KESKKONNAMINISTEERIUM

Estonian Marine Strategy's Programme of Measures 2022-2027

Strategic Environmental assessment (SEA) programme (04.02.2022)

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Contents

1. General

According to the Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment and the Estonian Environmental Impact Assessment and Environmental Management System Act stipulate the need for strategic environmental assessment (SEA) of strategic plans and programmes.

The SEA of Estonian Marine Strategy's Programme of Measures 2022-2027 was initiated 15.09.2021 by Minister of the Environment with a decree No. 1-2/21/390. The SEA was initiated according to the Environmental Impact Assessment and Environmental Management System Act § 33 sub-s 2 clause 1 and § 35 sub-s 2, without giving reasons, because the strategy involves fisheries, waste management and water management subject fields.

Strategic environmental assessment programme is a document, where the planned actions of the strategic document, the subject and content are described, the extent of the SEA is determined and the methods, activities and timetable of the SEA are given. The SEA programme is the source document for conducting the SEA process and drawing up the SEA report.

2. SEA objects' objective and short description

The subject of the SEA is Estonian Marine Strategy's Programme of Measures 2022-2027. Marine Strategy is applied to Estonian marine area and its objectives are:

- protect and preserve good environmental status of Estonian marine area, prevent it from degradation or possibly restore damaged marine ecosystems.
- prevent and minimise emissions to marine environment to gradually lessen the pollution and to assure that it won't affect or endanger marine biodiversity, ecosystems, human health nor the legal utilization.

Estonian Marine Strategy's Programme of Measures 2022-2027 and the SEA were initiated 15.09.2021 by Minister of the Environment with a decree No. 1-2/21/390.

The objective of the programme of measures is to bring up to date Estonian Marine Strategy's Programme of Measures (2017) to assure that validated environmental goals are achieved and thus good environmental status (hereafter GES) of Estonian marine area is achieved or maintained. According to the European Union's Marine Strategy Framework Directive (2008/56/EC), GES is described with 11 qualitative descriptors: biodiversity (D1), non-indigenous species (D2), commercial fish and shellfish (D3), food webs (D4), eutrophication (D5), sea-floor integrity (D6), hydrographical conditions (D7), contaminants (D8), contaminants in seafood (D9), marine litter (D10) and energy, incl. underwater noise (D11).

Estonian Marine Strategy's Programme of Measures' interim report was compiled in 2019. According to the report, only two of the measures were implemented (*measure No. 8* - Application of electronic reporting system for fishing efforts (gears) to better control fishing and avoid abandoning of fishing gear; *measure No. 14* - Environmental awareness raising regarding marine litter and preventing plastic packages entering the sea). The implementation of measure No. 4 (Ratification and implementation of the International Convention For The Control And Management Of Ships' Ballast Water And Sediments (BWMC), and participating in the regional information system) should also meet the deadline. Implementation of the remaining 13 measures is delayed, with the main reason of lack of data or knowledge and the lack of or renewal of national implementation tools.

According to the European Union's Marine Strategy Framework Directive's article 17, each Member State must bring up to date its marine strategy in every six years. Renewed programme of measures must be implemented in 2022.

Measures are differentiated to four types according to their implementation:

1.a – measures to achieve and maintain GES, which already are accepted and implemented with other laws or policies.
1.b – measures to achieve and maintain GES, which have been accepted with other policies but haven't been implemented.
2.a – additional measures to achieve GES, which are founded on other EU laws and international agreements, but the requirements need to be more strict, specified etc.
2.b – new measures to achieve GES, which don't predicate on existing EU laws or international agreements.

Measures are differentiated also to four types according to their content:

- technical.
- legislative.

- economic (benefits etc).
- political (voluntary agreements, communication strategies, awareness raising, campaigns, trainings etc).

Initial, discussed and characterized by experts, measures are shown in Table 2.1. Measures' indicators are initial and are attributed after final validation.

Table 2.1 Estonian Marine Strategy's Programme of Measures 2022-2027

Indicator (initial)	Measure	GES descriptor
BALEE-M017	Improving the efficiency of the existing network of marine protected areas	D1, D4, D6
BALEE-M019	Updating of eel protection and management in Estonia	D1
BALEE-M020	Improving the condition of spawning grounds and migration routes for semi-migratory and migratory fish	D1, D3, D4
BALEE-M021	Development and implementation of by-catch reduction and prevention technologies for the protection of species in the Baltic Sea, informing the target groups and introduction of new technologies	D1
BALEE-M022	Inventory of whitefish spawning grounds and, if necessary, improvement of spawning grounds, improving of populations viability and modernization of protection measures	D1
BALEE-M024	Harmonized implementation of the IMO Biofouling Guidelines and continuation of relevant work in the IMO to prevent the spread of invasive non-indigenous species	D2
BALEE-M026	Reduction of fishing efforts to achieve GES and development and implementation of compensatory measures for fishermen	D3
BALEE-M030	Supporting scheme for developers based on the amount of nutrients taken from the sea by fishing, harvesting or aquaculture	D5
BALEE-M032	Development of the system requiring implementation of compensatory measures if disturbance or destruction of the integrity of the seabed is foreseen	D6
BALEE-M035	Preparation and implementation of a package of minimum requirements for EIA and in service monitoring of blue economy development projects	D6, D1, D2, D3, D4, D5, D7
BALEE-M036	Construction of openings in the Väike Väin dam to improve water exchange and open the strait as a migration route for fish	D7, D1
BALEE-M039	Communication and outreach on the handling of pharmaceuticals harmful for the environment	D8, D9
BALEE-M040	Enhancing readiness for pollution response, including through the design and construction of a new buoy and research vessel with oil pollution control capacity	D8 jt
BALEE-M043	Develop sufficient capacity to receive ship residuals (including grey water) in the Baltic Sea ports	D8, D5
BALEE-M044	Reduction of organotin (TBT) load	D8, D9
BALEE-M046	Litter collection campaigns in the vicinity of ports	D10, D6
BALEE-M047	Environmentally friendly management of waste on the coast and beaches	D10

