REPUBLIC OF ESTONIA
MINISTRY OF THE ENVIRONMENT

THE ENVIRONMENTAL STATUS OF ESTONIAN MARINE AREA 2018

The aim of this report is to provide an overview of the current status of Estonian marine area and the pressures influencing it, the indicators of good environmental status and updated environmental targets according to the requirements of the Marine Strategy Framework Directive (2008/56/EC) and the European Commission Decision (EU) 2017/848. The status of marine area was assessed based on data from 2011–2016.

The report was requested by the Ministry of the Environment and funded by the Environmental Investment Centre. The work involved experts from different institutions: the Marine Systems Institute, Department of Civil Engineering and Architecture of the Tallinn University of Technology, the Estonian Marine Institute of the University of Tartu, the Estonian Environmental Research Centre (LTD), the Estonian Ornithological Society (NGO), the Institute of Agricultural and Environmental Sciences of the Estonian University of Life Sciences, Pro Mare (NGO), the Estonian Fund for Nature, the Estonian Environment Agency and the Ministry of the Environment.

The most important results of the work are:

The status of the marine environment

Biodiversity

Birds. The importance of Estonian marine area for birds results from its location directly on the East Atlantic Flyway and the diversity of the marine habitats. During the breeding season, the status was evaluated good for only 64% of the bird species studied, which is why the status of aquatic birds as a whole was determined to be bad. Of the five species groups, the status of only one was good (pelagic-feeding birds) and the status of the remaining four was bad (wading, surface-feeding, benthic-feeding, grazing birds). The overall status of wintering birds is good both, as a whole and across various species groups. The status was good for 94% of the species studied. Steller's eider—globally the most vulnerable species of our wintering birds—was the only individual species whose status was unfavourable.

Mammals. Grey seals' abundance, distribution and distribution pattern achieved good environmental status. Abundance of the species in the Baltic Sea is approximately 30 000 (exceeding the threshold value), distribution is continuous along the coast and relative abundance in inhabited parts of the sea is increasing with respect to the overall Baltic Sea grey seal population. The status of ringed seals does not achieve good environmental status. The abundance of ringed seals is considerably below the threshold value, there is no trend for the abundance increase and their distribution has decreased considerably during the last 50 years. The retreat of their distribution to the east has geographically divided the ringed seal populations between the west and north cost of Estonia. As the ringed seal is a climate sensitive species, whose reproduction rates depend on ice conditions, the increase of population has been complicated by the lack and instability of winter ice coverage.

Fish. Baltic sprat and Baltic herring constitute over 90% of the commercial fishery of Estonia. Salmon, perch, zander and flounder are important for small-scale/local coastal fishery. Only one commercially used fish population has achieved good environmental status—Baltic herring outside the Gulf of Riga. The populations of Baltic sprat, flounder, salmon, perch and zander do not meet the criteria for good environmental status. The areas of concern are: the unfavourable status of Baltic herring in the Gulf of Riga, the high fishing mortality of Baltic sprat, the unfavourable size distribution of the flounder population, the small abundance of juvenile salmons compared to the maximum natural potential abundance and the overall bad status of zander and perch. There are no noticeable changes compared to the last status report of 2012. The main pressures are fishing mortality rate, hydrometeorological conditions and decline of spawning ground due to eutrophication.

Water column habitats

To characterise the water column habitats, the status of phytoplankton and zooplankton was evaluated. Seasonal dynamics of dominant phytoplankton groups was evaluated based on trend assessments and allowed deviances. Zooplanktons average size and general abundance was evaluated. The status of pelagic habitats is not good in Estonian marine area as a whole. The main pressure is the eutrophication of the seawater.

Marine ecosystems and food webs

To evaluate the structure and function of food webs, the status of various trophic guilds[1] and their interactions have to be assessed. In this analysis, the status of food webs was evaluated mostly using data that describes fish populations. In addition, the balance of lower level trophic guilds was evaluated using data on plankton and benthos. Currently, data of marine mammals and birds cannot be used in the assessment of food webs due to lack of information. All fish guild indicators show the unfavourable status of the marine ecosystem with the exception of the indicator of the balance between plankton and trophic guilds of the benthos. The marine ecosystems and food webs of Estonian marine area have not achieved good environmental status.

