HELCOM Monitoring Programme topic Non-indigenous species

Programme:

Non-indigenous species

Contents

a. Metadata on monitoring strategies and monitoring programmes

a.1 Responsible HELCOM subsidiary body

Please indicate the relevant expert group/network if available, otherwise the responsible HELCOM Working Group.

	Permament Groups
☐	Gear – Group on the Implementation of the Ecosystem Approach
☐	Maritime – Maritime Working Group
☐	Pressure – Working Group on Reduction of Pressures from the Baltic Sea Catchment Area
☐	Response – Response Working Group
☒	State and Conservation – Working Group on the State of the Environmental and Nature Conservation
	Time-limited Groups
☐	Agri – Group on Sustainable Agricultural Practices
☐	Fish – Group on Ecosystem-based Sustainable Fisheries
☐	HELCOM-VASAB MSP WG - Joint HELCOM-VASAB Maritime Spatial Planning Working Group
	Expert Groups
☐	AIS EWG – Expert Working Group for Mutual Exchange and Deliveries of AIS data
☐	EN Hazardous Substances – Expert Network on hazardous substances
☐	EN Marine Litter – Expert Network on Marine Litter
☐	EN Noise – Expert Network on Underwater Noise
☐	ESA – Expert Network on Economic and Social Analyses
☐	EWG OWR – Expert Working Group on Oiled Wildlife Response
☐	EWG SHORE – Expert Working Group on Response on the Shore
☐	Green Technology and Alternative Fuels Platform for Shipping
☒	Joint HELCOM/OSPAR Task Group on Ballast Water Management Convention (BWMC) and Biofouling
☒	IN Benthic habitat – Intersessional Network on habitat monitoring
☐	IN-EUTROPHICATION - Intersessional Network on Eutrophication
☐	IWGAS – Informal Working Group on Aerial Surveillance
☐	JWG Bird – HELCOM-OSPAR-ICES Joint Working Group on Seabirds
☐	MORS EG – Expert group on monitoring of radioactive substances in the Baltic Sea
☐	PRF Cooperation Platform – Cooperation Platform on Port Reception Facilities in the Baltic Sea
☐	SAFE NAV – Group of Experts on Safety of Navigation
☐	SUBMERGED – Expert Group on Environmental Risks of Hazardous Submerged Objects

a.2 Regional Cooperation

The monitoring of this programme is:

☐ Fully coordinated

☐ Partly coordinated. Indicate missing component(s):

☒ Coordinated monitoring is under development. Indicate by which group/project and by when a recommendation on coordinated monitoring can be expected.

Completing Management Options in the Baltic Sea Region to reduce risk of invasive species introduction by shipping (COMPLETE project), April 2020.

b. Monitoring strategies

b.1 Descriptor

The programme supports the following obligatory MSFD Monitoring Programmes. Tick one or more relevant boxes.

☐ **D1**	Biodiversity
☒ **D2**	Non-indigenous Species
☐ **D3**	Commercial fish and shellfish
☐ **D4**	Food webs
☐ **D5**	Eutrophication
☐ **D6**	Seafloor integrity
☐ **D7**	Hydrographical conditions
☐ **D8**	Contaminants
☐ **D9**	Contaminants in seafood
☐ **D10**	Marine litter
☐ **D11**	Energy including underwater noise

b.2 BSAP segments

The sub-programme serves the following BSAP segments. Tick one or more relevant boxes.

☐Eutrophication

☐Hazardous substances

☒Biodiversity

☒Maritime activities

b. 3 Monitoring strategy description

Monitoring strategy :

Non-indigenous species (NIS) monitoring is to address all biotic components as NIS may belong to any trophic level and be found in various man-made as well as natural habitats. NIS data is needed to assess the effectiveness of legal and administrative measures aimed at prevention of unwanted human-mediated introductions, update HELCOM core indicator and to report for EU MSFD, EU IAS regulation, for those HELCOM countries being EU members, and to fulfil the data needs for exemptions applied from the Ballast Water Management Convention (BWMC). There is currently no coordinated monitoring specifically targeting NIS in the Baltic Sea. Some observations (e.g. plankton, soft bottom macrofauna and coastal fish species) are obtained through the HELCOM biological monitoring programme, which initially was not targeted on NIS. Many new species are found during scientific projects as well. HELCOM COMBINE, HELCOM/OSPAR JHP and ICES BITS surveys are now proposed to be complemented with additional monitoring methods and surveys.

Monitoring approaches

Combine monitoring programme

The well-established COMBINE monitoring programme, which has comprehensive quality control system, is currently used for records of presence-absence and densities of NIS in a given area in the taxonomic groups covered by the programme. The programme was initially targeted to monitor effects of eutrophication and therefore lacks several habitats and taxonomic groups that NIS monitoring should cover. However, while the HELCOM joint programme itself is far from sufficient both temporally and spatially (fixed sampling stations) to obtain the required information on NIS presence and especially spread, there are certainly several elements which are very useful to exploit in NIS monitoring purposes.

Fish surveys

HELCOM coastal fish monitoring and Baltic International Trawl Surveys (BITS) provide information on NIS presence-absence, spread and abundance/biomass. During such surveys, non-indigenous fish and mobile epifauna (e.g. crabs) can be caught and such records should be made available for the national authority responsible for managing NIS records. However, such records are nonsystematic and may not reflect actual density or distribution of mobile epifauna.

Port monitoring

The targeted method to monitor NIS in ports is the HELCOM/OSPAR Port survey protocol, which provides information on NIS found in ports to support decisions on granting exemptions (HELCOM, 2015). Such a protocol is part of the "Joint HELCOM/OSPAR Guidelines on the granting of exemptions under the International Convention for the Control and Management of Ships' Ballast Water and Sediments, Regulation A-4" adopted by HELCOM and OSPAR Contracting Parties in 2013. The protocol which includes detailed sampling information with focus on different habitats and species groups (also including plankton surveys) has been well tested in several ports around the Baltic Sea and North Sea East Atlantic, is regularly updated and ready for routine use. Information obtained during port surveys (available on-line) should also be used to complete NIS assessments for HELCOM and the MSFD (D2) reporting purposes for those HELCOM countries being EU members. For further discussions, developments and better data comparability / quality, it would be helpful to implement relevant parts of the port survey protocol also in other named monitoring approaches. Especially the usage of settlement plates, scraping samples or traps could be used as modules in marinas and

coastal monitoring. The port survey should inevitably form one core component of the NIS monitoring programme.