Indicator (initial)	Measure	GES descriptor
BALEE-M049	Reducing littering related to the recreational activities and tourism industry	D10
BALEE-M051	Treatment of stormwater and effluents to reduce input of microplastics	D10, D8
BALEE-M052	Transition to the use of biodegradable sponges, brushes, etc.	D10
BALEE-M053	Decommissioning of tires with low resistance to abrasion	D10
BALEE-M055	Implementing HELCOM underwater noise action plan, including setting speed limits near and during sensitive areas and periods	D11, D1
BALEE-M002-01	Enabling marine aquaculture while avoiding an increase in nutrient loads	D1, D5
BALEE-M002-02	Avoiding an increase in the load of hazardous substances in aquaculture	D8, D9
BALEE-M008-01	Further implementation of a reception and handling system for lost and recovered gears, including support for investment in appropriate handling technologies	D10, D3
BALEE-M010-01	Establishment of artificial wetlands to reduce the load of nutrients, microplastics and hazardous substances into the Baltic Sea	D5, D8, D10
BALEE-M0XX	Management of maritime and marine data, improvement of data exchange and availability of environmental data, including development of relevant services	D1-D11
BALEE-M0XX1	Updating of regulations	D1-D11
BALEE-M0XX2	Participation in international co-operation	D1-D11
BALEE-M0XX3	An educational measure bringing together all forms of communication and education and information sharing with the public	D1-D11

More accurate descriptions of the measures will be disserted in the SEA report.

3. SEA objective and scope

According to the European Union's Marine Strategy Framework Directive's article 17, each Member State must bring up to date its marine strategy in every six years. Which is why Estonian Marine Strategy's Programme of Measures 2022-2027 will be drawn up. The implementation of the programme of measures will help to achieve or maintain good environmental status of Estonian marine area.

According to the Environmental Impact Assessment and Environmental Management System Act § 31^1 the purpose of strategic environmental assessment is to contribute to the integration of environmental considerations into the preparation and adoption of strategic planning documents, provide for a high level of protection of the environment and promote sustainable development. The SEA was initiated according to the Environmental Impact Assessment and Environmental Management System Act § 33 sub-s 2 clause 1 and § 35 sub-s 2, without further justification, because the strategy involves fisheries, waste management and water management subject fields.

Objectives of the current SEA are:

1) to explain, describe and evaluate the significant strategic environmental impacts of the new measures developed for the Estonians Marine Strategy's Programme of Measures and to bring out measures for mitigation or/and avoiding of negative impacts or increasing of positive impacts.
2) to evaluate the internal accordance of the new measures developed for the Programme of Measures and to analyse the compliance of the new measures with environmental objectives of other relevant Estonian and international strategic documents.
3) to describe necessary environmental impact monitoring actions for the measures of the Estonians Marine Strategy's Programme of Measures if significant potential environmental impacts are identified during the SEA.
4) to involve different interest groups to the compilation of the SEA and receiving feedback from different interest groups, which can be taken into consideration in the SEA programme and report.

The SEA and the assessment of the environmental impacts of a strategic document gives the person who adopts the strategic planning document necessary information what the adoption of the strategic document can involve. The objective of the current SEA is to give the preparer of the Programme of Measures information about the environmental impacts of the planned measures.

The extent of the SEA covers the impact assessment of the new measures developed in the Programme of Measures. Since the SEA is conducted for a strategic document, the impacts are assessed also on a more general strategic level. The principal objective of the SEA is to gather information and analyse the possible environmental impacts which could emerge with the measures developed for the Programme of Measures and to integrate environmental considerations to the planning process in its early stages.

The SEA takes the whole Estonian marine area into consideration, when assessing the possible environmental impacts of the strategic document. The measures developed for the Programme of Measures could affect the whole Baltic Sea and its habitants. The sphere of influence in different categories will be specified in the SEA report.

4. Correlation to other strategic planning documents

A connection may occur with Estonian Marine Strategy's Programme of Measures 2022-2027 to other EU and Estonian strategic planning documents, e.g.:

- European Union Strategy for Sustainable Development.
- European Union Strategy for the Baltic Sea Region.
- European Union climate and energy framework for 2030.
- European Union Biodiversity Strategy for 2030.
- The European Green Deal.
- European Union A Farm to Fork Strategy to a fair, healthy and environmentally-friendly food system.
- HELCOM Baltic Sea Action Plan (2021).
- HELCOM Revised Regional Action Plan on Marine Litter (2021).
- HELCOM Regional Action Plan on Underwater Noise (2021).
- HELCOM Regional Maritime Spatial Planning Roadmap 2021-2030.
- HELCOM Baltic Sea Regional Nutrient Recycling Strategy (2021).
- HELCOM Science Agenda (2021).
- HELCOM Guidelines for Sea-Based Measures to Manage Internal Nutrient Reserves in the Baltic Sea Region (2021).
- Estonia 2035 strategy.
- Estonian Marine Strategy.
- Estonian low carbon strategy "General Principles of Climate Policy until 2050".
- Estonian national energy and climate plan 2030.
- Climate Change Adaptation Development Plan until 2030.
- Estonian Environmental Strategy 2030.
- National Strategy on Sustainable Development "Sustainable Estonia 21".
- Changing the World: 2030 Agenda for Sustainable Development.
- Agriculture and Fisheries Strategy 2030.
- Prioritised Action Framework for Natura 2000 in Estonia (2021-2027).
- Welfare Development Plan 2016-2023.
- Fish farming restoration action plan 2017–2019 (with a 2023 perspective).
- Migratory, semi-migratory, and freshwater fish species spawning grounds restoration program 2017–2023 (with a 2027 perspective).
- Spawning ground restoration program 2017-2023 (with a 2027 perspective).
- River Basin Management Plans for East-Estonia, West-Estonia and Koiva river basins 2021-2027 (draft).
- National Spatial Plan "Estonia 2030+".
- Hiiu maritime spatial plan.
- Pärnu maritime spatial plan.
- Estonian maritime spatial plan (draft).