Pressures on the marine environment

Non-indigenous species

Due date, at least 32 non-indigenous species have been found from the Estonian marine area. The prerequisite of good environmental status is the absence of new non-indigenous species during the 6-year evaluation period. Two new non-indigenous species (polychaete *Laonome* sp of unknown origin and Gulf wedge clam, *Rangia cuneata* from the Gulf of Mexico), both introduced here probably through human activity, have been registered in the Estonian marine area within the last six years. Thus, good environmental status of this pressure has not been achieved. The level of biological pollution and the influence of non-indigenous species on the bottom invertebrate communities have both increased.

Eutrophication

The enrichment of the seawater with nutrients—eutrophication—is the cause of the biggest environmental problem of the Baltic Sea. To characterise this pressure, the concentrations of nutrients in water column, and the direct influence (content of chlorophyll-a, biomass of

[1] Trophic guild is a group of species that consumes similar food in a similar manner regardless of the systematic categories of the species.

phytoplankton, water transparency) and the indirect influence (concentration of oxygen, percentage of opportunistic species, depth distribution of phytobenthos, zoobenthos community index) of nutrient enrichment is evaluated. The overall assessment shows that the Estonian marine area is eutrophied and good environmental status has not been achieved. Most of the sea has not achieved good environmental status due to the high concentration of nutrients and the direct influence of eutrophication (e.g. water transparency). The indirect influence of nutrients enrichment is at an acceptable level only in the coastal waters of Estonia.

Physical disturbances to the sea floor

Dredging, dumping, natural resource excavation and trawling can disturb the sea floor, and as a result, cause destruction to the benthos. Of the Estonian marine habitats, the level of physical disturbance is evaluated for reefs, sandbanks, estuaries, mudflats and large shallow inlets and bays. The status of all evaluated habitats is good. At the moment, there is no reason to consider the influence of the disturbance to sea floor, the direct physical loss of the sea floor nor the change of hydrographical conditions as important factors damaging our sea floor habitats.

Contaminants in the marine environment and seafood

Contaminants include compounds that have an adverse effect to the marine ecosystem and human health due to their toxicity, persistence and bioaccumulation.

The annual rates of oil pollution identified through monitoring have been considerably below the substantial pollution limit. The number of pollution cases has also decreased compared to the last evaluation period. Therefore, based on the absence of substantial acute pollution cases, the status of the Estonian marine area can be considered good in this regard.

In Estonian coastal waters, mercury is the most problematic pollutant with average concentrations exceeding the established environmental quality standards in biota. In addition, in a few areas, the unfavourable status is also caused by nickel, anthracene, brominated diphenylethers, DEHP or tributyltin-cation exceeding allowed maximum levels. In a large part of the open sea, the concentration of cadmium is above the established limit.

Radioactive Cesium-137 levels that originate from the Chernobyl disaster continue to be high although a downward trend can be noticed. It is estimated that radioactivity in the Baltic Sea region reaches acceptable levels by the year 2020, but a good status for Cs-137 has not been reached yet.

With regard to food safety, the most problematic pollutants are dioxins and dioxin-like PCBs that exceeded the threshold values for food safety in a few samples of Baltic herring and river lamprey from the Gulf of Riga and Gulf of Finland and flounder from the Gulf of Finland.

It should be noted that the reliability of contaminant status evaluations is low due to lack of monitoring data.

Marine litter

An estimate of 80% of the marine litter originates from the land. In particular, from landfills, city sewers, storm water drainage, industrial waste and beaches. To characterise the influence of marine litter, the sea litter quantities on beaches and seabed, and microlitter quantities in the marine water were assessed. The beach litter quantities show that good environmental status has not been achieved. The seafloor litter quantities show good status for all natural sea areas and 2/3 of the areas influenced by human activity (e.g. ports). Microlitter quantities in

the surface layer of the water column indicate good environmental status. There are currently no assessments on the microlitter quantities in the bottom sediments and the influence of the litter on sea fauna.

