



MONITORING STRATEGY	D1 Biodiversity - birds
Description of the monitoring strategy	<p>The aim of the monitoring strategy "SD1.1 – Biological diversity – Birds" is to assess the status of water birds, their abundance, distribution and population structure in the Estonian marine and coastal areas. The status of waterbirds in the breeding season and the wintering season, as well as the status of migratory birds, are assessed. The following functional groups of water birds are monitored: herbivorous birds, waders, surface-feeding birds, pelagic-feeding birds and benthic-feeding birds. White-tailed eagle breeding success is monitored to assess the impact of contaminants. The monitoring area covers the coasts (up to 20 km landward), coastal sea and off-shore areas. The visual observations on land and from the research vessel, as well as flight monitoring, are conducted. The assessment is produced for the whole Estonian marine areas as a whole. The strategy involves the following monitoring programmes: "Abundance of wintering birds", "Abundance of waterbirds in the breeding season", "Abundance of migratory waterbirds (coastal area)", "Abundance of migratory waterbirds (feeding in off-shore areas)", and "Birds - mortality due to oil pollution". Information on the uses and human activities affecting birds' populations is collected in the programme "Marine and coastal activities".</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>One of the shortcomings of the monitoring is the insufficiency of the monitoring system and gathering information on occurred birds by-catches and entangled or trapped within fishing gears. This could give a comprehensive and reliable overview of the incidental by-catch mortality. Project-based monitoring is mostly held nowadays. Since human activity pressure has a large extend on the status of birds population, the improvement of such data collection system should be done. The future assessment of criterion D1C1 could be done using the HELCOM core indicator "Number of drowned mammals and waterbirds in fishing gear".</p> <p>The protected areas monitoring programme needs to be developed and include birds, mammals, fish, benthos, and habitats, as well as pelagic communities' components.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D0104-1_BirdsWinter, BALEE-D0104-2_BirdsBreeding, BALEE-D0104-3_BirdsMigrateThrough, BALEE-D0104-4_BirdsMigrateStay, BALEE-D08-35_BirdsWashedAshore, BALEE-D00-40_MarineAndCoastalActivities</p>



MONITORING STRATEGY	D1 Biodiversity - mammals
Description of the monitoring strategy	<p>The aim of the strategy "SD1.2 – Biological diversity – marine mammals" is to monitor abundance, distribution and population trends of grey seals and ringed seals, as well as grey seal's breeding success. The strategy is divided into two programmes, one for monitoring of seal abundance and distribution, and the other, for monitoring of the breeding success of grey seals. Data are gathered to assess directly the population status and trends of seal populations, indirectly the impact of pressure levels in the marine environment. The status assessment is made for the whole Estonian marine area for grey seals as a part of the Baltic Sea assessment unit and for ringed seals as a part of the southern assessment unit, covering the Gulf of Riga, including Väinameri, and the Gulf of Finland. The monitoring programmes are regionally coordinated via HELCOM and the HELCOM guidelines are followed.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>One of the shortcomings of the monitoring is the insufficiency of the monitoring system and gathering information on occurred seals by-catches and entangled or trapped within fishing gears. This could give a comprehensive and reliable overview of the incidental by-catch mortality. Project-based monitoring is mostly held nowadays. Since human activity pressure has a large extend on the status of the seals' population, the improvement of such a data collection system should be done. The protected areas monitoring programme needs to be developed and include birds, mammals, fish, benthos, and habitats, as well as pelagic communities' components.</p> <p>In addition to seals, the harbour porpoises (<i>Phocoena phocoena</i>) also live in the Baltic Sea, but they have occurred in the Estonian sea only as occasional visitors. As the Estonian sea area is not a distribution area for porpoises, there is no regular monitoring of harbour porpoises established and no measures or targets are applied under the Marine Strategy and their status was not assessed. The possibility of participation in relevant international (especially HELCOM) porpoise studies or projects is under the consideration though.</p> <p>There are also some issues considering chiropterans (their flight areas and corridors) arisen during the marine spatial planning process, including wind farms development plans. However bats are not directly regulated under the marine strategy, there are plans to discuss and work out an appropriate regional bat monitoring programme in cooperation with HELCOM Contracting Parties and experts.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D0104-5_SealsAbundance, BALEE-D0104-6_SealsReproduction, BALEE-D00-40_MarineAndCoastalActivities, BALEE-D07-27_Ice</p>