Referred to and if necessary other relevant strategic planning documents' correlation with current SEA object will be expanded upon in the SEA report.

5. Description of the environment presumably affected

The Baltic Sea with an area of approximately 370,000 km^2 (415,000 km^2 with Denmark Strait and Kattegat) is relatively isolated from other seas and has only a narrow connection with Atlantic Ocean through Danish Straits. The Baltic Sea is a shallow sea, with an average depth of 50–55 metres and approximately 20% is shallower than 10 metres, maximum depth is 459 metres. The water volume is about 20,000 km^3, 21,000 km^3 with Danish Straits and Kattegat[1].

Estonian marine area is located in the north-east parts of the Baltic Sea and consist of several bigger Baltic Sea pools, which are different in natural conditions and loads conditioned from human activities: Gulf of Finland, the opening of western islands and Gulf of Riga, which also comprises of the Väinameri Sea. The Baltic Sea is the second largest brackish water areas in the world, with a surface area of 420,000 km^2. It is ecologically one of a kind, but is also very responsive to human activities[2].

Ca 36,622 km^2 of the Baltic Sea is under Estonian jurisdiction and it is divided into three areas[3]:

- internal sea – marine area, which is located between territorial sea baseline and the coastline. Territorial sea baseline is a notional line which connects mainland, islands, cliffs, and farthest points of rocks from the coast that protrude from the water (ca 14,487 km^2).
- territorial sea – marine area which adjoins the internal waters, its width is up to 12 sea miles with an average depth of about 30 metres (ca 10,714 km^2).
- economic zone – outside of but adjoined with the territorial sea, its boarders are appointed between Republic of Estonia and neighbouring countries, its average depth is about 80 metres (ca 11,421 km^2).

Internal sea (coastal sea) is divided into 16 bodies of water – Narva-Kunda bay, Eru-Käsmu bay, Hara and Kolga bay, Muuga-Tallinna-Kakumäe bay, Pakri bay, Hiiu shallow, Haapsalu bay, Matsalu bay, Soela strait, Kihelkonna bay, Pärnu bay, Kassari-Õunaku bay, Väinameri Sea, northwestern part of Gulf of Riga, northeastern part of Gulf of Riga, centre part of Gulf of Riga coastal waters. All coastal waterbodies in Estonia are in bad conditions[4]. According to the Ministry of Environment 16.04.2020 decree No. 19, coastal waters is divided into six types of bodies of water, consequently to natural properties[5].

[1] Pärnu maakonnaga piirneva mereala maakonnaplaneering (II köide). Olemasoleva olukorra analüüs. Planeeringulahenduse kujunemine. Keskkonnamõju strateegilise hindamise aruanne (2016) // link
[2] Keskkonnaministeerium. (2019). Eesti mereala keskkonnaseisund 2018 // link
[3] Keskkonnaagentuur, 05.10.2021 // link
[4] Pinnavee ja põhjavee seisund – Interaktiivne kaart. Pinnavee koondseisund 2020 // link
[5] RT I, 21.04.2020, 61 // link

5.1 Natural conditions and the state of the Baltic Sea

Functioning of the Baltic Sea and thereat Estonian marine area, is affected by different physical and chemical properties[6]:

- **seabed** – detailed knowledge of the seabed is only available from places where measuring and analysis have been done, but bottom sediments haven't been systematically mapped out in Estonia and can only be described with modelling data. According to modelling data there are primarily muddy sediments in Estonian marine area, there can also be found sand and sand sediments and less rocky areas.
- **depth** – Estonian marine area is quite shallow, where about third of the area is deeper than 60 metres, but the overall depth varies from 0–180 metres. The average depth of Gulf of Finland is 38 metres, its maximum depth 124 m. Gulf of Rigas' depth is primarily under 30 m but reaches over 50 m in its middle areas. Väinameri Sea is the shallowest area in Estonian marine area, where depth is primarily under 10 m. The opening area of western islands has a depth of 10-40 m and is the deepest in the economic zone areas. The deepest point in the Estonian marine area resides west from Hiiumaa where the depth amounts to 249 m in the economic zone border.
- **water salinity** – water salinity is one of the most important factors for species' distribution in the Baltic Sea. Saline water inflow comes through Danish straits and freshwater inflow from the rivers at the same time. Freshwater stays on the surface due to its lower density and therefor flows out of the Baltic Sea, whereas saline water stays near the bottom. Due to such foliation, transport of the nutrients and oxygen is impeded between the surface and bottom layers. Estonian marine area salinity is between 0-8 g/kg.
- **temperature** – Gulf of Riga and Väinameri Sea, which are connected to the high sea with narrow straits, have a bigger fluctuation in water temperature than in Gulf of Finland or in the open area of the western islands. There also are differences between deeper and more open areas and shallow bay areas. Sea areas with freshwater warm up in the spring and cool down in autumn faster than the high sea (temperature difference is 2–3°C). There is also seasonal foliation from May to September, which is an important factor for nutrient and dissolved oxygen transportation between layers.
- **ice coverage** – ice coverage in the Baltic Sea has a determinative importance on seabed habitats and predisposes oxygen deficiency in half-closed bay areas in the winter. In the last 100 years, annual maximum ice coverage on the Baltic Sea has reduced by 20% and the duration of it has also reduced. Estonian marine area is covered in ice during rough winters, whereas during soft winters only Pärnu bay and Väinameri sea has ice coverage. Ice coverage is thicker and more constant in the Gulf of Riga and Väinameri sea than in the high sea areas. Gulf of Finland and the open area of the western islands cool down slower in the autumn and ice starts to form much later.
- **water transparency** – water transparency is mainly affected by concentration of solid particles in the water, which cause dispersal of light. Eutrophication decreases water transparency due to excessive input of nutrients which increases the supply of dissolved organic waste and organic matter. Water transparency is lower in bay areas. Water transparency in Gulf of Finland is naturally low due to high content of humic materials.
- **oxygen level** – oxygen level in the Baltic Sea is largely affected by the saline water inflow through Danish straits. Thereof, large inflows are very important (happens