RAS/eRAS

A rapid assessment survey (RAS) is a time and cost-efficient method to detect NIS, that can be recognized in the wild from morphological characteristics and whose abundance and distribution can be assessed for a particular area. RAS may also be activated following a particular NIS introduction event, e.g. a report of a NIS finding, requiring confirmation for management actions to take place. Target lists of NIS may help to optimize monitoring but should not reduce sampling effort, over full inventories of biota present, and are more relevant for a swift management response. One approach to select NIS for a RAS is to follow IMO (2007) definition of target species: "...Species identified by a Party that meet specific criteria indicating that they may impair or damage the environment, human health, property or resources and are defined for a specific port, State or biogeographic region...". However, not all NIS may be easily recognized in the field and further systematic examination in laboratory may be required, which is also part of RAS, as well as eRAS. The extension of RAS with a limited set of exposure panels increases the accuracy of the method, but also the time and costs involved in the monitoring effort.

eRAS (extended rapid assessment survey) is a special RAS programme focused on detection of NIS which may be arranged simultaneously by several countries within the Baltic Sea. However, the general eRAS method described in the HELCOM Monitoring Manual is cost-efficient and may provide timely information for managers and policy-advisers (e.g. Pederson et al. 2003, Arenas et al. 2006, Minchin 2007, Nall et al. 2014, Bishop et al. 2015, Collin et al. 2015). It may also contribute to the assessment of the HELCOM Indicator "Trends in arrival of new non-indigenous species".

Coastal monitoring for mobile and sessile epifauna

As there has not been a joint monitoring programme for natural coastal habitats and particularly mobile and sessile epifauna, although some countries have monitored macrozoobenthos and macrophytes/macroalgae as part of the EU WFD, several methods have been tested for this purpose. The recommended monitoring actions for these species include artificial habitat collectors and settlement plates. Some of these methods are similar to the port survey and eRas protocols, and they should be applied also in natural coastal habitats in all countries as there are currently two highly invasive crab species, invasive coastal fish as well as other NIS among the macrozoobenthos present across the Baltic Sea.

Molecular methods

Molecular methods are rapidly evolving and will become established within monitoring protocols including further specifications on how and for which purpose they are to be used. Such methods will be helpful in multiple purposes: early detection, determining marine NIS identities, determining source and routes of invasions, and the genetic make-up of founding populations. Molecular methods can also be used for the rapid identification of cholera bacteria (relevant for e.g. BWMC exemption granting process) and several NIS can be identified even from genetic profiles within water, eDNA. Molecular methods are particularly useful for NIS detection at early life-history stages (due to difficulties in their identifications), at initial stages of invasions, and when occurring at low densities and in a limited area (Xia et al. 2017, Holman et al. 2019, Miralles et al. 2019, van den Heuvel-Greve et al. 2021).

Monitoring protocol for leisure boats and marinas

Leisure boats and marinas have been identified as potential vectors and hubs of NIS introductions and spread also in the Baltic Sea. As leisure boats do not utilise ballast water, the protocol

concentrates particularly on the detection of fouling species. The sampling approach includes scraping samples from boats and artificial marina structures, as well as utilization of settlement plates that mimic additional attachment surfaces for fouling species.

Citizen science

Public involvement can aid in detection of NIS. Divers, anglers, leisure craft users and students help to track the spread of NIS. Volunteers (citizen scientists) may look for a restricted number of species, and the data can be used to identify range expansions. Partnerships with the aquaculture, fisheries and leisure craft industries may enable early detection of NIS arrivals. The advent of electronic communication facilitates the usage of online websites in reporting NIS observations. Websites also aid in providing up-to-date information on identification, distribution and means of preventing further spread. Public involvement increases general awareness on the NIS problem and may therefore help in preventing further intentional introductions. In Finland, public observations are used already to gather presence information on charismatic and easily identifiable NIS (www.vieraslajit.fi) (Lehtiniemi et al., 2020). For marine species, these are verified by experts and used for e.g. EU reporting.

Additional NIS monitoring approaches

A variety of other targeted approaches and methods have been developed, which may be used for NIS monitoring.

MPAs

A Marine Protected Areas (MPAs) observation program has been successfully used to identify occurrences of NIS around the UK coast. This approach could be useful in the Baltic Sea as well. In UK a standard list of NIS was compiled against which, infauna and epifaunal data records from the MPAs were compared and reported to the appropriate national authorities. Within MPAs monitoring programmes a series of conventional and novel methods of surveillance are likely to become part of a protocol, and their potential use for detection of NIS should be considered.

Automated image analysis

Another rapidly developing approach is automated systems, which may pick up unfamiliar biological shapes. Such in-situ continuous monitoring capacity initially images aliquots of sea water and rejects images of low-risk objects. A managed web-based image database may be developed that acts as a repository for images of identified NIS, together with metadata reflecting the scale of the object, its location, depth and date of image collection, and collector. Currently, these methods (e.g. ZooScan, ZooImage, FlowCytoBot, FlowCam) may be used for abundance estimates of already known NIS in the sample which are identifiable by automatic image analysis.

Monitoring the spatial spread

To be able for HELCOM countries being EU members to meet the requirements of the most recent amendment of the Marine Strategy Framework Directive (2017/845/EU) and the Commission Decision on criteria and methodological standards on good environmental status of marine waters (2017/848/EC), spatial spread of NIS needs to be monitored for criteria D2C2 and D2C3 of the EU MSFD. As HELCOM monitoring programme is relying on sampling at fixed stations, a taxon-specific approach in relevant habitats needs to be taken in order to obtain information on presently spreading NIS with methods enabling proper identification of mostly small NIS. In addition, underwater habitat surveys, which are being conducted in many Baltic Sea countries, may provide information on the spread of conspicuous NIS such as large mobile epifauna (e.g. crabs) and habitat engineers, e.g. zebra mussels.

b.4 BSAP Ecological objectives

Choose only the most relevant option(s). Tick one or more boxes below.