MONITORING STRATEGY	D1 Biodiversity - reptiles
Description of the monitoring strategy	Monitoring for this descriptor is not relevant
Description of the gaps and plans to complete the implementation of monitoring	Monitoring for this descriptor is not relevant



MONITORING STRATEGY	D1 Biodiversity - fish
Description of the monitoring strategy	<p>The aim of the monitoring strategy "SD1.4 – Biological diversity – Fish" is to assess the status of fish species in the sea areas of Estonia. The status of the temporal and geographical structure of fish communities and population dynamics of different fish species are monitored. During the annual monitoring programme, all coastal fish species are included in the dataset, but special attention is directed towards economically significant or ecologically relevant key species (perch, flounder, pikeperch). Atlantic salmon is used as a model species for migratory (anadromous) species. Baltic herring and sprat are included as model pelagic fish species. The monitoring and assessment system for protected fish species under Habitats Directive needs further development.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>The monitoring and assessment system for protected fish species under Habitats Directive needs further development: there are populations of <i>Cobitis taenia</i>, <i>Cobitis taneria</i>, <i>Cottus gobio</i>, <i>Lampetra fluviatilis</i>, <i>Coregonus lavaretus</i> represented in the Estonian sea area in the context of criterion D1C4, critically endangered <i>Anguilla anguilla</i> population status also needs to be monitored. But there is no regular monitoring held in marine waters on these species (monitored in rivers) and appropriate indicators need to be developed.</p> <p>The protected areas monitoring programme needs to be developed and include birds, mammals, fish, benthos, and habitats, as well as pelagic communities' components.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D010403-7_FishCoastal, BALEE-D010403-8_FishOffshore, BALEE-D00-40_MarineAndCoastalActivities</p>



MONITORING STRATEGY	D1 Biodiversity - cephalopods
Description of the monitoring strategy	Monitoring for this descriptor is not relevant
Description of the gaps and plans to complete the implementation of monitoring	Monitoring for this descriptor is not relevant



MONITORING STRATEGY	D1 Biodiversity – pelagic habitats
Description of the monitoring strategy	<p>The aim of the monitoring strategy "SD1.6 – Biological diversity – pelagic habitats" is to assess the status of pelagic habitats by collecting data on species composition, abundance and biomass of phytoplankton and zooplankton communities, as well as the physical and chemical conditions influencing their distribution and diversity. Following monitoring programmes produce data for the assessments of the status and impact, as well as pressures in the marine environment: "Phytoplankton species composition, abundance and biomass", "Zooplankton species composition, abundance and biomass", "Water column – physical characteristics", "Water column – chemical characteristics", "Nutrients in the water column", "Hydrological characteristics", "Ice", and "Non-indigenous species – harbours and adjacent regions". The main anthropogenic pressure to the pelagic habitats is the input of nutrients that is monitored in the frames of the programme "Inputs of nutrients and hazardous substances – land-based sources". Information on the uses and human activities affecting the pelagic habitats is collected in the programme "Marine and coastal activities".</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>Monitoring frequency in the coastal water bodies (once per 6-year period, excluding monitoring areas with high monitoring frequency) does not provide sufficient data that could give a good overview of whether and to what extent human activities influence phytoplankton species composition, abundance, and biomass. The effect of anthropogenic pressures (eg nutrient levels) may be overridden by meteorological and hydrophysical conditions during the observations.</p> <p>Microzooplankton is not fully covered by monitoring. Zooplankton sampling methods need to be developed for shallow areas also (currently ZP monitoring methods require water depth at least 7 m).</p> <p>„Seasonal succession of dominating phytoplankton groups“ and „Zooplankton mean size and total stock“ indicators’ thresholds are not developed nor agreed for all sub-basins.</p> <p>For new methods as automated image analysis, HPLC pigment analysis, DNA sequencing, etc that could help to increase the frequency of monitoring, additional studies and pilot monitoring projects are needed as well as parallel measurement sessions during a long-time period.</p> <p>As only two status indicators have been currently used in an assessment, the need for additional indicators is under discussion (e.g. indicator „Zooplankton species diversity“ is being developed in cooperation with HELCOM).</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D010405-10_Phytop, BALEE-D010405-11_Zoopl, BALEE-D0507-25_WaterColumnPhys, BALEE-D05-24_WaterColumnChem, BALEE-D05-23_NutrientWaterColumn, BALEE-D02-18_NISRiskAreas, BALEE-D02-19_NISDynImpact, BALEE-D07-26_PhysCharWaves, BALEE-D07-27_Ice, BALEE-D00-40_MarineAndCoastalActivities, BALEE-D05-21_AlgalBlooms</p>