[6] Keskkonnaministeerium. (2019). Eesti mereala keskkonnaseisund 2018 // link

approximately every 10 years), because large inflows of saline and oxygen rich waters enter the sea. Eutrophication leads to increased decomposition of organic matter which can lead to oxygen deficiency and result in loss of habitants. For decades the whole Baltic Sea region has been impacted by diminishing oxygen levels and these areas are constantly widening. Approximately 18% of the Baltic Sea has poor oxygen conditions and ca 28% is affected by anoxia. Oxygen deficiency is seasonal in the Gulf of Finland and in the Gulf of Riga, but in the open areas of the sea, oxygen deficiency is longstanding. Väinameri Sea has shallow waters and is well blended which is why oxygen deficiency isn't a problem.

- **currents** – the movement of water mainly affects the transportation and distribution of sediments and dissolved matter; peregrination of different species happens with the currents. The currents in Estonian coastline are very changeable and mostly depend on the local wind. Estonian marine areas currents' characteristic velocity on the surface is 10-20 cm/s, maximum velocity (over 1 m/s) have been recorded in straits and along the coastline. The highest currents' velocity (up to 2 m/s) in Estonian marine area has been recorded in the strait of Soela. In the summer marine waters are vertically stratified, thereby currents' vertical distribution is also stratified. In the deep waters of the sea, currents' velocity can grow up to 40-50 cm/s.
- **waves** – main natural process which relocates sediments and therefor affects marine life, storm waves can also change the shoreline. During southwestern, western, and northwestern winds, waves have strong impacts in the Gulf of Finland and the open area of the western islands, weak impacts in the Gulf of Riga and impacts in the Väinameri Sea are relatively inexplicit.
- **upwelling** – process in which deep water rises toward the surface when the currents move the surface water away from the coast. Water that rises to the surface is often cold, with better transparency and rich in nutrients, which is why waters' optical properties change for some time and phytoplankton starts to proliferate. This phenomenon is mainly related to great depths and sharp underwater edges of the coast. The upwelling is intense in the western parts of the Gulf of Finland. The Väinameri Sea has shallow waters and is well blended, so upwelling isn't noticeable.

Good environmental status for the year 2030 probably won't be achieved in the field of biodiversity, eutrophication, and contaminants. The main factor, why good environmental status hasn't been achieved with commercial fish and shellfish, is the pressure from fisheries[7]. Bad status of some species' (i.e., pike, salmonids, some minnows) is the bad state of spawning areas (i.e., closed river estuaries) are as or more important factors.

From 16 coastal waterbodies all were in bad conditions in 2019, which means that none were in good or in very good state. Poor chemical state is the primary reason for their bad state, which was caused by mercury content in the marine life. Poor or bad ecological conditions in coastal waterbodies are mainly caused by eutrophication and plant nutrients[8].

[7] Keskkonnaministeerium. (2019). Eesti mereala keskkonnaseisund 2018 // link
[8] Muna, M jt. (2020). Eesti pinnaveekogumite seisundi 2019. aasta ajakohastatud vahehinnang // link

5.2 Pressures of the state of the Baltic Sea

Approximately 85 million people inhabit the coastal area of the Baltic Sea, whose land-based and sea-based activities exert a wide variety of pressures on the sea. Some of the pressures are exacerbated by the limited level of water exchange, which means that nutrients and other substances accumulate and are only diluted slowly[9].

5.2.1 Eutrophication

Eutrophication was first recognized as a large-scale pressure of the Baltic Sea in the early 1980s, but after that nutrient inputs have decreased. However, the total nitrogen input was about 7% larger than the maximum allowable input in 2015, whereas phosphorus input remained 44% above the threshold value. Atmospheric inputs account for about 30% of the total nitrogen inputs, natural sources constitute about one third of the riverine inputs of nitrogen and phosphorus. The annual total input of nutrients to the Baltic Sea amounts to about 826,000 tonnes of nitrogen and 30,900 tonnes of phosphorus. The predominant nitrogen load comes from diffuse sources on land, especially agricultural areas, also from various transportation means, aquaculture, wastewater treatment plants, industrial water, and pesticides. The main contribution of human-introduced phosphate comes from domestic and industrial sewage and wastewater and from fertilizers[10].

Eutrophication leads to an increased algal growth which can lead to a shift in species composition to fast growing algae species (including toxic species). Large algal blooms impact the water transparency which can lead to the reduced amount of sunlight received by bottom waters. Increased decomposition of organic matter can lead to oxygen deficiency, which can impact the fish and benthic fauna. Eutrophication could also have socio-economic impacts through reduced fish and shellfish stocks and shellfish poisoning[11].

5.2.2 Hazardous substances

Man-made chemicals and heavy metals enter the Baltic Sea via numerous sources, including wastewater treatment plants, leaching from waste deposits, industrial plant emissions and pesticides. Some are highly visible (i.e., oil spills), others however can remain unnoticed or are only apparent when detrimental impacts on the ecosystem or biota are observed. Many contaminants degrade slowly, and their impacts can magnify as they accumulate within the aquatic food web. Thousands of environmentally hazardous substances have been identified as potentially occurring in the Baltic Sea, but only some hundreds are regularly monitored[9].

Chemical contaminants degrade the state of the Baltic Sea and can cause serious damage to its functioning. In addition to the degradation of the state of marine waters, a consequence from the contamination of seas is that organisms themselves or biological processes may be adversely affected. There is growing evidence that contaminants may be partly responsible in

[9] HELCOM. (2018). State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155 // link
[10] European Comission. (2021) Our Oceans, Seas and Coasts. Descriptor 5: Eutrophication // link
[11] Balti Keskkonnafoorum. (2009). Läänemeri meie ühine ja kordumatu aare // link

outbreaks of diseases, which adversely affect individuals, or populations of marine organisms[12].

