	0.48	Moderate
1002	Total Nitrogen	20132018	1036	GER-035	meso- to polyhaline open coastal waters, seasonally stratified, Hohwachter Bucht	Kiel Bay	15.00	13.79	NA	0.73	0.68	Good
1002	Total Nitrogen	20132018	1037	GER-036A	A.mesohaline open coastal waters, Fehmarnsund	Kiel Bay	14.30	15.63	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1038	GER-036B	B.mesohaline open coastal waters, Fehmarnsund	Bay of Mecklenburg	14.30	15.63	NA	0.61	0.52	Moderate

1002	Total Nitrogen	20132018	1039	GER-037	mesohaline inner coastal waters, Orther Bucht	Kiel Bay	19.70	21.55	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1040	GER-038A	A.mesohaline open coastal waters, Fehmarnbelt	Kiel Bay	14.30	15.95	NA	0.60	0.50	Moderate
1002	Total Nitrogen	20132018	1041	GER-038B	B.mesohaline open coastal waters, Fehmarnbelt	Bay of Mecklenburg	14.30	15.95	NA	0.60	0.50	Moderate
1002	Total Nitrogen	20132018	1042	GER-039	meso- to polyhaline open coastal waters, seasonally stratified, Fehmarn Sund Ost	Bay of Mecklenburg	15.00	14.34	NA	0.70	0.64	Good
1002	Total Nitrogen	20132018	1043	GER-040	mesohaline open coastal waters, Groemitz	Bay of Mecklenburg	14.30	19.26	NA	0.50	0.36	Poor
1002	Total Nitrogen	20132018	1044	GER-041	mesohaline open coastal waters, Neustaedter Bucht	Bay of Mecklenburg	14.30	17.39	NA	0.55	0.43	Moderate
1002	Total Nitrogen	20132018	1046	GER-043	mesohaline inner coastal waters, Poetenitzer Wiek	Bay of Mecklenburg	37.10	120.37	NA	0.21	0.11	Bad
1002	Total Nitrogen	20132018	1047	GER-044	mesohaline inner coastal waters, Untere Trave	Bay of Mecklenburg	37.10	135.51	NA	0.18	0.10	Bad
1002	Total Nitrogen	20162020	1048	GER-111	mesohaline inner coastal waters, Nordruegensche Bodden	Arkona Basin	17.70	52.80	NA	0.22	0.12	Bad
3001	Total Nitrogen	20162021	3001	EST-001	Narva-Kunda Bay CWB	Gulf of Finland	NA	NA	NA	0.75	0.70	Good
3001	Total Nitrogen	20202020	3002	EST-002	Eru-Käsmu Bay CWB	Gulf of Finland	NA	NA	NA	0.56	0.54	Moderate

3001	Total Nitrogen	20212021	3003	EST-003	Hara and Kolga Bay CWB	Gulf of Finland	NA	NA	NA	0.58	0.55	Moderate
3001	Total Nitrogen	20162021	3004	EST-005	Muuga-Tallinna-Kakumäe Bay CWB	Gulf of Finland	NA	NA	NA	0.72	0.67	Good
3001	Total Nitrogen	20212021	3005	EST-006	Pakri Bay CWB	Gulf of Finland	NA	NA	NA	0.80	0.76	Good
3001	Total Nitrogen	20212021	3006	EST-007	Hiiu Shallow CWB	Gulf of Riga	NA	NA	NA	0.42	0.45	Moderate
3001	Total Nitrogen	20182021	3007	EST-008	Haapsalu Bay CWB	Gulf of Riga	NA	NA	NA	0.41	0.45	Moderate
3001	Total Nitrogen	20212021	3008	EST-009	Matsalu Bay CWB	Gulf of Riga	NA	NA	NA	0.33	0.40	Moderate
3001	Total Nitrogen	20212021	3009	EST-010	Soela Strait CWB	Northern Baltic Proper	NA	NA	NA	0.64	0.58	Moderate
3001	Total Nitrogen	20212021	3010	EST-011	Kihelkonna Bay CWB	Eastern Gotland Basin	NA	NA	NA	0.62	0.57	Moderate
3001	Total Nitrogen	20162021	3011	EST-013	Pärnu Bay CWB	Gulf of Riga	NA	NA	NA	0.71	0.66	Good
3001	Total Nitrogen	20162018	3012	EST-014	Kassari-Õunaku Bay CWB	Gulf of Riga	NA	NA	NA	0.70	0.63	Good
3001	Total Nitrogen	20212021	3013	EST-016	Väinameri CWB	Gulf of Riga	NA	NA	NA	0.36	0.42	Moderate
3001	Total Nitrogen	20212021	3014	EST-017	NW part of the Gulf of Riga CWB	Gulf of Riga	NA	NA	NA	NA	NA	NA