MONITORING STRATEGY	D2 Non-indigenous species
Description of the monitoring strategy	<p>The aim of the monitoring strategy "SD2 - Non-indigenous species" is to assess the introduction and status of non-indigenous species in the pelagic and benthic realm through collection of data on their occurrence, abundance/biomass, distribution and ecological impacts. The monitoring is aimed at characterising the anthropogenic pressure and associated impacts, but the gathered data and information also allows to characterise the state of the marine environment. As shipping (ballast water and sediments) is the major introduction vector for marine non-indigenous species, monitoring is established in major ports and adjacent areas to them. Monitoring includes phytoplankton, zooplankton, phytobenthos, zoobenthos and fish. In addition, species-specific monitoring covers a few most invasive non-indigenous species, such as the round goby <i>Neogobius melanostomus</i>, Chinese mitten crab <i>Eriocheir sinensis</i> and Harris mud crab <i>Rhithropanopeus harrisi</i>. Data from the following monitoring programmes are exploited in this monitoring strategy: "Non-indigenous species – harbours and adjacent regions", "Non-indigenous species – abundance and biomass", "Phytoplankton species composition, abundance and biomass", "Zooplankton species composition, abundance and biomass", "Macrozoobenthos", "Phytobenthic communities", "Coastal fish" and "Off-shore fish". The main anthropogenic activities and associated pressures are dealt with in the programme "Marine and coastal activities".</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>Potential pathways of introduction as Sillamäe and Paldiski harbours, leisure craft (hull fouling) and aquaculture are not covered by monitoring yet. There is no regular monitoring of certain groups of non-indigenous species (microorganisms and parasites), but done by research projects. The frequency of zooplankton monitoring is low. The same applies to phytoplankton in case of monitoring of phytoplankton non-indigenous species. The monitoring of mobile epifauna (demersal fish, marine invertebrates) needs to be extended.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D02-18_NISRiskAreas, BALEE-D02-19_NISDynImpact, BALEE-D010405-10_Phytop, BALEE-D010405-11_Zoopl, BALEE-D01040605-14_Macrozoobenthos, BALEE-D01040605-13_SeabedVegetationZone, BALEE-D010403-7_FishCoastal, BALEE-D010403-8_FishOffshore, BALEE-D00-40_MarineAndCoastalActivities</p>



MONITORING STRATEGY	D3 Commercial fish and shellfish
Description of the monitoring strategy	<p>The aim of the monitoring strategy "SD3 – Commercially exploited fish" is to assess the status of main commercial fish species in the sea areas of Estonia. The strategy aims to contribute to the assessment of the fishing mortality, status of spawning stock biomass and size and age structure of monitored stocks. The monitored fish stocks include pelagic Baltic herring (two stocks) and sprat stocks, economically significant coastal fish species (perch, flounder, pikeperch) and Atlantic salmon is used as an indicator species for migratory (anadromous) fishes.</p> <p>The monitoring is undertaken under the "Coastal fish" and "Off-shore fish" monitoring programmes. The data on human activities that potentially affect fish stocks are collected in the programme "Marine and coastal activities". An additional data indirectly contributing to the strategy is gathered from several monitoring programmes as "Non-indigenous species – harbours and adjacent regions", "Inputs of nutrients and contaminants – land-based sources", "Contaminant levels – in sediment", "Contaminant levels – in water", "Oil spills", "Macrolitter", "Litter micro-particles", "Impulsive underwater noise" and "Continuous underwater noise".</p>
Description of the gaps and plans to complete the implementation of monitoring	There are no evident gaps or shortcomings in the commercially exploited fish monitoring strategy.
Monitoring programmes that contribute to this strategy	BALEE-D010403-7_FishCoastal, BALEE-D010403-8_FishOffshore, BALEE-D00-40_MarineAndCoastalActivities