5.2.3 Marine litter

Marine litter is a clearly visible problem along the Baltic Sea coastline, and it also appears under the surface in many different size classes. Larger marine litter can cause direct harm to animals when they swallow it or become entangled. The smallest microlitter is invisible to the human eye but reaches the marine food web when animals ingest it. Around 70% of the marine litter in the Baltic Sea is plastic, which is a special concern due to their risks to the environment and slow degradation. Besides having effects on the environment, marine litter also has a strong socioeconomic dimension, affecting human activities (reduce the value of tourism and recreation) and health. It can also damage fishing gear, contaminate catches or be a risk to navigational safety. Additionally, marine litter is a possible vector for the transfer of non-indigenous species[13].

Main sources of marine litter are littering of beaches, rivers, untreated municipal sewerage, fishing, illegal or accidental dumping, offshore mining etc[14]. So called "ghost nets" pose an especially large risk to marine life since they continue fishing, trapping not only fish, but also other marine life. Marine litter has a long-term negative impact on marine life – once larger litter degrades into microlitter over time and may additionally cause chemical effects[13].

5.2.4 Underwater sound

Sound is continuously present in the underwater environment, but human activities cause additional sounds which may have a polluting effect. Sound waves propagate over long ranges in water and their impact may occur far from the sources. Two categories of sound are identified: continuous and impulsive. Continuous sound may be generated from bridges, offshore wind turbines, shipping etc, which may mask animals' communication and signals used for orientation. Impulsive sound can be associated with underwater explosions or other short-term activities. This type of sound can displace animals, and scare them away from significant areas (i.e., areas for feeding or calving). Extremely loud sounds may cause hearing damage, either temporarily or permanently, which they depend on for navigating, communicating, or hunting prey[13,15].

5.2.5 Non-indigenous species

Non-indigenous species are transferred to the Baltic Sea as a result of human activities, most probably with aquaculture or they are transported in ballast water. Around 140 non-indigenous species or species with unknown origin have been recorded in the Baltic Sea. Non-indigenous species adapt to new environmental conditions over time and could become invasive and in

[12] European Comission. (2021). Our Oceans, Seas and Coasts. Descriptor 8: Contaminants // link
[13] HELCOM. (2018). State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155 // link
[14] European Comission. (2021). Our Oceans, Seas and Coasts. Descriptor 10: Marine Litter // link
[15] Oceancare. (2021). Underwater Noise: Consequences // link

turn have an impact on the food web. Thereof can reduce natural biodiversity and make ecosystems less resilient to changes[13,16].

5.2.6 Species removal by fishing and hunting

Fishing and hunting are traditional sources of livelihood in all Baltic Sea countries. The fish is used for human consumption, but industrial use represents a large share (i.e., fish oil). Stocks should be exploited sustainably and should have full reproductive capacity. Overfishing can have very negative environmental impacts that can result in stock depletion, which in turn could influence the food web. Many European fisheries today depend on young and smaller fish, which are caught before they can reproduce[17,18].

5.2.7 Seabed loss and disturbance

Maintaining sea-floor integrity is necessary to preserve marine biodiversity and living resources. However, some human activities may impact the structure, i.e., offshore mining, using certain fishing practices, polluting, introducing non-indigenous species etc. Some activities may affect the seabed directly, others cause indirect effects. Some activities lead to permanent loss, some cause temporary disturbance. Based on the latest data (2011–2016), less than 1% of the Baltic Sea seabed is potentially lost due to human activities while roughly 40% of the seabed area is potentially disturbed[17,19].

5.3 Biological diversity, protected species and Natura 2000 network areas

In comparison to other water ecosystems, there are relatively low number of species in the Baltic Sea. Biodiversity in the Baltic Sea consists of salt-water and fresh-water species who are adapted to the brackish water and there is a small number of real brackish water species. In the northern and eastern parts of the Baltic Sea, where the water salinity is low, is less habitable and fresh-water species are predominant in funnel areas and in coastal waters[20].

There are approximately 100 different fish species in the Baltic Sea, and most of them are originated from lakes and rivers. Although there are species who also live in the Atlantic Ocean, they are unable to reproduce in the Baltic Sea due to its low salinity, and they are much smaller from the ones who live in the ocean. Very common fish in the Baltic Sea are sprat, Baltic herring, flounder, and codfish. The Baltic Sea is also rich in bird species, some of them are migratory, some come here to hatch. In the spring, migratory birds are on their way to north and to south in the autumn but hatching birds will stay in the Baltic Sea region to nest and hatch. Typical marine birds are eider, oystercatcher, and goosander but there are also birds which reside at lakes and coastal areas (i.e., gulls, swans, and sea eagles). There aren't a lot of mammals in the Baltic Sea, but there are seals (ringed and grey seals), water voles and muskrats. Algae is represented in belts – green algae is in the shallow; brown algae is in the

[16] European Comission. (2021). Our Oceans, Seas and Coasts. Descriptor 2: Non-indigenous Species // link
[17] HELCOM. (2018). State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155 // link
[18] European Comission. (2021). Our Oceans, Seas and Coasts. Descriptor 3: Commercial Fish and shellfish // link
[19] European Comission. (2021). Our Oceans, Seas and Coasts. Descriptor 6: Sea-floor Integrity // link
[20] Keskkonnaministeerium. (2021). Merekeskkonna kaitse // link

middle and red algae is at the deepest belt. Algae offer shade to different invertebrate and fish species. Invertebrates are represented with zooplanktons (the biggest is aurelia or in other words moon jellies) in the Baltic Sea, amphipods can be found in shore waters and *Saduria entomon* can be found in the deep sea. Different shellfish can be found in the Baltic Sea, most common in the Estonian marine area are Baltic macoma and blue mussel[21].