Eutrophication	☐ Concentrations of nutrients close to natural levels
	☐ Clear water
	☐ Natural level of algal blooms
	☐ Natural distribution and occurrence of plants and animals
	☐ Natural oxygen levels
Hazardous substances	☐ Concentrations of hazardous substances close to natural levels
	☐ All fish safe to eat
	☐ Healthy wildlife
	☐ Radioactivity at pre-Chernobyl levels
Biodiversity	☐ Natural landscapes and seascapes
	☒ Thriving and balanced communities of plants and animals
	☒ Viable populations of species
Maritime activities	☐ No illegal pollution
	☐ Safe maritime traffic without accidental pollution
	☐ Efficient response capability
	☒ No introductions of alien species from ships
	☐ Minimum air pollution from ships
	☐ Zero discharges from offshore platforms

b.5 MSFD Criteria (Criteria)

Choose only the most relevant option(s). Tick one or more boxes below.

Descriptor 1	☐ D1C1 – Primary: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long- term viability is ensured. Member States shall establish the threshold values for the mortality rate from incidental by-catch per species, through regional or subregional cooperation. ☒ D1C2 – Primary: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured. Member States shall establish threshold values for each species through regional or subregional cooperation, taking account of natural variation in population size and the mortality rates derived from D1C1, D8C4 and D10C4 and other relevant pressures. For species covered by Directive 92/43/EEC, these values shall be consistent with the Favourable Reference Population values established by the relevant Member States under Directive 92/43/EEC. ☐ D1C3 – Primary for commercially- exploited fish and cephalopods and secondary for other species:

	The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures. Member States shall establish threshold values for specified characteristics of each species through regional or subregional cooperation, taking account of adverse effects on their health derived from D8C2, D8C4 and other relevant pressures. ☐ D1C4 – Primary for species covered by Annexes II, IV or V to Directive 92/43/EEC and secondary for other species: The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions. Member States shall establish threshold values for each species through regional or subregional cooperation. For species covered by Directive 92/43/EEC, these shall be consistent with the Favourable Reference Range values established by the relevant Member States under Directive 92/43/EEC. ☒ D1C5 – Primary for species covered by Annexes II, IV and V to Directive 92/43/EEC and secondary for other species: The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species. ☒ D1C6 – Primary 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. Member States shall establish threshold values for the condition of each habitat type, ensuring compatibility with related values set under Descriptors 2, 5 and 8, through regional or subregional cooperation.
Descriptor 2	☒ D2C1 – Primary: The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimised and where possible reduced to zero. Member States shall establish the threshold value for the number of new introductions of non-indigenous species, through regional or subregional cooperation. ☒ D2C2 — Secondary: Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types. ☒ D2C3 — Secondary: Proportion of the species group or spatial extent of the broad habitat type which is adversely altered due to non-indigenous species, particularly invasive non-indigenous species. Member States shall establish the threshold values for the adverse alteration to species groups and broad habitat types due to non-indigenous species, through regional or

	subregional cooperation.
Descriptor 3	☐ D3C1 — Primary: The Fishing mortality rate of populations of commercially-exploited species is at or below levels which can produce the maximum sustainable yield (MSY). Appropriate scientific bodies shall be consulted in accordance with Article 26 of Regulation (EU) No 1380/2013. ☐ D3C2 — Primary: The Spawning Stock Biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield. Appropriate scientific bodies shall be consulted in accordance with Article 26 of Regulation (EU) No 1380/2013. ☐ D3C3 — Primary: The age and size distribution of individuals in the populations of commercially-exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diversity. Member States shall establish threshold values through regional or subregional cooperation for each population of species in accordance with scientific advice obtained pursuant to Article 26 of Regulation (EU) No 1380/2013.
Descriptor 4	☒ D4C1 — Primary: The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures. Member States shall establish threshold values through regional or subregional cooperation. ☐ D4C2 — Primary: The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures. Member States shall establish threshold values through regional or subregional cooperation. ☐ D4C3 — Secondary: The size distribution of individuals across the trophic guild is not adversely affected due to anthropogenic pressures. Member States shall establish threshold values through regional or subregional cooperation. ☒ D4C3 — Secondary (to be used in support of criterion D4C2, where necessary): Productivity of the trophic guild is not adversely affected due to anthropogenic pressures. Member States shall establish threshold values through regional or subregional cooperation.
Descriptor 5	☐ D5C1 — Primary: 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 ☐ D5C2 — Primary: Chlorophyll a concentrations are not at levels that indicate adverse effects of nutrient enrichment. The threshold values are as follows: (c) in coastal waters, the values set in accordance with Directive 2000/60/EC; (d) 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. ☐ D5C3 — Secondary: The number, spatial extent and duration of harmful algal bloom events are not at levels that indicate adverse effects of nutrient enrichment. ☐ D5C4 — Secondary: The photic limit (transparency) of the water column is not reduced, due to increases in suspended algae, to a level that indicates adverse effects of nutrient enrichment. The threshold values are as follows: (e) in coastal waters, the values set in accordance with Directive 2000/60/EC; (f) 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. ☐ D5C5 — Primary (may be substituted by D5C8): The concentration of dissolved oxygen is not reduced, due to nutrient enrichment, to levels that indicate adverse effects on benthic habitats (including on associated biota and mobile species) or other eutrophication effects. The threshold values are as follows: (g) in coastal waters, the values set in accordance with Directive 2000/60/EC; (h) 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. ☐ D5C6 — Secondary: The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment. The threshold values are as follows: (a) in coastal waters, the values set in accordance with Directive 2000/60/EC; (b) should this criterion be relevant for waters 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.