3001	Total Nitrogen	20212021	3015	EST-018	NE part of the Gulf of Riga CWB	Gulf of Riga	NA	NA	NA	NA	NA	NA
3001	Total Nitrogen	20212021	3016	EST-019	Central part of the Gulf of Riga CWB	Gulf of Riga	NA	NA	NA	0.56	0.54	Moderate
4001	Total Nitrogen (summer)	20162021	4001	FIN-001	Lounainen sisäsaaristo	Åland Sea	NA	NA	NA	NA	0.46	Moderate
4001	Total Nitrogen (summer)	20162021	4002	FIN-002	Lounainen ulkosaaristo	Åland Sea	NA	NA	NA	NA	0.54	Moderate
4001	Total Nitrogen (summer)	20162021	4003	FIN-003	Suomenlahden sisäsaaristo	Gulf of Finland	NA	NA	NA	NA	0.47	Moderate
4001	Total Nitrogen (summer)	20162021	4004	FIN-004	Suomenlahden ulkosaaristo	Gulf of Finland	NA	NA	NA	NA	0.49	Moderate
4001	Total Nitrogen (summer)	20162021	4005	FIN-005	Lounainen välisaaristo	Åland Sea	NA	NA	NA	NA	0.52	Moderate
4001	Total Nitrogen (summer)	20162021	4006	FIN-006	Merenkurkun sisäsaaristo	The Quark	NA	NA	NA	NA	0.46	Moderate
4001	Total Nitrogen (summer)	20162021	4007	FIN-007	Merenkurkun ulkosaaristo	The Quark	NA	NA	NA	NA	0.84	High
4001	Total Nitrogen (summer)	20162021	4008	FIN-008	Selkämeren sisemmät rannikkovedet	Bothnian Sea	NA	NA	NA	NA	0.67	Good

4001	Total Nitrogen (summer)	20162021	4009	FIN-009	Selkämeren ulommat rannikkovedet	Bothnian Sea	NA	NA	NA	NA	0.69	Good
4001	Total Nitrogen (summer)	20162021	4010	FIN-010	Perämeren sisemmät rannikkovedet	Bothnian Bay	NA	NA	NA	NA	0.73	Good
4001	Total Nitrogen (summer)	20162021	4011	FIN-011	Perämeren ulommat rannikkovedet	Bothnian Bay	NA	NA	NA	NA	0.76	Good
4001	Total Nitrogen (summer)	20162021	4012	FIN-012	Åland innerskärgård	Åland Sea	NA	NA	NA	0.66	0.51	Moderate
4001	Total Nitrogen (summer)	20162021	4013	FIN-013	Åland mellanskärgård	Åland Sea	NA	NA	NA	0.73	0.59	Moderate
4001	Total Nitrogen (summer)	20162021	4014	FIN-014	Åland ytterskärgård	Åland Sea	NA	NA	NA	0.73	0.59	Moderate
7003	Total Nitrogen	20162021	7001	POL-001	PL TW I WB 9 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Bornholm Basin	1.90	1.71	0.32	0.76	0.72	Good
7003	Total Nitrogen	20162021	7002	POL-002	PL TW I WB 8 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Bornholm Basin	1.90	1.68	0.21	0.77	0.73	Good

7003	Total Nitrogen	20162021	7003	POL-003	PL TW I WB 1 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Gdansk Basin	0.98	1.58	0.22	0.42	0.26	Poor
7003	Total Nitrogen	20162021	7004	POL-004	PL TW II WB 2 very sheltered, fully mixed, substratum: lagoonal fine sand medium grained sand/silty sand; residence time 138 day, ice cover >90 days	Gdansk Basin	0.30	0.58	0.10	0.36	0.20	Poor
7004	Total Nitrogen	20162021	7005	POL-005	PL TW III WB 3 partly protected, partly stratified, substratum: medium grained sand/pebbles/marine silty sand; ice-incident	Gdansk Basin	0.40	0.50	0.10	0.55	0.44	Moderate
7004	Total Nitrogen	20162021	7006	POL-006	PL TW IV WB 4 partly stratified, moderately exposed, substratum: sand/silt; ice - incidental	Gdansk Basin	0.40	0.53	0.11	0.53	0.40	Moderate
7004	Total Nitrogen	20162021	7007	POL-007	PL TW V WB 6 river mouth, partly stratified, partly sheltered, substratum: medium grained sand/silty sand	Bornholm Basin	0.27	0.73	0.06	0.25	0.13	Bad
7004	Total Nitrogen	20162021	7008	POL-008	PL TW V WB 5 river mouth, partly stratified, partly sheltered,	Gdansk Basin	0.40	0.62	0.13	0.45	0.30	Poor

					substratum: medium grained sand/silty sand							
7004	Total Nitrogen	20162021	7009	POL-009	PL TW V WB 7 river mouth, partly stratified, partly sheltered, substratum: medium grained sand/silty sand	Bornholm Basin	0.53	0.74	0.12	0.49	0.35	Poor
7004	Total Nitrogen	20162021	7010	POL-010	PL CWI WB2 coastal waters, moderately exposed, fully mixed, substratum:sand/fine sand	Gdansk Basin	0.30	0.51	0.10	0.41	0.25	Poor
7004	Total Nitrogen	20162021	7011	POL-011	PL CWI WB1 coastal waters, moderately exposed, fully mixed, substratum:sand/fine sand	Gdansk Basin	0.40	0.56	0.07	0.48	0.34	Poor
7004	Total Nitrogen	20162021	7012	POL-012	PL CWI WB3 coastal waters, moderately exposed, fully mixed, substratum:sand/fine sand	Gdansk Basin	0.30	0.63	0.13	0.33	0.18	Bad
7004	Total Nitrogen	20162021	7013	POL-013	PL CW II WB 8 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.38	0.08	0.54	0.43	Moderate