There are more than 30,000 known species in Estonia, but it is estimated that more than 40,000 species can be found here[22]. There are estimably 75 species of fish in Estonia and about 30 of them live in the coastal waters. The water that surrounds Estonia is brackish, which is why it's a suitable place to many fresh-water species[23]. The character of seabed, a significant factor to a habitat type, is different in the Baltic Sea and the Baltic countries' coast in its eastern side. In general terms they can be defined by hard and soft seabed habitat types. Hard seabed habitats are crystalline basement, hard and soft sediments, reef, rocky bottom, gravel bottom, hard clay bottom, gravel-shellfish bottom, and mussel bottom. Soft seabed habitats can be covered with sand, mud, peat, or combined sediments. The most common seabed habitats' plants are sea wrack and various green, brown, or red algae. In the sandy parts of the sea there are usually only a few plants, but there are rocks densely covered with algae. Big algae species and species who latch onto the seabed, prefer rocky bottoms and reefs. Soft seabed habitat is preferred by vascular plants and species who live in the soil. Biodiversity is higher in shady regions (i.e., small creeks and bays) but only a few species can adapt to such harsh living conditions where they are under direct exposure to waves. In comparison to other Baltic countries' marine area, Estonian seabed habitats are more varied[24].

As of the end of 2020, Estonia has 3,946 protected natural sites that consists of 6 national parks, 22 natural objects protected at the local government level, 38 protected areas with old protection regulation, 231 nature conservation areas, 156 landscape conservation areas, 319 special conservation areas, 471 parks and forest stands, 1,070 separate protected natural objects and 1,633 species protection sites[25]. In Estonia, 23% of the total area (dry land and water areas combined) is under protection, territorial sea is protected 27% of its total area, and marine area (incl. economic zone) is protected 18,7% of its total area[26]. As of 2017, Estonian Natura 2000 network consists of 66 bird sites and 542 natural habitat sites with a total area of 14,863 km^2. A little less than half of Natura 2000 sites are located in the sea, 17% of Estonian mainland territory is covered with Natura 2000 sites[27].

[21] Eesti Merebioloogia Ühing. Läänemere elustik // link
[22] Loodusveeb. (2021). Liigiline mitmekesisus // link
[23] Riigiportaal. (2021). Kalandus // link
[24] Balti Keskkonnafoorum. (2009). Läänemeri meie ühine ja kordumatu aare // link
[25] Keskkonnaministeerium. (2021). Looduskaitse // link
[26] Keskkonnaagentuur. (2021). Looduskaitse arvudes // link
[27] Keskkonnaministeerium. (2021). Natura 2000 // link

6. Possible environmental impacts of the strategic planning document

The subject of the SEA, Estonian Marine Strategy's Programme of Measures 2022-2027, is bound to national (in other words general) level to draw up measures in order to achieve good environmental status (GES). That is why assessable impact categories are defined relying on GES descriptors, which were elaborated prior to the Programme of Measures. According to the European Union's Marine Strategy Framework Directive (2008/56/EC), GES is described with 11 qualitative descriptors: biodiversity (D1), non-indigenous species (D2), commercial fish and shellfish (D3), food webs (D4), eutrophication (D5), sea-floor integrity (D6), hydrographical conditions (D7), contaminants (D8), contaminants in seafood (D9), marine litter (D10) and energy, incl. underwater noise (D11). Given descriptors are disserted in the SEA report as natural environment impact categories.

Possible impacts with effectuating the Programme of Measures on the natural environment (incl. aquatic environment, atmosphere, seafloor, and seacoast):

- impacts on biodiversity, food webs, water columns and commercial fish and shellfish and other species (descriptors D1, D3, D4 and D6).
- impacts related to non-indigenous species (descriptor D2).
- impacts on marine habitats (seabed integrity and hydrographical conditions), and other physical indicators of the marine environment (underwater noise), including impact on protected species and Natura 2000 sites' protection and integrity (descriptors D6, D7 and D11).
- impact on the marine water quality, including eutrophication, contaminants in the aquatic environment and in seafood, impact on marine litter (descriptors D5, D8, D9 and D10).

Possible impacts with effectuating the Programme of Measures on socio-economic environment:

- impacts on the well-being and health of humans (first and foremost the impact on employment, marine enterprises, and research and development), and impacts on the property.
- impacts on the marine cultural heritage.

Impacts on previously given categories will be assessed and analysed during the SEA report. The exact characters and extent of the possible significant environmental impacts that may ensue with effectuating the Programme of Measures will turn out and will be given in the SEA report.

Considering current information, with effectuating the Programme of Measures, transboundary environmental impacts may result. Which is why the SEA programme and report will be transmitted to neighbouring countries (Latvia, Sweden, Finland, and Russia) in association with the Ministry of Environment of Estonia. Rest of the countries, which are situated in the Baltic Sea region, will be notified about the compiling of the Estonian Marine Strategy's Programme of Measures and the initiation of the SEA.

The SEA takes the whole Estonian marine area into account, which is why planned activities/measures can have an impact on Natura 2000 network. Because the Programme of Measures is a national level strategic document, on account of which detailed Natura 2000

appropriate assessment won't be carried out. Nevertheless, possible impacts on Natura 2000 network will be assessed and if needed, measures for its areas' conservation will be stipulated.

The spectrum of subjects may widen if new and significant information emerges.

7. The methods of assessment

The SEA is conducted according to the Estonian Environmental Impact Assessment and Environmental Management System act and to relevant guidance materials. Significant impacts (negative and positive) of the strategic planning document, that are likely to occur, are assessed in the SEA. Environmental impact is significantly negative if it may potentially exceed the environmental capacity of a site, cause irreversible changes in the environment; endanger health, well-being, cultural heritage, or the property of human. Environmental impact is significantly positive if it decreases the environmental load of a site or area (for example the reduction of environmental pollution or the use of natural resources) or measures are taken, which ensure the preservation or improvement of the environmental status of natural areas, provide the improvement of human health and well-being and secure the preservation of cultural heritage or property.