	☐ D5C7 — Secondary: The species composition and relative abundance or depth distribution of macrophyte communities achieve values that indicate there is no adverse effect due to nutrient enrichment including via a decrease in water transparency, as follows: (a) in coastal waters, the values set in accordance with Directive 2000/60/EC; (b) should this criterion be relevant for waters 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. ☐ D5C8 — Secondary: (except when used as a substitute for D5C5): The species composition and relative abundance of macrofaunal communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment, as follows: (a) in coastal waters, the values for benthic biological quality elements 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.
Descriptor 6	☐ D6C1 – Primary: Spatial extent and distribution of physical loss (permanent change) of the natural seabed. ☐ D6C2 – Primary: Spatial extent and distribution of physical disturbance pressures on the seabed. ☐ D6C3 – Primary: Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions (e.g. through changes in species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), by physical disturbance. Member States shall establish threshold values for the adverse effects of physical disturbance, through regional or subregional cooperation. ☒ D6C4 – Primary: The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area. Member States shall establish the maximum allowable extent of habitat loss as a proportion of the total natural extent of the habitat type, through cooperation at Union level, taking into account regional or subregional specificities. ☐ D6C5 – Primary: 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 the habitat type in the assessment area. Member States shall establish threshold values for adverse effects on the condition of each habitat type, ensuring compatibility with related values set under Descriptors 2, 5, 6, 7 and 8, through cooperation at Union level, taking into account regional or subregional specificities. Member States shall establish the maximum allowable extent of those adverse effects as a proportion of the total natural extent of the habitat type, through cooperation at Union level, taking into account regional or subregional specificities.
Descriptor 7	☐ D7C1 – Secondary: Spatial extent and distribution of permanent alteration of hydrographical conditions (e.g. changes in wave action, currents, salinity, temperature) to the seabed and water column, associated in particular with physical loss (1) of the natural seabed. ☐ D7C2 – Secondary: Spatial extent of each benthic habitat type adversely affected (physical and hydrographical characteristics and associated biological communities) due to permanent alteration of hydrographical conditions.
Descriptor 8	☐ D8C1 – Primary: Within coastal and territorial waters, the concentrations of contaminants do not exceed the following threshold values: (a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC; (b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by Member States through regional or subregional cooperation; (c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. Member States shall establish these concentrations through regional or subregional cooperation, considering their application within and beyond coastal and territorial waters. Beyond territorial waters, the concentrations of contaminants do not exceed the following threshold values: (a) for contaminants selected under point 2(a) of criteria elements, the values as applicable within coastal and territorial waters; (b) for contaminants selected under point 2(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. Member States shall establish these concentrations through regional or subregional cooperation. ☐ D8C2 – Secondary: The health of species and the condition of habitats (such as their species composition and relative abundance at locations of chronic pollution) are not adversely affected due to contaminants including cumulative and synergetic effects. Member States shall establish those adverse effects and their threshold values through

	regional or subregional cooperation. ☐ D8C3 – Primary: The spatial extent and duration of significant acute pollution events are minimised. ☐ D8C4 – Secondary (to be used when a significant acute pollution event has occurred): The adverse effects of significant acute pollution events on the health of species and on the condition of habitats (such as their species composition and relative abundance) are minimised and, where possible, eliminated.
Descriptor 9	☐ D9C1 – Primary: The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed: (a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the threshold values for the purposes of this Decision; (b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, threshold values, which Member States shall establish through regional or subregional cooperation.
Descriptor 10	☐ D10C1 – Primary: The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities. ☐ D10C2 — Primary: The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities. ☐ D10C3 — Secondary: The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned. Member States shall establish threshold values for these levels through regional or subregional cooperation. ☐ D10C4 — Secondary: The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects. Member States shall establish threshold values for the adverse effects of litter, through regional or subregional cooperation.

Descriptor 11	☐ D11C1 – Primary: The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities. ☐ D11C2 – Primary: The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.

b.6 Gaps in monitoring

In relation to the GES criteria addressed, indicate when sufficient monitoring was in place or by when sufficient coverage will be in place (Coverage_GEScriteria)

☒ Adequate monitoring was in place in 2014

☐ Adequate monitoring was in place by 2018

☐ Adequate monitoring is in place by July 2020

☐ Adequate monitoring will be in place by 2024

☐ Monitoring is not being put in place for this descriptor due to a low risk

☐ Monitoring for this descriptor is not relevant

Description of the implementation gaps and plans to complete the establishment and implementation of this descriptor monitoring strategy (Gaps_Plans):

The HELCOM COMBINE monitoring programme has been the basis for NIS monitoring although it does not target on NIS but provides useful data on certain taxonomic groups. This has been improved with additional monitoring protocol developed for NIS monitoring in ports (Joint Harmonized Procedure and eRAS and other potential hot spots for NIS introductions (eRAS). Further additional methods e.g. molecular methods and citizen science approaches as well as those methodologies targeting habitats presently lacking in the monitoring programmes are now added to the NIS programme. These methods should be taken into national monitoring programmes of the Contracting Parties as suitable and possible. After these new methodologies have been incorporated into existing monitoring still remaining gaps are possible to identify. These most probably include monitoring of spread of already established NIS as well as their impacts. In the future, it is important to consider developing monitoring activities that can quantify the effects of NIS introduction on the patterns of species/habitats and the productivity of ecosystems in order to draw any solid conclusions on the impacts of NIS in the Baltic Sea.

c. Monitoring programmes

c.1 Purpose of monitoring

c.1a Assessment purpose in general

The programme supports the assessment of:

Tick the relevant box.

Temporal trends	Spatial distribution	State classification
☒	☒	☒

The **programme** supports the assessment of: (Environmental state and impacts, pressures in the marine environment).

Note that the answer to this question will be decisive for whether to answer upcoming questions e.g. upcoming questions on pressures should only be answered if the monitoring is defined as supporting the assessment of pressures.

Tick the relevant boxes.

