

**Template for Submission of Information, including Traditional Knowledge,
to Describe Areas Meeting Scientific Criteria for
Ecologically or Biologically Significant Marine Areas**

EASTERN GULF OF FINLAND

Abstract

The area is a shallow (mean 24 m, max 95 m deep) archipelago area in the northeastern Baltic Sea. It is characterized by hundreds of small islands and skerries, coastal lagoons and boreal narrow inlets, as well as a specific geomorphology, with clear signs from the last glaciation. Due to the low salinity (0-5 permille), the species composition is a mixture of freshwater and marine organisms, and especially diversity of aquatic plants is high. Many marine species, including habitat forming key species such as bladderwrack (*Fucus vesiculosus*) and blue mussel (*Mytilus trossulus*), live on the edge of their geographical distribution limits, which makes them vulnerable to human disturbance and effects of climate change. The area has a rich birdlife and supports one of the most important populations of the ringed seal (*Pusa hispida botnica*), an endangered species.

Introduction to the area

The proposed area (Fig. 1 & 2) is situated on the north-eastern part of the Gulf of Finland, in the Baltic Sea, which is the largest brackish water area in the World.

The proposed area is an archipelago with hundreds of small islands and skerries, coastal lagoons and boreal narrow inlets, as well as a specific geomorphology, with clear signs from the last glaciation (ca. 18.000 – 9.000 BP). Coastal areas freeze over still freeze over every winter for at least a few weeks.

The scenery in the area ranges from sheltered inner archipelago with lagoons, shallow bays and boreal inlets, through middle archipelago, with few larger islands, to wave exposed outer archipelago with open sea, small islands and skerries. The salinity in the open sea varies from 4 to 5 permille, but may in the inlets and estuaries be close to zero (Fig. 8). Water depth is relatively low both in the inner archipelago (0 to 10 m) and the outer archipelago (mostly below 30 m) (Fig. 7). The maximum depth of the area is 95 meters and the mean depth is 24 meters.

The Eastern Gulf of Finland represents a mosaic of seabed geologic environments. The high geodiversity of the Eastern Gulf arises from its extensive archipelago and Precambrian crystalline basement of rugged and irregular features and the high degree of heterogeneity of its seabed relative to the rest of the Baltic Sea (Kaskela et al., 2012; Kaskela & Kotilainen, 2017, Kaskela et al., 2017). Till deposits, moraines and eskers are typical seabed features of the area (Häkkinen & Åker 1991). A seafloor area of high geodiversity has also been acknowledged in the maritime spatial plan of the Finnish eastern Gulf of Finland (Kymenlaakson Liitto 2014).

Several types of rocky, gravelly and sandy islands exist; several of them are surrounded by underwater sandbanks. There are a few spectacular esker islands, for instance, Pitkäviiri, a two-kilometre-long esker that has been formed by the last glaciation and has since risen from the sea. The vegetation on the islands varies from lush groves on the larger islands to low-growing pines, junipers and shrubs on the outer rocky skerries. The bottom types are varied, containing rapakivi granite, large boulders, moraine, gravel, sand and mud (Fig. 5 & 6). Algae, vascular plants, charophytes, invertebrates and fish inhabit all bottom types.

Regular monitoring of the ecological state of the sea takes place in the area. The Finnish Inventory Programme for Marine Underwater Environment (VELMU) has conducted extensive biodiversity inventories in the area. The inventories done in 2004-2017 have included dive lines and drop videos, benthic sampling, fish larvae sampling, and echosoundings. Observation data for hundreds of species is available. Also, species distribution models (SDMs) have been made for many species (below referred to as “VELMU data”; viewable in <https://paikkatieto.ymparisto.fi/velmu>). Spatial data on birdlife and seals also exist.

Location

Finland. Gulf of Finland, the Baltic Sea (Fig. 1 & 2).

The area is situated in the north-eastern Gulf of Finland, in the northern Baltic Sea. The proposed area is ca. 120 km in width and 50 km high (in W-E and N-S direction, respectively). The total coverage of the proposed EBSA is 4256 km² and its sea area is 3956 km².

The area is within national jurisdiction.

Feature description of the proposed area

Several important marine habitat types of the EU Habitats directive exist in the area: estuaries (1130), coastal lagoons (1150), large shallow inlets and bays (1160), boreal Baltic narrow inlets (1650), underwater sandbanks (1110), reefs (1170), and Baltic esker islands with sublittoral vegetation (1610) (Fig. 3 & 4). Also, a large number of EU Natura 2000 sites exist in the area.