The SEA uses two main methodical approaches: compliance analysis and environmental impact analysis.

The compliance analysis is used to assess if and how are the new measures of the Programme of Measures in compliance with other strategic documents' objectives. It will be analysed if new measures will or won't help to achieve different international strategic documents', European Union, and Estonian national political environmental objectives. The strategic documents which are being assessed are shown in Chapter 4 of the SEA programme.

Environmental impact analysis is an approach that assesses the planned measures in the spectrum of different impacts. An overview of the current situation and of the main problems are given in the analysis. The impact analysis covers which natural and socio-economic environmental fields and to what extent are influenced by the planned measures and actions of the strategic planning document. If necessary, suggestions are made to change the plan (Programme of Measures) regarding the environmental aspects to mitigate negative effects and to amplify positive effects. Categories that will be assessed, are given in Chapter 6 of the SEA programme.

In the impact analysis the impacts are mainly assessed qualitatively (descriptively) in relation to the different fields of natural and socio-economic environment. If possible, the impacts to different environmental fields are also assessed quantitatively. Considering the strategic scale of the Programme of Measures and that there is not always enough detailed information about the effects of planned measures, quantitative assessment can be difficult. Therefore, in many fields it is impossible to make quantitative assessments. The impacts are generally assessed as short-term and long-term impacts.

Since the SEA follows the strategic definition of the strategic planning document, the impacts are assessed in more general level than for example for development consents (e.g. building or environmental permits). No further research or studies are conducted for the SEA, thus the SEA will be based on existing data and research previously conducted.

Due to the strategic stage of the Programme of Measures, the assessment of cumulative impacts is important in the SEA, because cumulative effects may have a significant proportion in the

overall spectrum of impacts. Cumulative impacts will be assessed after the environmental impact analysis is composed.

8. Interested parties and authorities concerned

Interested parties and authorities concerned, who can be affected by the measures and actions developed in the strategic planning document or who can have valid interests against the strategic planning document are presented in Table 8.1.

Table 8.1 Persons and authorities who can be affected by the measures and actions developed in the strategic planning document or who can have valid interests against the strategic planning document

Person or authority	Impact and/or interest	Informed according to Estonian Environmental Impact Assessment and Environmental Management System Act §37 sub-s 1
Ministry of Economic Affairs and Communications	Relevant authority. Regulating the safety of marine transportation, mercantile marine travel, and harbours.	Via e-mail
Ministry of the Interior	Relevant authority. Regulating marine rescue works, coordination of the activities related to marine pollution.	Via e-mail
Ministry of Rural Affairs	Relevant authority. Planning an implementation of fishing industry of the fisheries policy, the coordination of the activities related to animal and plant health, ensuring food safety and compliance.	Via e-mail
The Ministry of Education and Research	Relevant authority. Planning of education and research (incl. marine and fisheries).	Via e-mail
Ministry of Social Affairs	Relevant authority. Develops and implements the working life and labour market policy, organises the protection of public health.	Via e-mail
The Ministry of Finance	Relevant authority. Maritime spatial planning.	Via e-mail
Estonian Ministry of Defence	Relevant authority. Training and/or detonation on the sea, and the consequential noise.	Via e-mail

Person or authority	Impact and/or interest	Informed according to Estonian Environmental Impact Assessment and Environmental Management System Act §37 sub-s 1
Estonian Environmental Board	Relevant authority. Protected natural objects, waste management, implementation of river basin management plans.	Via e-mail
Estonian Environmental Agency	Relevant authority. Environmental monitoring.	Via e-mail
Estonian Transport Administration	Relevant authority. Development of different means of transportation, incl. marine transportation; harbours.	Via e-mail
Food and Veterinary Office	Relevant authority. Agricultural impacts, land reclamation, food safety, professional fishing.	Via e-mail
Estonian Police and Border Guard Board	Relevant authority. Marine rescue, organizing marine pollution discovery, location, and cleaning.	Via e-mail
Estonian Rescue Board	Relevant authority. Marine rescue, removal of coastal pollution	Via e-mail
Consumer Protection and Technical Regulatory Authority	Relevant authority. Building permits in maritime areas.	Via e-mail
Estonian National Heritage Board	Relevant authority. Cultural monuments in maritime areas.	Via e-mail
Health Board of Estonia	Relevant authority. Bathing waters' quality.	Via e-mail
Center for Environmental Investments SA	Relevant authority. Implementation of the Marine Strategy and funding for necessary research.	Via e-mail
State Forest Management Centre	Relevant authority.	Via e-mail

Person or authority	Impact and/or interest	Informed according to Estonian Environmental Impact Assessment and Environmental Management System Act §37 sub-s 1
	Reestablishment of fish.	
Local governments, which have a marine coastline: • Saaremaa Parish • Hiiumaa Parish • Muhu Parish • Vormsi Parish • Kihnu Parish • Ruhnu Parish • Häädemeeste Parish • Pärnu City • Lääneranna Parish • Lääne-Nigula Parish • Haapsalu City • Lääne-Harju Parish • Paldiski City • Harku Parish • Tallinn • Viimsi Parish • Jõelähtme Parish • Kuusalu Parish • Loksa City • Haljala Parish • Viru-Nigula Parish • Toila Parish • Sillamäe City • Narva-Jõesuu City	May be affected by the Programme of Measures	Via e-mail
Estonian Ports Association	Interested person. Cooperation between Estonian ports, promoting Estonian maritime.	Via e-mail
Estonian Council of Environmental NGOs	Interested person. Improvement of environmental protection	Via e-mail
Estonian Fishermen's Association	Interested person. Fishery.	Via e-mail
Estonian Association of Fishery	Interested person. Fishery.	Via e-mail
Estonian Open Sea Aquaculture Cooperative	Interested person.	Via e-mail