Environmental state and impacts	Pressures in the marine environment	Pressures at source (land-based, riverine and atmospheric sources)	Human activities causing the pressures	Effectiveness of measures
☒	☒	☐	☒	☒
If this is selected fill in the following questions: c.1b	If this is selected fill in the following questions: c.1c, d	If this is selected fill in the following questions: c.1c, d	If this is selected fill in the following questions: c.1c, d	If this is selected fill in the following questions: c.1c, d

Give any other monitoring purpose e.g. if the programmes include supporting parameters for other monitoring programmes

Native species detection in port environments and natural coastal habitats

For questions 1b-1d, select when applicable for the sub-programme, the link to:

- structure, functions and processes of marine ecosystems from Commission Directive (EU) 2017/845 of 17 May 2017 Table 1
- anthropogenic pressures, uses and human activities in or affecting the marine environment from Commission Directive (EU) 2017/845 of 17 May 2017 Table 2b (Features)
- uses and human activities in or affecting the marine environment from Commission Directive (EU) 2017/845 of 17 May 2017 Table 2b (Features)

For questions 1b-1d, select when applicable for the sub-programme, the link from the Reporting on the 2020 update of Article 11 for the Marine Strategy Framework Directive (MSFD Guidance Document 17, 2020) (Features) to:

- Ecosystem components (relevant for monitoring and assessment for Article 8(1a) for D1C2-C5, D3, D4, D6C3-C5, D7C2)
- Pressures and impacts in the marine environment (relevant for monitoring and assessment for Article

8(1b) for D1C1, D2, D5, D6C1-C2, D7C1, D8, D9, D10, D11)

- Pressure inputs to the marine environment (relevant for monitoring and assessment for Article 10)
- Uses and human activities (relevant for monitoring and assessment for Article 8(1c) and 13)

c.1b • Ecosystem components (Features)

Choose only the most relevant option(s). Tick one or more boxes below.

Theme	Sub-theme	Label feature
Species	☒ Birds	☐ Grazing birds
		☐ Wading birds
		☐ Surface-feeding birds
		☐ Pelagic-feeding birds
		☒ Benthic-feeding birds
	☒ Mammals	☐ Small toothed cetaceans
		☐ Deep-diving toothed cetaceans
		☐ Baleen whales
		☐ Seals
	☐ Reptiles	☐ Turtles
	☒ Fish	☒ Coastal fish
		☐ Pelagic shelf fish
		☐ Demersal shelf fish
		☐ Deep-sea fish
		☒ Commercially exploited fish and shellfish
	☐ Cephalopods	☐ Coastal/shelf cephalopods
		☐ Deep-sea cephalopods
Habitats	☒ Benthic habitats	☒ Benthic broad habitats
		☐ Other benthic habitats
	☒ Pelagic habitats	☒ Pelagic broad habitats
		☒ Other pelagic habitats
Ecosystems	☐ Physical and hydrological characteristics	
	☐ Chemical characteristics	
	☒ Ecosystems, including food webs	☒ Coastal ecosystems
		☐ Shelf ecosystems
		☐ Oceanic/deep-sea ecosystems

c.1c • Pressures and impacts in the marine environment (Features)

Choose only the most relevant option(s). Tick one or more boxes below.

Theme	Label: Feature
Biological	☒ Newly introduced non-indigenous species
	☒ Established non-indigenous species
	☐ Species affected by incidental by-catch
Physical and hydrological	☐ Hydrographical changes
	☐ Physical disturbance to seabed
	☐ Physical loss of the seabed
Substances, litter and energy	☐ Eutrophication
	☐ Contaminants - non UPBT substances
	☐ Contaminants - UPBT substances
	☐ Contaminants – in seafood
	☐ Adverse effects on species or habitats
	☐ Acute pollution events
	☐ Litter in the environment
	☐ Impulsive sound in water
	☐ Continuous low frequency sound

c.1d • Pressure inputs to the marine environment (Features)

Theme	Label: Feature
Biological	☒ Input or spread of non-indigenous species
	☐ Input of microbial pathogens
	☐ Input of genetically modified species and translocation of native species
	☐ Loss of, or change to, natural biological communities due to cultivation of animal or plant species
	☐ Disturbance of species (e.g. where they breed, rest and feed) due to human presence
	☐ Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities)
Substances, litter and energy	☐ Input of nutrients — diffuse sources, point sources, atmospheric deposition
	☐ Input of organic matter — diffuse sources and point sources
	☐ Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) — diffuse sources, point sources, atmospheric deposition, acute events

☐ Input of litter (solid waste matter, including micro-sized litter)
☐ Input of anthropogenic sound (impulsive, continuous)
☐ Input of other forms of energy (including electromagnetic fields, light and heat)
☐ Input of water — point sources (e.g. brine)

c.1e • Uses and human activities (Features)

Choose only the most relevant option(s). Tick one or more boxes below.

Theme	Label: Feature
Physical restructuring of rivers, coastline or seabed (water management)	☐ Land claim
	☐ Canalisation and other watercourse modifications
	☐ Coastal defence and flood protection
	☐ Offshore structures (other than for oil/gas/renewables)
	☐ Restructuring of seabed morphology, including dredging and depositing of materials
Extraction of non-living resources	☐ Extraction of minerals (rock, metal ores, gravel, sand, shell)
	☐ Extraction of oil and gas, including infrastructure
	☐ Extraction of salt
	☐ Extraction of water
Production of energy	☐ Renewable energy generation (wind, wave and tidal power), including infrastructure
	☐ Non-renewable energy generation
	☐ Transmission of electricity and communications (cables)
Extraction of living resources	☐ Fish and shellfish harvesting (professional, recreational)
	☐ Fish and shellfish processing
	☐ Marine plant harvesting
	☐ Hunting and collecting for other purposes
Cultivation of living resources	☒ Aquaculture — marine, including infrastructure
	☐ Aquaculture — freshwater
	☐ Agriculture
	☐ Forestry
Transport	☒ Transport infrastructure
	☒ Transport — shipping
	☐ Transport — air

	☐ Transport — land
Urban and industrial uses	☐ Urban uses
	☐ Industrial uses
	☐ Waste treatment and disposal
Tourism and leisure	☒ Tourism and leisure infrastructure
	☒ Tourism and leisure activities
Security/defence	☐ Military operations (subject to Article 2(2))
Education and research	☒ Research, survey and educational activities

c.2 Other legislation

The sub-programme links with the following other international legislation (Q8a_LinksExistingMonitoringProgrammes). Tick one or more relevant boxes.