MONITORING STRATEGY	D4 Food webs/D1 Biodiversity - ecosystems
Description of the monitoring strategy	The aim of the monitoring strategy "SD4/SD1 Food webs / Biodiversity – ecosystems" is to assess the status of marine food webs by collecting data on the condition of fish communities and other ecosystem components. The following monitoring programmes produce (directly or indirectly) relevant data for the assessments of the status and impact, as well as pressures in the environment: "Coastal fish", "Off-shore fish", "Phytoplankton species composition, abundance and biomass", "Chlorophyll-a", "Macrozoobenthos", "Abundance of wintering birds", "Abundance of waterbirds in the breeding season". The main anthropogenic activities and associated pressures are dealt with in the programme "Marine and coastal activities".
Description of the gaps and plans to complete the implementation of monitoring	The monitoring being done according to the strategy provides sufficient data to assess the achievement of targets and the effectiveness of measures implemented. GES indicators for several food webs components as waterbirds, marine mammals etc still need to be developed to provide an assessment of the food web as a whole (preferably in cooperation with HECOM).
Monitoring programmes that contribute to this strategy	BALEE-D010403-7_FishCoastal, BALEE-D010403-8_FishOffshore, BALEE-D01040605-14_Macrozoobenthos, BALEE-D05-20_PhytopChla, BALEE-D0104-1_BirdsWinter, BALEE-D0104-2_BirdsBreeding, BALEE-D010405-10_Phytop, BALEE-D010405-11_Zoopl, BALEE-D00-40_MarineAndCoastalActivities



MONITORING STRATEGY	D5 Eutrophication
Description of the monitoring strategy	<p>The aim of the monitoring strategy “SD5 - Eutrophication” is to collect data on nutrient inputs, concentrations as well as direct and indirect effect of eutrophication. The parameters monitored are concentrations of inorganic nitrogen (DIN) and phosphorus (DIP), total nitrogen (TN) and phosphorus (TP), phytoplankton chlorophyll-a content, biomass and blooms, water transparency, dissolved oxygen concentration, status of the benthic flora and fauna. The main human-induced pressures are related to the nutrient inputs by rivers, direct discharges (incl marine fish farms) and atmospheric deposition. Also, nutrient loads from the adjacent marine areas as well as from bottom sediments have to be estimated. The following monitoring programmes produce relevant data for the assessments of the eutrophication status and impact, as well as pressures in the environment: “Phytoplankton species composition, abundance and biomass”, “Chlorophyll-a”, “Harmful blooms (remote sensing)”, “Inputs of nutrients and contaminants – land-based sources”, “Phytobenthic communities”, “Macrozoobenthos”, “Water column – physical characteristics”, “Water column – chemical characteristics”, and “Nutrients in the water column”. Information on the uses and human activities causing eutrophication is collected in the programme “Marine and coastal activities”.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>There is a need to analyse the structure of the national hydrochemical monitoring programme of rivers, including its spatial and temporal scope, in order to ensure sufficient data for reliable assessment of nutrient load from land-based sources (including nutrient balance on agricultural land).</p> <p>There are only a few marine stations, where water sampling of nutrients are done from discrete depths strictly following HELCOM guidance. Samples are collected from 1, 5, 10 m depth and the bottom layer at the most stations. This doesn't give a comprehensive overview of nutrients concentration in the water column, the depth of nutricline after spring bloom and stratification process.</p> <p>There is no monitoring to assess the internal nutrient load from sediments and transboundary nutrient inputs yet.</p> <p>There is no regular monitoring of pCO₂. Regular measurements of pH are done, but only pH data do not allow reliably assess the acidification of the marine environment. Regular pCO₂ measurements also would provide the data for production assessments.</p> <p>The frequency of monitoring in off-shore areas (6 times per year) does not allow the full use of developed chlorophyll-a indicator as the status assessment based on this data is not with sufficient reliability. There are only a few stations, where water sampling and analyses of chlorophyll-a are done from discrete depths strictly following HELCOM guidance. Off-shore area low sampling frequency is partly compensated by ferrybox-monitoring.</p> <p>Dissolved oxygen and chlorophyll-a concentration data collected by remote sensing and new technologies (buoys, glider) (fluorescence is measured and converted to Chl a concentration using corresponding laboratory analyses results) should be integrated to regular in situ monitoring for status assessments.</p> <p>The number of benthic monitoring stations and benthic transects in coastal waters is not sufficient to provide high-level confidence assessments of the ecological status of a body of water in some areas. Currently, there is no zoobenthos transect in the Northern Baltic Proper basin and <i>Limecola balthica</i> depth distribution in this area could not be assessed, therefore.</p> <p>There is a need to develop the remote sensing methods as perspective and effective approach to monitoring the effects of eutrophication (criteria D5C2, D5C3, and also D5C4, D5C6). It is necessary to carry out relevant pilot projects and develop regional cooperation.</p>