7004	Total Nitrogen	20162021	7014	POL-014	PL CW II WB 6W central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.59	0.23	0.40	0.28	Poor
7004	Total Nitrogen	20162021	7015	POL-015	PL CW II WB 6E central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.54	0.20	0.42	0.28	Poor
7004	Total Nitrogen	20162021	7016	POL-016	PL CWII WB5 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Eastern Gotland Basin	0.30	0.54	0.15	0.40	0.25	Poor
7004	Total Nitrogen	20162021	7017	POL-017	PL CWII WB4 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Gdansk Basin	0.30	0.53	0.18	0.42	0.29	Poor
7004	Total Nitrogen	20162021	7018	POL-018	PL CW III WB 9 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.40	0.63	0.09	0.43	0.27	Poor
7004	Total Nitrogen	20162021	7019	POL-019	PL CW III WB 7 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.40	0.08	0.52	0.40	Poor

80021	Total Nitrogen winter	20182018	8001	SWE-001	1s West Coast inner coastal water	Kattegat	22.03	21.38	NA	0.81	0.65	Good
80021	Total Nitrogen winter	20182018	8002	SWE-003	4 West Coast outer coastal water, Kattegat	Kattegat	22.75	18.05	NA	1.00	0.99	High
80021	Total Nitrogen winter	20182018	8003	SWE-004	5 South Halland and north Öresund coastal water	Kattegat	22.08	13.34	11.10	0.79	0.50	Moderate
80021	Total Nitrogen winter	20182018	8004	SWE-005	6 Öresund inner coastal water	The Sound	22.08	29.41	NA	0.58	0.25	Poor
80021	Total Nitrogen winter	20172017	8005	SWE-006	7 Skåne coastal water	Arkona Basin	20.33	29.13	NA	0.59	0.31	Poor
80021	Total Nitrogen winter	20182018	8006	SWE-007	8 Blekinge archipelago and Kalmarsund, inner	Western Gotland Basin	22.16	25.42	NA	0.73	0.31	Poor
80021	Total Nitrogen winter	20182018	8007	SWE-008	9 Blekinge archipelago and Kalmarsund, outer	Western Gotland Basin	20.75	21.79	NA	0.80	0.43	Moderate
80021	Total Nitrogen winter	20172017	8010	SWE-011	12n Östergötland and Stockholm archipelago	Northern Baltic Proper	22.38	24.30	NA	0.78	0.54	Moderate
80021	Total Nitrogen winter	20172017	8011	SWE-012	12s Östergötland and Stockholm archipelago	Western Gotland Basin	22.85	27.44	NA	0.70	0.63	Good

80021	Total Nitrogen winter	20172017	8012	SWE-013	13 Östergötland inner coastal water	Western Gotland Basin	27.63	38.53	NA	0.60	0.95	High
80021	Total Nitrogen winter	20172017	8013	SWE-014	14 Östergötland outer coastal water	Western Gotland Basin	23.77	26.21	NA	0.76	0.51	Moderate
80021	Total Nitrogen winter	20172017	8015	SWE-016	16 South Bothnian Sea, inner coastal water	Bothnian Sea	23.12	32.60	NA	0.60	0.80	High
80021	Total Nitrogen winter	20172017	8017	SWE-018	18 North Bothnian Sea, Höga kusten, inner	Bothnian Sea	21.63	35.02	NA	0.51	0.71	Good
80021	Total Nitrogen winter	20172017	8019	SWE-020	20 North Quark inner coastal water	The Quark	22.23	29.17	NA	0.63	0.64	Good
80021	Total Nitrogen winter	20182018	8024	SWE-025	25 Göta and Nordre älv estuary	Kattegat	22.33	23.87	NA	0.74	0.51	Moderate
80022	Total Nitrogen summer	20182018	8001	SWE-001	1s West Coast inner coastal water	Kattegat	15.65	16.87	NA	0.71	0.54	Moderate
80022	Total Nitrogen summer	20182018	8002	SWE-003	4 West Coast outer coastal water, Kattegat	Kattegat	14.72	14.43	NA	0.79	0.63	Good
80022	Total Nitrogen summer	20182018	8003	SWE-004	5 South Halland and north Öresund coastal water	Kattegat	15.58	16.14	NA	0.74	0.42	Moderate

80022	Total Nitrogen summer	20182018	8004	SWE-005	6 Öresund inner coastal water	The Sound	15.58	21.14	NA	0.57	0.25	Poor
80022	Total Nitrogen summer	20172017	8005	SWE-006	7 Skåne coastal water	Arkona Basin	19.50	20.93	NA	0.72	0.77	Good
80022	Total Nitrogen summer	20182018	8006	SWE-007	8 Blekinge archipelago and Kalmarsund, inner	Western Gotland Basin	19.93	21.24	NA	0.72	0.29	Poor
80022	Total Nitrogen summer	20182018	8007	SWE-008	9 Blekinge archipelago and Kalmarsund, outer	Western Gotland Basin	19.77	19.14	NA	0.80	0.54	Moderate
80022	Total Nitrogen summer	20182018	8010	SWE-011	12n Östergötland and Stockholm archipelago	Northern Baltic Proper	20.33	25.03	NA	0.63	0.47	Moderate
80022	Total Nitrogen summer	20182018	8011	SWE-012	12s Östergötland and Stockholm archipelago	Western Gotland Basin	19.99	25.00	NA	0.62	0.46	Moderate
80022	Total Nitrogen summer	20172017	8012	SWE-013	13 Östergötland inner coastal water	Western Gotland Basin	23.03	27.11	NA	0.66	0.49	Moderate
80022	Total Nitrogen summer	20182018	8013	SWE-014	14 Östergötland outer coastal water	Western Gotland Basin	19.96	23.41	NA	0.67	0.50	Moderate
80022	Total Nitrogen summer	20182018	8014	SWE-015	15 Stockholm archipelago, outer coastal water	Northern Baltic Proper	20.47	20.70	NA	0.76	0.51	Moderate