☐Bathing Water Directive

☐Common Fisheries Policy and Data Collection Framework

☐Habitats Directive

☐Birds Directive

☐Nitrates Directive

☐Urban Waste Water Treatment Directive

☐Water Framework Directive

☒OSPAR Convention

☒Trilateral Wadden Sea Convention

☒Other, Specify: EU Invasive Alien Species Regulation, IMO Ballast Water Management Convention

c.3 Implementation of Regional Cooperation

Indicate the level of implementation by selecting one of the following:

☐Agreed data collection methods

☐Common monitoring strategy (spatial and temporal design of programme)

☒Coordinated data collection (delivered separately by each country)

☐Joint data collection (multinational delivery using same platform and/or algorithms)

c.4 Monitoring concepts

Monitoring concepts table:

Current means of coordination	Features or Elements	Parameter	Method	QA/QC	Frequency[1]	Spatial resolution (density) of sampling	Link to HELCOM core indicators[2]	Spatial scope	Monitoring started (year)	CPs monitoring[3]
	Elements (Features) (Features_enum)	Parameters (Parameters_enum)	MonitoringMethod (Monitoring Method_Enum)	(Free text)	MonitoringFrequency, DescriptionProgramme (Frequency_Enum)	(DescriptionProgramme)		(SpatialScope)	(TemporalScope)	(CountryCode_Enum)
Regional (COMBINE)	Non-indigenous species	Species distributional range/pattern	All biological monitoring programs	HELCOM COMBINE manual	Yearly	Whole Baltic Sea (biological monitoring programs)	Trends in arrival of new NIS	EEZ	Different programs started at different times.	All HELCOM Contracting Parties
Other	Non-indigenous species	Offshore fish	Baltic International Trawl Survey	Manual for the Baltic International Trawl Survey	yearly	Whole Baltic Sea	Trends in arrival of new NIS	EEZ	1985	DE, DK, LV, PL, SE, RU, EE, LT
Regional (JHP) HELCOM/ OSPAR	Non-indigenous species	Species present	Port survey protocol as part of the HELCOM/OSPAR JHP	JHP port survey protocol	Minimum every 5 years	Ports	Trends in arrival of new NIS	Coastal waters	2013	EE, SE, FI, PL, LV, DE

[1] The option "Different for each country - see MORE overview" refers to the overview carried out in 2013
[2] Give the name of HELCOM core indicators that are based on the monitoring parameter.
[3] Provide information on the Contracting Partie(s) that are monitoring the parameter.

Current means of coordination	Features or Elements	Parameter	Method	QA/QC	Frequency[1]	Spatial resolution (density) of sampling	Link to HELCOM core indicators[2]	Spatial scope	Monitoring started (year)	CPs monitoring[3]
Other	Non-indigenous species	Species present	Extended Rapid Assessment Survey (eRAS)	Other	Yearly recommended	Ports and harbors, waterways and canals, aquaculture sites and other NIS hot spots	Trends in arrival of new NIS	Coastal waters	2009	DE
Other	Non-indigenous species	Selected species present	Molecular methods, DNA barcoding	Other	Yearly recommended	Ship hulls	Trends in arrival of new NIS	Coastal waters	Has not started yet	
Other	Non-indigenous species	Selected species present	Molecular methods, DNA barcoding	Other	Yearly recommended	Ship ballast waters	Trends in arrival of new NIS	Coastal waters	Has not started yet	
Other	Non-indigenous species	Selected species present	Molecular methods, DNA barcoding	Other	Yearly recommended	eDNA-based detection of target species		Coastal waters	Has not started yet	DK
Other	Non-indigenous species	Fouling species present	Monitoring protocol for marinas	Other	Recommended minimum every 3 years	Marinas	Trends in arrival of new NIS	Coastal waters	Has not started yet	FI, PL, LV, DE
Other	Non-indigenous species	-Selected species present	Reporting NIS observations to online web portal by citizens	Other	Continuously ongoing	Whole Baltic Sea	Trends in arrival of new NIS	Coastal waters	FI: 2010	FI, SE, LV
Other	Non-indigenous species	Mobile and sessile epifauna present	Settlement plates and habitat collectors	Other	Recommended minimum every 3 years	Natural coastal habitats	Trends in arrival of new NIS	Coastal waters	Has not started yet	FI, PL

All biological monitoring programs (COMBINE)

PARAMETER

Element/Parameter pair
Phytoplankton, zooplankton, soft bottom benthos, fish, macrophytes

METHOD

Element/parameter
Monitoring is conducted based on the HELCOM COMBINE manual

QA/QC

Element/Parameter pair
QA/QC procedures are followed, where such procedures exist

FREQUENCY

Frequency

Element/Parameter pair
Depending on the parameter, in minimum yearly

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Country-specific Exclusive Economic Zones (EEZ)

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Biological monitoring covers the HELCOM sub-division into 17 open sea subbasins.

Baltic International Trawl Survey

PARAMETER

Element/Parameter pair
Offshore fish

METHOD

Element/parameter
Monitoring is based on the Manual for the Baltic International Trawl Surveys

QA/QC

Element/Parameter pair
Sampling equipment and data are quality assured (BITS, 2017)

FREQUENCY

Frequency

Element/Parameter pair
Yearly

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Country-specific Exclusive Economic Zones (EEZ)

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
The whole Baltic Sea with the ICES Subdivisions and rectangles (see Annex 1 of the Manual for the Baltic International Trawl Surveys

Port survey protocol as part of the HELCOM/OSPAR JHP

PARAMETER

Element/Parameter pair
Phytoplankton, zooplankton, soft bottom benthos, fish, mobile and sessile epifauna

METHOD

Element/parameter
Monitoring is based on the HELCOM/OSPAR JHP Port survey protocol, used for granting of exemptions in the HELCOM/OSPAR area according to BWMC.