Person or authority	Impact and/or interest	Informed according to Estonian Environmental Impact Assessment and Environmental Management System Act §37 sub-s 1
Estonian Recreational Fishermen Association	Interested person.	Via e-mail
Estonian Trawling Cooperative	Interested person.	Via e-mail
Estonian Professional Fishermen Cooperative	Interested person.	Via e-mail
Estonian Maritime Academy of Tallinn University of Technology	Interested person.	Via e-mail
Department Of Marine Systems of Tallinn University of Technology	Interested person.	Via e-mail
Estonian Marine Institute, University of Tartu	Interested person.	Via e-mail
Institute of Agricultural and Environmental Sciences of the Estonian University of Life Sciences The Institute of Veterinary Medicine and Animal Sciences of the Estonian University of Life Sciences	Interested person.	Via e-mail
Other authorities or persons	Affected or interested general public	Via public announcement in newspapers and on the website *Ametlikud Teadaanded* (Official Announcements)

Considering current information, with effectuating the Programme of Measures, transboundary environmental impacts may result. Which is why the SEA programme and report will be transmitted to neighbouring countries (Latvia, Sweden, Finland, and Russia) in association with the Ministry of Environment of Estonia. Rest of the countries, which are situated in the Baltic Sea region, will be notified about the compiling of the Estonian Marine Strategy's Programme of Measures and the initiation of the SEA.

9. SEA timeline

The schedule of the SEA process is presented in Table 9.1.

Table 9.1 Schedule of the SEA process

Stages of the SEA	Timing schedule
Compilation and translation of the SEA programme draft	December 2021
Asking the opinions of the authorities and neighbouring countries regarding the SEA programme. If necessary, amendment of the programme.	February – March 2022
Public display and consultation of the SEA programme, and if necessary, amendment of the programme.	April 2022
Approval of the SEA programme	May 2022
Compilation and translation of the SEA report	June – July 2022
Asking the opinions of the authorities and neighbouring countries regarding the SEA report. If necessary, amendment of the report.	July – September 2022
Public display and consultation of the SEA report, and if necessary, amendment of the report.	October – November 2022
Coordination of the SEA report with relevant authorities.	December 2022 – January 2023
Approval of the SEA report.	February 2023

8. Information about the person responsible for the preparation of the strategic planning document and its SEA, the person who establishes the strategic planning document, the supervisor of strategic environmental assessment and the SEA expert

The initiator and establisher of the Programme of measures:
Estonian Ministry of Environment
Address: Paldiski mnt 96, 13522 Tallinn
Contact person: Rene Reisner
E-mail: rene.reisner@envir.ee
Phone: +372 626 2855

SEA composer:
Alkranel LCC
Address: Riia 15b, 51010 Tartu
Head of the SEA expert group: Alar Noorvee (SEA licence No. KMH0098)
E-mail: alar@alkranel.ee
Phone: +372 736 6676; +372 554 0579

The SEA expert group:

- Alar Noorvee (Alkranel LCC) – the head of the SEA expert group. Education: University of Tartu, Environmental technology, PhD. Work experience in EIA/SEA for over 15 years. Impact categories in current SEA: impacts on biodiversity, water quality (incl. eutrophication), contaminants in aquatic environment and in seafood, impacts of marine litter and impacts on human health, wellbeing, and estate.
- Tanel Esperk (Alkranel LCC) – environmental expert. Education: University of Tartu, Environmental technology, MSc. Work experience in EIA/SEA for over 10 years. Impact categories in current SEA: impacts on biodiversity, food webs, sea-floor and water columns, commercial fish and shellfish, impacts of non-indigenous species, and impacts on Natura 2000 network.
- Elar Põldvere (Alkranel LCC) – environmental specialist. University of Tartu, Environmental technology, PhD. Work experience in EIA/SEA for over 15 years. Impact categories in current SEA: impacts on water quality (incl. eutrophication), contaminants in aquatic environment and in seafood, impacts of marine litter.
- Paula Nikolajeva (Alkranel LCC) – environmental consultant. Tallinn University of Technology, Industrial Ecology, MSc. Work experience in EIA/SEA for over a year. Impact categories in current SEA: impacts on biodiversity, food webs, sea-floor and water columns, commercial fish and shellfish, impacts of non-indigenous species, impacts on Natura 2000 network.
- Terje Liblik (Alkranel LCC) **–** environmental consultant. Tallinn University of Technology, Industrial Ecology, MSc. Work experience in EIA/SEA for over 4 years. Impact categories in current SEA: impacts on human health, wellbeing, and estate, and on marine cultural heritage.

If necessary, additional experts will be involved in the SEA process.

The head of the expert group Alar Noorvee has the right to carry out the SEA process according to Estonian Environmental Impact Assessment and Environmental Management System Act §34 sub-s 3, because he:

- has acquired officially recognised higher education (PhD degree) in environmental engineering in the University of Tartu
- has more than 15 years of professional experience in environmental impact assessment and strategic impact assessment. Has environmental consultation experience since 2000, environmental impact assessment experience as leading EIA expert since 2003 and strayegic environmental expert experience as leading SEA expert since 2006.strategic environmental assessments.
- Has undergone training instrategic environmental assessment at least 60 hours in 2016 in a course conducted by Estonian Assosation of Impact Assessment.
- Has undergone undergone management training at least 60 hours in Estonian Business School. .
- has conducted strategic impact assessments releated to the current topic:
    - SEA of the Estonian Maritime, Fisheries and Aquaculture Fund operational plan for 2021-2027 (SEA report is on public display in December of 2021)
    - SEA of Estonian Marine Strategy`s Programme of Measures to achieve and maintain Good Environmental Status of Estonian marine area and SEA of of national development plan "Estonian Marine Policy 2012–2020" (2015-2016)
    - SEA of the Spatial Plan of the Marine Area of Hiiu County (2012-2014)
- knows the principles of and procedure for strategic environmental assessment and the legislation concerning the assessment.

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