Underwater noise

Underwater noise is mainly caused by ships, sonars and underwater construction. If frequent, underwater noise caused by human activity may affect marine organisms adversely. The noise masks natural sounds, damages hearing, causes stress and therefore causes changes to the normal behaviour of the marine life. It has been assessed that noise levels in the Baltic Sea have substantial spatial and temporal variability, although it is not clear how severe the influence of the noise is to the marine species. Anthropogenic impulsive sound and continuous low-frequency sound in water have been preliminarily mapped, but there is still a lack of indicators needed to evaluate the status. Therefore, it is not possible to assess whether the good environmental status has been achieved or not in relation to this criterion.

Summary of the evaluation:

STATUS			**PRESSURE**	
Biodiversity:	Bad		Bad	Non-indigenous species
○ Birds	Bad		Bad	Fisheries
○ Fish	Bad		Bad	Eutrophication
○ Mammals	Bad		Good	Change of hydrographical conditions
Pelagic habitats	Bad		Bad	Contaminants
Marine ecosystems and food webs	Bad		Bad	Marine litter
Benthic habitats	Good		N/A	Underwater noise

Socio-economic evaluation

Next to agriculture and industry, the most impacting economic activities are shipping and marine transport since they influence the marine environment in various ways. However, this does not mean that other activities are less important because the cumulative pressure on the environment comes from the combination of all pressures and their impacts. Considering the effect of future pressures from economic activities, there is a serious risk that good environmental status will not be achieved for biodiversity, eutrophication and pollutants by the year 2030. Based on the current research as of 2017, the economic costs incurred are approximately 60 million euros a year if good status is not achieved.

Reasons for not achieving good environmental status

Biodiversity, marine ecosystems and food webs have not achieved good environmental status due to the cumulative effects of a number of pressures. These are complicated descriptors that depend on the synergistic effect of many existing ecological and anthropogenic pressures, some of which are unclear to this day. The status of some species depends on climatic factors (e.g. ringed seal). The status of birds is additionally influenced by the situation of primary populations and breeding areas outside of the Estonian marine areas.

The environmental status of the Baltic Sea, including the biodiversity and food webs, is influenced the most by eutrophication, contaminant loads, commercial exploitation of fish and introduction of non-indigenous species.

The main cause for eutrophication in the Baltic Sea as a whole as well as in the Estonian marine area is excessive nutrient load from the mainland due to human activities. At the moment, nutrients mainly originate from diffuse pollution caused primarily by the use of fertilisers (both, mineral and organic). Without additional measures to reduce diffuse pollution, the load from agriculture will remain the same in the future or, considering the increase of direct agricultural subsidies, will even increase. It is therefore necessary to take measures to reduce nutrients outflow from the mainland into the sea. At the same time, the Baltic Sea is an enclosed sea area with naturally limited water circulation and excess internal load of nutrients that have accumulated into bottom sediments during decades, which have to be taken into account as well.

The main factor that impedes achieving good environmental status for commercially exploited fish species is pressure from the fishery. To achieve good status for and sustainable use of food stocks, fish stock conservation measures (adjustment of undersize, temporospatial restrictions) and multiannual fish stock exploitation schemes (salmon, sea trout) have to be updated.

The main sources of the contaminant loads into water bodies or the atmosphere are industries, transport and households. An important source of marine pollutants is precipitation that brings with it pollutants from the atmosphere. However, it is hard to avoid this source of pollutants because it does not depend that much on local factors but rather on the long-range transboundary air pollution and emissions by other countries. At this stage, there is no clear understanding on the sources of mercury and cadmium, and this complicates the planning of effective measures to achieve good environmental status.

The primary focus in the reduction of the pressure from non-indigenous species is the mitigation of their introduction risk. Ballast water is possibly the most significant pathway for the introduction of non-indigenous species into our marine area. This means that the reduction of risks related to shipping is the most important measure to be taken in this regard. In 2018, the Ballast Water Management Convention was enforced in Estonia. This aims at protecting the marine environment from the non-indigenous species that may migrate in the ballast water of ships. It is important that other countries of the Baltic Sea region simultaneously implement measures related to the ballast water convention.