QA/QC

Element/Parameter pair
All samples are to be analysed by quality assured requirements according to the stated method.

FREQUENCY

Frequency

Element/Parameter pair
In minimum every 5 years according to the JHP.

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Major ports in all subbasins

Extended Rapid Assessment Survey (eRAS)

PARAMETER

Element/Parameter pair
Non-indigenous species

METHOD

Element/parameter
Monitoring is based on the Extended Rapid Assessment Survey (eRAS)

QA/QC

Element/Parameter pair
Identifications should be conducted by taxonomic experts

FREQUENCY

Frequency

Element/Parameter pair
Yearly recommended

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Ports and harbors, waterways and canals, aquaculture sites and other NIS hot spots in all subbasins

Molecular methods, DNA barcoding (ship hull)

PARAMETER

Element/Parameter pair
Non-indigenous biofouling species, detection by e-DNA combined with Meta barcoding methods

METHOD

Element/parameter
Monitoring is based on the protocol for e-DNA sampling and Meta barcoding of ship hulls

QA/QC

Element/Parameter pair
Standard QA/QC procedures for molecular laboratories

FREQUENCY

Frequency

Element/Parameter pair
Yearly recommended

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Ship hulls in ports and harbors, waterways and canals

Molecular methods, DNA barcoding (Ship ballast waters)

PARAMETER

Element/Parameter pair
Non-indigenous species in ballast water, detection by e-DNA combined with Metabarcoding methods

METHOD

Element/parameter
Monitoring is based on the protocol for e-DNA sampling of ships' ballast waters

QA/QC

Element/Parameter pair
Standard QA/QC procedures for molecular laboratories

FREQUENCY

Frequency

Element/Parameter pair
Yearly recommended

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Ship ballast waters in ports and harbors, waterways and canals

Molecular methods, DNA barcoding (eDNA-based detection of target species)

PARAMETER

Element/Parameter pair
Target species detection with Metabarcoding methods

METHOD

Element/parameter
Monitoring is based on the protocol for eDNA-based detection of target species

QA/QC

Element/Parameter pair
Standard QA/QC procedures for molecular laboratories

FREQUENCY

Frequency

Element/Parameter pair
Yearly recommended

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Ports and harbors, waterways and canals, aquaculture sites and other NIS hot spots in all subbasins

Monitoring protocol for marinas

PARAMETER

Element/Parameter pair
Fouling / sessile organisms

METHOD

Element/parameter
Monitoring is based on the protocol for marinas

QA/QC

Element/Parameter pair
All samples are to be analysed by quality assured requirements according to the stated method.

FREQUENCY

Frequency

Element/Parameter pair
Every 3 years at minimum

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
Major marinas in all subbasins

Reporting NIS observations to online web portal by citizens

PARAMETER

Element/Parameter pair
Non-indigenous species

METHOD

Element/parameter
Citizens reporting observations to a NIS web portal

QA/QC

Element/Parameter pair
All observations are validated by an expert scientist

FREQUENCY

Frequency

Element/Parameter pair
Continuously ongoing

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
The HELCOM sub-division into 17 open sea subbasins

Settlement plates and habitat collectors

PARAMETER

Element/Parameter pair
Coastal monitoring for mobile and sessile epifauna

METHOD

Element/parameter
Monitoring is based on the Protocol for the sampling of mobile and sessile epifauna

QA/QC

Element/Parameter pair
Quality assured laboratories analyse the samples

FREQUENCY

Frequency

Element/Parameter pair
Every 3 years at minimum

SPATIAL SCOPE

Spatial Scope

Element/Parameter pair
Coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Element/Parameter pair
3 replicates per site, minimum 2 sites per sub-basin

Provide considerations for the scale of aggregation of data for an indicator-based assessment Tick one or more relevant boxes below:

☐HELCOM assessment unit Level 4: Subbasins with coastal WFD division

☐HELCOM assessment unit Level 3: Subbasins with coastal and offshore division

☐HELCOM assessment unit Level 2: Subbasin

☒HELCOM assessment unit Level 1: Baltic Sea

☐MSFD Region

☐EU

☐Other (specify)

☐Unknown

c.5 Monitoring and assessment requirements

Monitoring requirements:

NIS monitoring should cover all man-made and natural habitats where NIS may be found. Most of the information concerning NIS is obtained through routine biological monitoring programs as the HELCOM COMBINE programme, BITS surveys and EU WFD monitoring in coastal waters for those HELCOM countries being EU members. The data flow and responsibility of the flow is on the national contact point shoulders whom would update all new NIS observation from the country in question to the AquaNIS database for the indicator updates and environmental assessments. These ongoing monitoring programs give data on NIS presence and abundance in plankton and benthic communities and fish. In some countries also shallow water habitats are covered by regular monitoring and this will give data also on NIS (macrophytes, sessile organisms, mobile crustaceans and in some cases fish). These ongoing monitoring programmes do not however cover all taxonomic groups or habitats where NIS are introduced and established. Therefore, certain additional methods covering presently not monitored habitats are needed.

The seasonal coverage of monitoring should take into account the lifecycle aspects of different taxonomic groups, e.g. fish monitoring may be conducted annually but phytoplankton with a short generation time should be monitored several times a year to be able to detect new NIS.

In addition to routine biological monitoring programmes, it is important to have NIS monitoring also in port areas because the most important vector for new introductions is shipping and thus recipient area for new NIS are ports and their vicinity. According to the HELCOM/OSPAR Joint Harmonized Procedure, exemptions are valid for maximum of five years. An intermediate review (as suggested in IMO G-7) is included in the grant based on any new information on the basis of the exemption granted including but not limited to: presence of non-indigenous species, introduction pathways for NIS, changes in physical conditions in the port. For MSFD purposes, more frequent monitoring would be required. Minimum site requirement in each port is dependent on the size of the port. Further details can be found from the HELCOM/OSPAR Joint Harmonized Procedure.

Adequacy for assessment of GES:

Monitoring should provide adequate data and information to enable the periodic assessment of environmental status, and distance from and progress towards GES as required by MSFD under Article 9 and Article 11.