80022	Total Nitrogen summer	20182018	8015	SWE-016	16 South Bothnian Sea, inner coastal water	Bothnian Sea	21.59	26.67	NA	0.29	0.20	Poor
80022	Total Nitrogen summer	20182018	8016	SWE-017	17 South Bothnian Sea, outer coastal water	Bothnian Sea	21.31	19.52	NA	0.42	0.27	Poor
80022	Total Nitrogen summer	20182018	8017	SWE-018	18 North Bothnian Sea, Höga kusten, inner	Bothnian Sea	21.39	20.45	NA	0.36	0.31	Poor
80022	Total Nitrogen summer	20182018	8019	SWE-020	20 North Quark inner coastal water	The Quark	20.12	21.76	NA	0.60	0.56	Moderate
80022	Total Nitrogen summer	20182018	8020	SWE-021	21 North Quark outer coastal water	The Quark	20.13	13.49	NA	0.57	0.51	Moderate
80022	Total Nitrogen summer	20182018	8023	SWE-024	24 Stockholm inner archipelago	Northern Baltic Proper	23.72	33.94	NA	0.66	0.76	Good
80022	Total Nitrogen summer	20182018	8024	SWE-025	25 Göta and Nordre älv estuary	Kattegat	16.32	19.36	NA	0.65	0.45	Moderate

Annex Table 2

IndicatorID	Name	Period	Unit ID	HELCOMID	HELCOM ID description	Assessment Unit	ET	ES	SD	EQR	EQRS	EQRS Class
1002	Total Nitrogen	20162020	1001	GER-001	mesohaline inner coastal waters, Wismarbucht, Suedteil	Bay of Mecklenburg	22.50	33.90	NA	0.44	0.28	Poor
1002	Total Nitrogen	20162020	1002	GER-002	mesohaline inner coastal waters, Wismarbucht, Nordteil	Bay of Mecklenburg	22.50	24.80	NA	0.60	0.51	Moderate
1002	Total Nitrogen	20162020	1003	GER-003	mesohaline inner coastal waters, Wismarbucht, Salzhaff	Bay of Mecklenburg	22.50	71.48	NA	0.21	0.11	Bad
1002	Total Nitrogen	20162020	1004	GER-004	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Travemuende bis Warnemuende	Bay of Mecklenburg	19.50	20.72	NA	0.63	0.54	Moderate
1002	Total Nitrogen	20162020	1005	GER-005	mesohaline inner coastal waters, Unterwarnow	Bay of Mecklenburg	17.70	76.33	NA	0.15	0.08	Bad
1002	Total Nitrogen	20162020	1006	GER-006	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Warnemuende bis Darss	Bay of Mecklenburg	19.50	27.46	NA	0.47	0.33	Poor
1002	Total Nitrogen	20162020	1007	GER-007	oligohaline inner coastal waters, Ribnitzer See / Saaler Bodden	Arkona Basin	38.10	204.97	NA	0.12	0.06	Bad

1002	Total Nitrogen	20162020	1008	GER-008	oligohaline inner coastal waters, Koppelstrom / Bodstedter Bodden	Arkona Basin	38.10	157.28	NA	0.16	0.08	Bad
1002	Total Nitrogen	20162020	1009	GER-009	mesohaline inner coastal waters, Barther Bodden, Grabow	Arkona Basin	17.70	92.84	NA	0.13	0.07	Bad
1002	Total Nitrogen	20162020	1010	GER-010	mesohaline open coastal waters, Prerowbucht/ Darsser Ort bis Dornbusch	Arkona Basin	18.00	22.18	NA	0.54	0.42	Moderate
1002	Total Nitrogen	20162020	1011	GER-011	mesohaline inner coastal waters, Westruegensche Bodden	Arkona Basin	17.70	48.40	NA	0.24	0.13	Bad
1002	Total Nitrogen	20162020	1012	GER-012	mesohaline inner coastal waters, Strelasund	Arkona Basin	17.70	43.22	NA	0.27	0.14	Bad
1002	Total Nitrogen	20162020	1013	GER-013	mesohaline inner coastal waters, Greifswalder Bodden	Arkona Basin	17.70	40.45	NA	0.29	0.15	Bad
1002	Total Nitrogen	20162020	1014	GER-014	mesohaline inner coastal waters, Kleiner Jasmunder Bodden	Arkona Basin	17.70	146.37	NA	0.08	0.04	Bad
1002	Total Nitrogen	20162020	1015	GER-015	mesohaline open coastal waters, Nord- und Ostruegensche Gewaesser	Arkona Basin	18.00	24.54	NA	0.49	0.35	Poor
1002	Total Nitrogen	20162020	1016	GER-016	oligohaline inner coastal waters, Peenestrom	Bornholm Basin	38.10	109.06	NA	0.23	0.12	Bad
1002	Total Nitrogen	20162020	1017	GER-017	oligohaline inner coastal waters, Achterwasser	Bornholm Basin	38.10	122.03	NA	0.21	0.11	Bad