Monitoring programmes that contribute to this strategy	BALEE-D010405-10_Phytop, BALEE-D05-20_PhytopChla, BALEE-D05-21_AlgalBlooms, BALEE-D01040605-13_SeabedVegetationZone, BALEE-D01040605-14_Macrozoobenthos, BALEE-D0508-22_NutContLandSource, BALEE-D05-23_NutrientWaterColumn, BALEE-D0507-25_WaterColumnPhys, BALEE-D05-24_WaterColumnChem, BALEE-D00-40_MarineAndCoastalActivities
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MONITORING STRATEGY	D6 Sea-floor integrity/D1 Biodiversity - benthic habitats
Description of the monitoring strategy	<p>The aim of the monitoring strategy “SD6/SD1 Sea-floor integrity/Biological diversity – benthic habitats” is to assess the status of benthic habitats by collecting data on the condition of benthic communities, species distribution, distribution and status of benthic habitats and extent as well as effect of human-induced disturbances to the seafloor. The following monitoring programmes produce data for the assessments of the status and impact as well as pressures in the environment: "Seabed habitats – community characteristics", "Phytobenthic communities", "Seabed physical and chemical characteristics", "Macrozoobenthos", "Physical loss and disturbance – from different human activities", "Water column – chemical characteristics", "Water column – physical characteristics", "Hydrological characteristics", "Coasts", "Marine and coastal activities".</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>Data on human activities causing physical loss and disturbance to the seabed are insufficiently georeferenced or missing, i.e information on environmental permits and respective works are available, but data on activities' actual locations and their extent are not inserted to the GIS-database. It is necessary to organise the process of harvesting data on activities related to environmental permits and ensure GIS-data availability.</p> <p>The number of monitoring stations and benthic transects in coastal waters is not sufficient to provide high-level confidence assessments of the ecological status of a body of water in some areas.</p> <p>There is no regular monitoring of the Habitats Directive habitat types yet, providing input to broad habitat type assessments, only project-based researches are carried out. The methodology was developed in frames of project NEMA.</p> <p>There is neither zoobenthos transect in the Northern Baltic Proper nor <i>Limecola balthica</i> depth distribution monitoring, thus the status can't be assessed there (lacking an indicator to assess circalittoral habitat types in NBP).</p> <p>Deep-water oxygen levels should be measured at least at 2-3 stations in the Eastern Gotland Basin (lacking an indicator for assessment of circalittoral habitat types).</p> <p>The protected areas monitoring programme needs to be developed and include birds, mammals, fish, benthos, and habitats, as well as pelagic communities' components.</p> <p>The use of remote sensing methods to monitor seabed habitats in the shallow sea will be taken into consideration.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D010406-12_SeabedHabitat, BALEE-D01040605-13_SeabedVegetationZone, BALEE-D01040605-14_Macrozoobenthos, BALEE-D01040607-15_SeabedPhysChemGeol, BALEE-D01040607-16_PhysDisturb, BALEE-D05-24_WaterColumnChem, BALEE-D07-26_PhysCharWaves, BALEE-D00-40_MarineAndCoastalActivities, BALEE-D0507-25_WaterColumnPhys, BALEE-D07-28_SeaCoast</p>



MONITORING STRATEGY	D7 Hydrographical changes
Description of the monitoring strategy	<p>The aim of the monitoring strategy “SD7 – Hydrographic conditions” is to collect data on the hydrographic conditions and their changes in the Estonian marine area. Based on the gathered data, the physical characteristics of marine ecosystems are described and the changes in the hydrographic conditions due to human-induced pressures and activities are assessed. The following parameters and characteristics are monitored: temperature and ice cover, salinity, waves and currents, upwelling, mixing, residence time, freshwater input, sea level, bathymetry, turbidity and transparency, seabed substrate and morphology. The monitoring programmes involved are: “Hydrographic characteristics”, “Water column – physical characteristics”, “Ice cover”, “Seabed physical and chemical characteristics”, “Coasts”, and “Physical loss and disturbance”. Information on the uses and human activities causing the alteration of hydrographic conditions is collected in the programme “Marine and coastal activities”.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>There are no monitoring stations, where the vertical distribution of water temperature and salinity are continuously recorded. There are also no monitoring stations, where regular wave and current measurements are done. The measurements, which can be used to assess changes in hydrographic conditions, are mostly project-based. In order to describe hydrographic changes in the whole marine area and potentially affected areas, it is necessary to apply mathematical models, but there are no sufficient validation data at the moment, including local measurements. There is a need for systematic monitoring of coastal areas to be carried out using an updated monitoring methodology. According to the updated methodology, the measurements should cover the entire coastal zone, i.e. the part of the coastal slope and the beach. For geophysical surveys of the underwater coastal slope, bottom profiles and side-view sonar are used to determine the morphology of the seabed and the distribution and composition of sediments. The remote sensing methods could be taken into consideration for mapping the shallow coastal sea, pilot studies need to be carried out.</p> <p>D7 indicators need to be developed and established. An indicator for assessing the spatial extent of disturbed infralittoral and circalittoral habitat types should be developed under D7C2.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D0507-25_WaterColumnPhys, BALEE-D07-26_PhysCharWaves, BALEE-D07-27_Ice, BALEE-D07-28_SeaCoast, BALEE-D01040607-15_SeabedPhysChemGeol, BALEE-D01040607-16_PhysDisturb, BALEE-D00-40_MarineAndCoastalActivities</p>