	Yes	No
Adequate data?	☒	☐
Established methods for assessment?	☒	☐
Adequate understanding of GES?	☒	☐
Adequate capacity to perform assessments?	☒	☐

Assessment of natural variability

Natural variability should be taken into account when conducting the assessment.

c.6 Data providers and access

From which database the data can be made available? Tick the relevant boxes below:

☒ HELCOM COMBINE ☐ HELCOM PLC ☐HELCOM MORS

☒Other: HELCOM-OSPAR port survey database, AquaNIS, national institutes responsible of the monitoring including EU WFD monitoring in coastal waters for those HELCOM countries being EU members

If the previous answer is "Other" please fill in the next questions (In case the answer is a HELCOM database, the HELCOM Secretariat will do it)

Data type Tick the relevant boxes below:

☒Unprocessed/raw Data

☒Processed Data sets

☒Data Products

☐Modelled data

Data management: General description of data management (DataManagement, Free text)

NIS database

A centralized database is the key element of the integrated NIS monitoring system. Thus AquaNIS (the Information system on Aquatic Non-Indigenous and Cryptogenic Species) database complemented by data from coordinated monitoring has been agreed to be the data

source for the assessments. AquaNIS meets the requirements for assembling, storing and disseminating data compiled from various monitoring programmes and contains the most up-do-date and free-access information/data on NIS introduction events within the Baltic Sea, neighboring regions (e.g. North Sea) and other regions of the world. The data flow and responsibility of the flow is on the national contact point shoulders whom would continuously update all new NIS observation from the country in question to the AquaNIS database for the indicator updates and environmental assessments.

ICES Database, HELCOM/OSPAR JHP database, AquaNIS, national datasets

What method/mechanism will be used to make the data available? Tick the relevant boxes below and provide location (DataAccess):

☒ Providing URL to view data: http://www.corpi.ku.lt/databases/index.php/aquanis,

☐ Providing URL to download data: Click here to enter text.

☒ Provide location of data in national data centre: Finland: www.vieraslajit.fi; https://www.syke.fi/en-US/Open_information; Estonia: ; Lithuania: ; Germany: ; Poland: ; Latvia: On request; Sweden: ; Denmark: ; Russia:

☒ Provide location of data in international data centre (e.g. RSC, ICES, EEA, EMODnet): Click here to enter text.

When will the data first become available? (DataPublicationDate)

Enter the date of reporting, or even a past date if desired (MM/YYYY):

Currently, data are available in several databases (e.g. HELCOM COMBINE, BITS, Ballast Water Exemptions Support Tool, AquaNIS and national databases). Further work is needed to develop a service that can harvest data from all the available databases

How frequently are the data expected to be updated thereafter? Tick the relevant box below:

☐Every 6 years
☐Every 3 years
☐Every 2 years
☐Yearly
☐6-monthly
☐3-monthly
☐Monthly
☐2-weekly
☐Weekly
☐Daily
☐Hourly
☐Continually
☐One-off
☐As needed
☒Other (specify) NIS monitoring programme includes various methods and survey types, frequency of their data delivery also varies.
☐Unknown

List providing contact points in the Contracting Parties

Denmark: Martin Søndergaard Jørgensen, Environmental Protection Agency
Estonia: Anastasija Kovtun-Kante, Environment Agency
Finland: Maiju Lehtiniemi, Finnish Environment Institute
Germany: Manuela Krakau, UBA
Latvia: Solvita Strake, LIAE
Lithuania: Aistė Kubiliūtė, Environmental Protection Agency
Poland: Magdalena Kamińska, Chief Inspectorate of Environmental Protection
Russia:
Sweden:

Has the data been used or is it planned to be used in HELCOM assessments? Tick the relevant box below:

☒Yes ☐No

Select if data is used in the following Baltic Sea Environment Fact Sheets (BSEF) Tick the relevant boxes below:

Biodiversity

☒Abundance and distribution of Marenzelleria species

☒Abundance and distribution of Round goby

☒Abundance and distribution of the Zebra mussel

☒Biopollution level index

☒Observed non-indigenous and cryptogenic species in the Baltic Sea

☐Population development of Great Cormorant

☐Population development of Sandwich Tern

☐Population development of Southern Dunlin

☐Population Development of White-tailed Sea Eagle

☐Temporal development of Baltic coastal fish communities and key species

Eutrophication

☐Bacterioplankton growth

☐Chlorophyll-a concentrations, temporal variations and regional differences from satellite remote sensing

☐Cyanobacteria biomass

☐Cyanobacterial blooms in the Baltic Sea

☐Cyanobacteria bloom index

☐Impacts of invasive phytoplankton species on the Baltic Sea ecosystem in 1980-2008

☐Nitrogen atmospheric deposition to the Baltic Sea

☐Nitrogen emissions to the air in the Baltic Sea area

☐Phytoplankton biomass and species succession

☐Shifts in the Baltic Sea summer phytoplankton communities in 1992-2006

☐Spatial distribution of the winter nutrient pool

☐Unusual phytoplankton event

Hazardous substances

☐Atmospheric deposition of heavy metals on the Baltic Sea

☐Atmospheric deposition of PCDD/Fs on the Baltic Sea

☐Atmospheric emissions of heavy metals in the Baltic Sea region

☐Atmospheric emissions of PCDD/Fs in the Baltic Sea region

☐Cesium-137 in Baltic Sea sediments

☐Temporal trends in contaminants in Herring in the Baltic Sea in the period 1980-2010

☐Emissions from Baltic Sea shipping

☐Illegal discharges of oil in the Baltic Sea

☐Liquid discharges of Cs-137, Sr-90 and Co-60 into the Baltic Sea

☐Trace metal concentrations and trends in Baltic surface and deep waters

Hydrography

☐Development of Sea Surface Temperature in the Baltic Sea

☐Hydrography and Oxygen in the Deep Basins

☐Ice season

☐Total and regional runoff to the Baltic Sea

☐Water Exchange between the Baltic Sea and the North Sea, and conditions in the Deep Basins

☐Wave climate in the Baltic Sea

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