1002	Total Nitrogen	20162020	1018	GER-018	mesohaline open coastal waters, Pommersche Bucht, Nordteil	Arkona Basin	18.00	31.15	NA	0.39	0.20	Poor
1002	Total Nitrogen	20162020	1019	GER-019	mesohaline open coastal waters, Pommersche Bucht, Südteil	Bornholm Basin	18.00	45.03	NA	0.27	0.14	Bad
1002	Total Nitrogen	20162020	1020	GER-020	oligohaline inner coastal waters, Kleines Haff	Bornholm Basin	38.10	98.02	NA	0.26	0.14	Bad
1002	Total Nitrogen	20132018	1021	GER-021	mesohaline inner coastal waters, Flensburg Innenfoerde	Kiel Bay	19.70	19.65	NA	0.67	0.60	Good
1002	Total Nitrogen	20132018	1023	GER-023	meso- to polyhaline open coastal waters, seasonally stratified, Flensburger Aussenfoerde	Kiel Bay	15.00	17.59	NA	0.57	0.46	Moderate
1002	Total Nitrogen	20132018	1024	GER-024	mesohaline open coastal waters, Aussenschlei	Kiel Bay	14.30	12.67	NA	0.75	0.72	Good
1002	Total Nitrogen	20132018	1025	GER-025	mesohaline inner coastal waters, Schleimuende	Kiel Bay	19.70	65.16	NA	0.20	0.11	Bad
1002	Total Nitrogen	20132018	1026	GER-026A	A.mesohaline inner coastal waters, Mittlere Schlei	Kiel Bay	37.10	118.78	NA	0.21	0.11	Bad
1002	Total Nitrogen	20132018	1027	GER-026B	B.mesohaline inner coastal waters, Mittlere Schlei	Kiel Bay	37.10	118.78	NA	0.21	0.11	Bad
1002	Total Nitrogen	20132018	1029	GER-028	mesohaline open coastal waters, Eckerfoerder Bucht, Rand	Kiel Bay	14.30	18.90	NA	0.50	0.37	Poor

1002	Total Nitrogen	20132018	1030	GER-029	meso- to polyhaline open coastal waters, seasonally stratified, Eckerfoerderbucht, Tiefe	Kiel Bay	15.00	14.91	NA	0.67	0.61	Good
1002	Total Nitrogen	20132018	1032	GER-031	meso- to polyhaline open coastal waters, seasonally stratified, Kieler Aussenfoerde	Kiel Bay	15.00	16.42	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1033	GER-032	mesohaline inner coastal waters, Kieler Innenfoerde	Kiel Bay	19.70	22.89	NA	0.57	0.47	Moderate
1002	Total Nitrogen	20132018	1034	GER-033	mesohaline open coastal waters, Probstei	Kiel Bay	14.30	16.32	NA	0.58	0.48	Moderate
1002	Total Nitrogen	20132018	1036	GER-035	meso- to polyhaline open coastal waters, seasonally stratified, Hohwachter Bucht	Kiel Bay	15.00	13.79	NA	0.73	0.68	Good
1002	Total Nitrogen	20132018	1037	GER-036A	A.mesohaline open coastal waters, Fehmarnsund	Kiel Bay	14.30	15.63	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1038	GER-036B	B.mesohaline open coastal waters, Fehmarnsund	Bay of Mecklenburg	14.30	15.63	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1039	GER-037	mesohaline inner coastal waters, Orther Bucht	Kiel Bay	19.70	21.55	NA	0.61	0.52	Moderate
1002	Total Nitrogen	20132018	1040	GER-038A	A.mesohaline open coastal waters, Fehmarnbelt	Kiel Bay	14.30	15.95	NA	0.60	0.50	Moderate

1002	Total Nitrogen	20132018	1041	GER-038B	B.mesohaline open coastal waters, Fehmarnbelt	Bay of Mecklenburg	14.30	15.95	NA	0.60	0.50	Moderate
1002	Total Nitrogen	20132018	1042	GER-039	meso- to polyhaline open coastal waters, seasonally stratified, Fehmarn Sund Ost	Bay of Mecklenburg	15.00	14.34	NA	0.70	0.64	Good
1002	Total Nitrogen	20132018	1043	GER-040	mesohaline open coastal waters, Groemitz	Bay of Mecklenburg	14.30	19.26	NA	0.50	0.36	Poor
1002	Total Nitrogen	20132018	1044	GER-041	mesohaline open coastal waters, Neustaedter Bucht	Bay of Mecklenburg	14.30	17.39	NA	0.55	0.43	Moderate
1002	Total Nitrogen	20132018	1046	GER-043	mesohaline inner coastal waters, Poetenitzer Wiek	Bay of Mecklenburg	37.10	120.37	NA	0.21	0.11	Bad
1002	Total Nitrogen	20132018	1047	GER-044	mesohaline inner coastal waters, Untere Trave	Bay of Mecklenburg	37.10	135.51	NA	0.18	0.10	Bad
1002	Total Nitrogen	20162020	1048	GER-111	mesohaline inner coastal waters, Nordruegensche Bodden	Arkona Basin	17.70	52.80	NA	0.22	0.12	Bad
3001	Total Nitrogen	20162021	3001	EST-001	Narva-Kunda Bay CWB	Gulf of Finland	NA	NA	NA	0.75	0.70	Good
3001	Total Nitrogen	20202020	3002	EST-002	Eru-Käsmu Bay CWB	Gulf of Finland	NA	NA	NA	0.56	0.54	Moderate
3001	Total Nitrogen	20212021	3003	EST-003	Hara and Kolga Bay CWB	Gulf of Finland	NA	NA	NA	0.58	0.55	Moderate
3001	Total Nitrogen	20162021	3004	EST-005	Muuga-Tallinna-Kakumäe Bay CWB	Gulf of Finland	NA	NA	NA	0.72	0.67	Good