MONITORING STRATEGY	D8 Contaminants
Description of the monitoring strategy	<p>The aim of the monitoring strategy “SD8 – Contaminants” is to collect data on levels of contaminants and their impact on the marine environment in the Estonian waters. Based on the gathered data, the human-induced pressures in the marine environment are assessed. The levels of contaminants are analysed in water, sediments or biota whereas the matrix depends on the substance. Priority substances, listed in EQS directive 2013/39 are monitored in coastal waters and metals, PCBs, TBT, PFOS, HBCDD, PBDE, PAH, DEHP, HCH and pesticides on offshore areas (from Baltic herring). The monitoring programmes involved are: “Inputs of nutrients and contaminants – land-based sources”, “Contaminant levels – in water”, “Contaminant levels – in sediments”, “Contaminant levels – in species”, “Radioactive substances”, “Oil spills”. The impact onto biota is assessed using data collected within the monitoring programmes “Birds – mortality due to oil pollution” and “Abundance of waterbirds in the breeding season”. Information on the uses and human activities, potentially causing contamination of the environment and on pollution loads, is collected in the programme “Marine and coastal activities”.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>There is a need to analyse the structure of the national hydrochemical monitoring programme of rivers, including its spatial and temporal scope, in order to ensure sufficient data for reliable assessment of contaminants load from land-based sources. There is no information about the input and load of synthetic substances.</p> <p>The monitoring frequency of concentration of contaminants in the coastal area does not provide sufficient data that could be used for the HELCOM assessments based on core indicators (at least 3 times per 6-year period needed). Open-sea area monitoring of contaminants in biota is carried out using fish species, while zoobenthos is the preferred matrix for some substances. There is no monitoring of contaminants in water and sediments in open-sea areas. There is also a need to monitor secondary pollution, including getting data of developments, dredging and dumping works into a public database.</p> <p>Monitoring of the biological effects of hazardous substances has been carried out as pilot projects, i.e information for the development of D8C2 assessment indicators has been collected. An indicator "Proportion of oiled birds" has been developed for the assessment of the impact and specific pressure of oil pollutants to the status of species and habitats (or the impact of significant acute pollution events on species health and habitat status, GES criterion D8C4), but has not been applied in the D8 assessment yet. Baltic Sea-specific threshold values for contaminants in sediments need to be developed.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D0809-29_ContaminantBiota, BALEE-D08-30_ContaminantSediment, BALEE-D08-31_ContaminantWater, BALEE-D08-34_OilPollution, BALEE-D08-35_BirdsWashedAshore, BALEE-D0104-2_BirdsBreeding, BALEE-D0508-22_NutContLandSource, BALEE-D00-40_MarineAndCoastalActivities, BALEE-D0809-33_Radionuclides</p>



MONITORING STRATEGY	D9 Contaminants in seafood
Description of the monitoring strategy	The aim of the monitoring strategy “SD9 – Contaminants in seafood” is to collect data on levels of contaminants in seafood (fishes) from the Estonian marine waters. Based on the gathered data, the safety of the seafood is assessed. The levels of contaminants are analysed in most common fish species for the concentration of the following contaminants: Pb, Cd, Hg, dioxins, PCBs. The monitoring programmes involved are: „Contaminants in seafood“, “Contaminant levels – in species” and “Marine and coastal activities”. The latter aims to collect information on the uses and human activities, potentially causing the contamination of seafood.
Description of the gaps and plans to complete the implementation of monitoring	Data are collected within different projects as results of current analyses show that there is no exceedance of the standard set for most contaminants, except dioxins. Regular annual seafood safety monitoring is required for substances that exceed the threshold values as dioxins in fish species.
Monitoring programmes that contribute to this strategy	BALEE-D09-32_ContaminantSeafood, BALEE-D0809-29_ContaminantBiota, BALEE-D00-40_MarineAndCoastalActivities