3001	Total Nitrogen	20212021	3005	EST-006	Pakri Bay CWB	Gulf of Finland	NA	NA	NA	0.80	0.76	Good
3001	Total Nitrogen	20212021	3006	EST-007	Hiiu Shallow CWB	Gulf of Riga	NA	NA	NA	0.42	0.45	Moderate
3001	Total Nitrogen	20182021	3007	EST-008	Haapsalu Bay CWB	Gulf of Riga	NA	NA	NA	0.41	0.45	Moderate
3001	Total Nitrogen	20212021	3008	EST-009	Matsalu Bay CWB	Gulf of Riga	NA	NA	NA	0.33	0.40	Moderate
3001	Total Nitrogen	20212021	3009	EST-010	Soela Strait CWB	Northern Baltic Proper	NA	NA	NA	0.64	0.58	Moderate
3001	Total Nitrogen	20212021	3010	EST-011	Kihelkonna Bay CWB	Eastern Gotland Basin	NA	NA	NA	0.62	0.57	Moderate
3001	Total Nitrogen	20162021	3011	EST-013	Pärnu Bay CWB	Gulf of Riga	NA	NA	NA	0.71	0.66	Good
3001	Total Nitrogen	20162018	3012	EST-014	Kassari-Õunaku Bay CWB	Gulf of Riga	NA	NA	NA	0.70	0.63	Good
3001	Total Nitrogen	20212021	3013	EST-016	Väinameri CWB	Gulf of Riga	NA	NA	NA	0.36	0.42	Moderate
3001	Total Nitrogen	20212021	3014	EST-017	NW part of the Gulf of Riga CWB	Gulf of Riga	NA	NA	NA	NA	NA	NA
3001	Total Nitrogen	20212021	3015	EST-018	NE part of the Gulf of Riga CWB	Gulf of Riga	NA	NA	NA	NA	NA	NA
3001	Total Nitrogen	20212021	3016	EST-019	Central part of the Gulf of Riga CWB	Gulf of Riga	NA	NA	NA	0.56	0.54	Moderate

4001	Total Nitrogen (summer)	20162021	4001	FIN-001	Lounainen sisäsaaristo	Åland Sea	NA	NA	NA	NA	0.46	Moderate
4001	Total Nitrogen (summer)	20162021	4002	FIN-002	Lounainen ulkosaaristo	Åland Sea	NA	NA	NA	NA	0.54	Moderate
4001	Total Nitrogen (summer)	20162021	4003	FIN-003	Suomenlahden sisäsaaristo	Gulf of Finland	NA	NA	NA	NA	0.47	Moderate
4001	Total Nitrogen (summer)	20162021	4004	FIN-004	Suomenlahden ulkosaaristo	Gulf of Finland	NA	NA	NA	NA	0.49	Moderate
4001	Total Nitrogen (summer)	20162021	4005	FIN-005	Lounainen välisaaristo	Åland Sea	NA	NA	NA	NA	0.52	Moderate
4001	Total Nitrogen (summer)	20162021	4006	FIN-006	Merenkurkun sisäsaaristo	The Quark	NA	NA	NA	NA	0.46	Moderate
4001	Total Nitrogen (summer)	20162021	4007	FIN-007	Merenkurkun ulkosaaristo	The Quark	NA	NA	NA	NA	0.84	High
4001	Total Nitrogen (summer)	20162021	4008	FIN-008	Selkämeren sisemmät rannikkovedet	Bothnian Sea	NA	NA	NA	NA	0.67	Good
4001	Total Nitrogen (summer)	20162021	4009	FIN-009	Selkämeren ulommat rannikkovedet	Bothnian Sea	NA	NA	NA	NA	0.69	Good

4001	Total Nitrogen (summer)	20162021	4010	FIN-010	Perämeren sisemmät rannikkovedet	Bothnian Bay	NA	NA	NA	NA	0.73	Good
4001	Total Nitrogen (summer)	20162021	4011	FIN-011	Perämeren ulommat rannikkovedet	Bothnian Bay	NA	NA	NA	NA	0.76	Good
4001	Total Nitrogen (summer)	20162021	4012	FIN-012	Åland innerskärgård	Åland Sea	NA	NA	NA	0.66	0.51	Moderate
4001	Total Nitrogen (summer)	20162021	4013	FIN-013	Åland mellanskärgård	Åland Sea	NA	NA	NA	0.73	0.59	Moderate
4001	Total Nitrogen (summer)	20162021	4014	FIN-014	Åland ytterskärgård	Åland Sea	NA	NA	NA	0.73	0.59	Moderate
7003	Total Nitrogen	20162021	7001	POL-001	PL TW I WB 9 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Bornholm Basin	1.90	1.71	0.32	0.76	0.72	Good
7003	Total Nitrogen	20162021	7002	POL-002	PL TW I WB 8 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Bornholm Basin	1.90	1.68	0.21	0.77	0.73	Good

7003	Total Nitrogen	20162021	7003	POL-003	PL TW I WB 1 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Gdansk Basin	0.98	1.58	0.22	0.42	0.26	Poor
7003	Total Nitrogen	20162021	7004	POL-004	PL TW II WB 2 very sheltered, fully mixed, substratum: lagoonal fine sand medium grained sand/silty sand; residence time 138 day, ice cover >90 days	Gdansk Basin	0.30	0.58	0.10	0.36	0.20	Poor
7004	Total Nitrogen	20162021	7005	POL-005	PL TW III WB 3 partly protected, partly stratified, substratum: medium grained sand/pebbles/marine silty sand; ice-incident	Gdansk Basin	0.40	0.50	0.10	0.55	0.44	Moderate
7004	Total Nitrogen	20162021	7006	POL-006	PL TW IV WB 4 partly stratified, moderately exposed, substratum: sand/silt; ice - incidental	Gdansk Basin	0.40	0.53	0.11	0.53	0.40	Moderate
7004	Total Nitrogen	20162021	7007	POL-007	PL TW V WB 6 river mouth, partly stratified, partly sheltered, substratum: medium grained sand/silty sand	Bornholm Basin	0.27	0.73	0.06	0.25	0.13	Bad
7004	Total Nitrogen	20162021	7008	POL-008	PL TW V WB 5 river mouth, partly stratified, partly sheltered, substratum:	Gdansk Basin	0.40	0.62	0.13	0.45	0.30	Poor

					medium grained sand/silty sand							
7004	Total Nitrogen	20162021	7009	POL-009	PL TW V WB 7 river mouth, partly stratified, partly sheltered, substratum: medium grained sand/silty sand	Bornholm Basin	0.53	0.74	0.12	0.49	0.35	Poor
7004	Total Nitrogen	20162021	7010	POL-010	PL CWI WB2 coastal waters, moderately exposed, fully mixed, substratum:sand/fine sand	Gdansk Basin	0.30	0.51	0.10	0.41	0.25	Poor
7004	Total Nitrogen	20162021	7011	POL-011	PL CWI WB1 coastal waters, moderately exposed, fully mixed, substratum:sand/fine sand	Gdansk Basin	0.40	0.56	0.07	0.48	0.34	Poor
7004	Total Nitrogen	20162021	7012	POL-012	PL CWI WB3 coastal waters, moderately exposed, fully mixed, substratum:sand/fine sand	Gdansk Basin	0.30	0.63	0.13	0.33	0.18	Bad
7004	Total Nitrogen	20162021	7013	POL-013	PL CW II WB 8 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.38	0.08	0.54	0.43	Moderate

7004	Total Nitrogen	20162021	7014	POL-014	PL CW II WB 6W central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.59	0.23	0.40	0.28	Poor
7004	Total Nitrogen	20162021	7015	POL-015	PL CW II WB 6E central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.54	0.20	0.42	0.28	Poor
7004	Total Nitrogen	20162021	7016	POL-016	PL CWII WB5 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Eastern Gotland Basin	0.30	0.54	0.15	0.40	0.25	Poor
7004	Total Nitrogen	20162021	7017	POL-017	PL CWII WB4 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Gdansk Basin	0.30	0.53	0.18	0.42	0.29	Poor
7004	Total Nitrogen	20162021	7018	POL-018	PL CW III WB 9 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.40	0.63	0.09	0.43	0.27	Poor
7004	Total Nitrogen	20162021	7019	POL-019	PL CW III WB 7 central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Bornholm Basin	0.30	0.40	0.08	0.52	0.40	Poor

80021	Total Nitrogen winter	20182018	8001	SWE-001	1s West Coast inner coastal water	Kattegat	22.03	21.38	NA	0.81	0.65	Good
80021	Total Nitrogen winter	20182018	8002	SWE-003	4 West Coast outer coastal water, Kattegat	Kattegat	22.75	18.05	NA	1.00	0.99	High
80021	Total Nitrogen winter	20182018	8003	SWE-004	5 South Halland and north Öresund coastal water	Kattegat	22.08	13.34	11.10	0.79	0.50	Moderate
80021	Total Nitrogen winter	20182018	8004	SWE-005	6 Öresund inner coastal water	The Sound	22.08	29.41	NA	0.58	0.25	Poor
80021	Total Nitrogen winter	20172017	8005	SWE-006	7 Skåne coastal water	Arkona Basin	20.33	29.13	NA	0.59	0.31	Poor
80021	Total Nitrogen winter	20182018	8006	SWE-007	8 Blekinge archipelago and Kalmarsund, inner	Western Gotland Basin	22.16	25.42	NA	0.73	0.31	Poor
80021	Total Nitrogen winter	20182018	8007	SWE-008	9 Blekinge archipelago and Kalmarsund, outer	Western Gotland Basin	20.75	21.79	NA	0.80	0.43	Moderate
80021	Total Nitrogen winter	20172017	8010	SWE-011	12n Östergötland and Stockholm archipelago	Northern Baltic Proper	22.38	24.30	NA	0.78	0.54	Moderate
80021	Total Nitrogen winter	20172017	8011	SWE-012	12s Östergötland and Stockholm archipelago	Western Gotland Basin	22.85	27.44	NA	0.70	0.63	Good