MONITORING STRATEGY	D10 Litter
Description of the monitoring strategy	<p>The aim of the monitoring strategy “SD10 – Litter” is to collect data on the abundance, characteristics, distribution and fate of litter in the marine environment. Data on coastal litter and at the seabed as well as micro-particles in water (sea surface), sediments and marine organisms are collected. The human-induced pressures in the environment and status are assessed for the HELCOM sub-basins and coastal water bodies. Beach litter and micro-particles in water and sediments are monitored yearly while litter at the seabed is monitored in each coastal water body once in six years. The following monitoring programmes produce relevant data for the status assessments: “Litter – characteristics and abundance/volume on coast and seabed”, “Litter micro-particles – abundance in water, sediment, and organisms”. Additional information is provided by programmes "Coastal fish", "Off-shore fish", "Birds – mortality due to oil pollution", "Seabed habitats – community characteristics" and "Phytobenthic communities". Information on the uses and human activities causing litter pollution is collected in the programme “Marine and coastal activities”.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>Macro-litter monitoring is mostly project-based. Studies have been carried out to develop an optimal monitoring plan for marine litter. Macro-litter monitoring on the seabed should be carried out together with the monitoring of benthic communities in the coastal sea. The current methodology for monitoring of macro-litter on the seabed covers only the shallow coastal sea, the data for deeper sea areas are not collected and relevant monitoring methods need to be developed.</p> <p>Micro-litter in the seabed sediment is not monitored regularly, only project-based researches are carried out. There is no monitoring of micro-litter on the coastline (may additionally be monitored according to the GES decision) and in marine animals (required for impact assessments). Several pilot studies are underway to give a comprehensive overview of the necessity of regular monitoring and how it should be conducted. There is no common harmonised micro-litter monitoring methodology for different matrixes (water, sediment, biota) agreed at the EU or RSC (HELCOM) level yet.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D10-36_MacroLitter, BALEE-D10-37_MicroLitter, BALEE-D010403-7_FishCoastal, BALEE-D010403-8_FishOffshore, BALEE-D00-40_MarineAndCoastalActivities, BALEE-D08-35_BirdsWashedAshore, BALEE-D010406-12_SeabedHabitat, BALEE-D01040605-13_SeabedVegetationZone</p>



MONITORING STRATEGY	D11 Energy, including underwater noise
Description of the monitoring strategy	<p>The aim of the monitoring strategy “SD11 – Underwater noise” is to collect data on the spatial and temporal distribution of anthropogenic impulsive sounds and low-frequency continuous noise. Data on impulsive sounds are gathered by the seismic monitoring and information on human activities causing underwater impulsive noise. Ambient continuous noise is measured by autonomous submersible recorders and the soundscape is modelled using numerical models in co-operation with other HELCOM parties. The monitoring programmes involved are: “Impulsive underwater noise – distribution, frequency and levels” and “Continuous underwater noise - distribution, frequency and levels”. Information on the uses and human activities causing underwater noise is collected in the programme “Marine and coastal activities”.</p>
Description of the gaps and plans to complete the implementation of monitoring	<p>It is necessary to perform random measurements of impulsive sounds to assess the occurrence and level of impulse noise based on human activity data (development work, such as pile driving, etc).</p> <p>The continuous noise is measured only at certain monitoring stations. The modelled soundscape is needed to assess the anthropogenic pressure, therefore more measurement results are needed for validation of the model and enhancing its reliability.</p> <p>Information and knowledge about the effects of underwater noise on different species are insufficient, and thresholds values for related indicators are still being developed both at the EU and regional levels. Databases need to be developed and the results of EIA studies and relevant monitoring have to be made available in public databases.</p>
Monitoring programmes that contribute to this strategy	<p>BALEE-D11-38_AcuteNoise, BALEE-D11-39_DiffuseNoise, BALEE-D00-40_MarineAndCoastalActivities</p>