80021	Total Nitrogen winter	20172017	8012	SWE-013	13 Östergötland inner coastal water	Western Gotland Basin	27.63	38.53	NA	0.60	0.95	High
80021	Total Nitrogen winter	20172017	8013	SWE-014	14 Östergötland outer coastal water	Western Gotland Basin	23.77	26.21	NA	0.76	0.51	Moderate
80021	Total Nitrogen winter	20172017	8015	SWE-016	16 South Bothnian Sea, inner coastal water	Bothnian Sea	23.12	32.60	NA	0.60	0.80	High
80021	Total Nitrogen winter	20172017	8017	SWE-018	18 North Bothnian Sea, Höga kusten, inner	Bothnian Sea	21.63	35.02	NA	0.51	0.71	Good
80021	Total Nitrogen winter	20172017	8019	SWE-020	20 North Quark inner coastal water	The Quark	22.23	29.17	NA	0.63	0.64	Good
80021	Total Nitrogen winter	20182018	8024	SWE-025	25 Göta and Nordre älv estuary	Kattegat	22.33	23.87	NA	0.74	0.51	Moderate
80022	Total Nitrogen summer	20182018	8001	SWE-001	1s West Coast inner coastal water	Kattegat	15.65	16.87	NA	0.71	0.54	Moderate
80022	Total Nitrogen summer	20182018	8002	SWE-003	4 West Coast outer coastal water, Kattegat	Kattegat	14.72	14.43	NA	0.79	0.63	Good
80022	Total Nitrogen summer	20182018	8003	SWE-004	5 South Halland and north Öresund coastal water	Kattegat	15.58	16.14	NA	0.74	0.42	Moderate

80022	Total Nitrogen summer	20182018	8004	SWE-005	6 Öresund inner coastal water	The Sound	15.58	21.14	NA	0.57	0.25	Poor
80022	Total Nitrogen summer	20172017	8005	SWE-006	7 Skåne coastal water	Arkona Basin	19.50	20.93	NA	0.72	0.77	Good
80022	Total Nitrogen summer	20182018	8006	SWE-007	8 Blekinge archipelago and Kalmarsund, inner	Western Gotland Basin	19.93	21.24	NA	0.72	0.29	Poor
80022	Total Nitrogen summer	20182018	8007	SWE-008	9 Blekinge archipelago and Kalmarsund, outer	Western Gotland Basin	19.77	19.14	NA	0.80	0.54	Moderate
80022	Total Nitrogen summer	20182018	8010	SWE-011	12n Östergötland and Stockholm archipelago	Northern Baltic Proper	20.33	25.03	NA	0.63	0.47	Moderate
80022	Total Nitrogen summer	20182018	8011	SWE-012	12s Östergötland and Stockholm archipelago	Western Gotland Basin	19.99	25.00	NA	0.62	0.46	Moderate
80022	Total Nitrogen summer	20172017	8012	SWE-013	13 Östergötland inner coastal water	Western Gotland Basin	23.03	27.11	NA	0.66	0.49	Moderate
80022	Total Nitrogen summer	20182018	8013	SWE-014	14 Östergötland outer coastal water	Western Gotland Basin	19.96	23.41	NA	0.67	0.50	Moderate
80022	Total Nitrogen summer	20182018	8014	SWE-015	15 Stockholm archipelago, outer coastal water	Northern Baltic Proper	20.47	20.70	NA	0.76	0.51	Moderate

80022	Total Nitrogen summer	20182018	8015	SWE-016	16 South Bothnian Sea, inner coastal water	Bothnian Sea	21.59	26.67	NA	0.29	0.20	Poor
80022	Total Nitrogen summer	20182018	8016	SWE-017	17 South Bothnian Sea, outer coastal water	Bothnian Sea	21.31	19.52	NA	0.42	0.27	Poor
80022	Total Nitrogen summer	20182018	8017	SWE-018	18 North Bothnian Sea, Höga kusten, inner	Bothnian Sea	21.39	20.45	NA	0.36	0.31	Poor
80022	Total Nitrogen summer	20182018	8019	SWE-020	20 North Quark inner coastal water	The Quark	20.12	21.76	NA	0.60	0.56	Moderate
80022	Total Nitrogen summer	20182018	8020	SWE-021	21 North Quark outer coastal water	The Quark	20.13	13.49	NA	0.57	0.51	Moderate
80022	Total Nitrogen summer	20182018	8023	SWE-024	24 Stockholm inner archipelago	Northern Baltic Proper	23.72	33.94	NA	0.66	0.76	Good
80022	Total Nitrogen summer	20182018	8024	SWE-025	25 Göta and Nordre älv estuary	Kattegat	16.32	19.36	NA	0.65	0.45	Moderate