Due to the low salinity (0-5 permille, depending on area and proximity of estuaries) (Fig. 8), the species composition is a mixture of freshwater and marine organisms. Therefore the combined biodiversity of macroalgae and aquatic vascular plants is high. Charophytes (many classified as VU) form large meadows in sheltered lagoons and bays (Fig. 20 & 27). Exceptionally, water mosses (Bryophyta), which normally are freshwater species, are also found in these sheltered sites (Fig. 28).

Many marine species, including keystone and habitat-forming species such as bladderwrack (*Fucus vesiculosus*) and blue mussel (*Mytilus trossulus*), live on the edge of their geographical distribution range in the area (Fig. 23 & 24). This makes them vulnerable to human disturbance and effects of climate change. Extensive observation data and spatial distribution models exist for both species.

Several rare charophytes, such as *Nitellopsis obtusa* (NT), *Nitella hyalina* (VU) and *Chara braunii* (VU), have been found in the national underwater inventories (VELMU data) (Fig. 14). A species distribution model is available for *N. hyalina*.

Macrolea pubipennis (VU/DD), a leaf beetle species of the subfamily Donaciinae that is endemic to Finland, has recently been found to have viable populations in the area. In the world, the species is only found in Finland, Sweden and China (Saari 2007; Fauna Europaea).

Vulnerable (VU) salmonids species, salmon (*Salmo salar*), sea-spawning whitefish (*Coregonus lavaretus f. pallasii*) (VU) and anadromous whitefish (*Coregonus lavaretus f. lavaretus*) (EN), Anguilla anguilla (EN), sea trout (*Salmo trutta*) (CR), and a near threatened river lamprey (*Lampetra fluviatilis*) (NT) are occasionally found in the area. This is the only coastal area in Finland, where the spined loach (*Cobitis taenia*) (VU) is found. The area also has important spawning areas for the Baltic herring.

The area is an important nesting area for birds, and there are several important bird areas, especially in the coastal lagoons and boreal narrow inlets, and in the open sea (Fig. 11). It has large occurrences of the Baltic lesser black-backed gull (*Larus fuscus fuscus*), a subspecies of lesser black-backed gull that is considered endangered (EN) in Finland. Common tern (*Sterna hirundo*) and the Arctic tern (*Sterna paradisaea*) breed abundantly on the skerries. Certain threatened bird species, such as velvet scoter (*Melanitta fusca*, EN), common eider (*Somateria mollissima*), red-breasted merganser (EN), common merganser (VU), common redshank (VU), ruddy turnstone (EN), black guillemot (EN), and common murre (Guillemot) (EN) are breeding in the area. During spring migration (Fig. 12) hundreds of thousands of Arctic ducks stop in the area (Hokkanen 2012).

Two sanctuaries for grey seals (*Halichoerus grypus*) exist in the area. The area also supports one of the Baltic Sea's most important subpopulations of the ringed seal (*Pusa hispida botnica*; HELCOM

category VU, Finnish category NT) (Halkka & Tolvanen 2017, Fig. 13). Although the ringed seals are only classified as vulnerable in the Baltic Sea (Liukko et al 2015), the population in the Eastern gulf of Finland needs special protection due to its small size (probably less than 200 individuals) (Jussi et al. 2016; Halkka & Tolvanen 2017). The ringed seal is threatened by climate change, because its pups need crested sea ice for hiding places as they grow. Currently the limited sea ice covered period during wintertime is causing great difficulties for ringed seal reproduction.

Table 1. Number of species in different sea areas listed by HELCOM (HELCOM 2012). The total number of species in the Baltic Sea is 2730 of which 1898 species are invertebrates. Total number of species in the table excludes bird species.

	Gulf of Finland	Archipelago Sea	Kvarken Archipelago	Bothnian Sea
Macrophytes	187	68	162	116
Benthic invertebrates	482	122	96	132
Fish & lamprey	87	68	51	48
Marine mammals	3	3	2	2
Total number of species	759	261	311	298
Share of species in the Baltic Sea	27.8 %	9.6 %	11.4 %	10.9 %

Feature condition and future outlook of the proposed area

The underwater biodiversity of the area is high for a low saline brackish-water sea area.

The area, especially its outer archipelago area, is in a quite natural state (Fig. 37-39). While there are a lot of smaller buildings and summer cottages in the inner archipelago, the outer archipelago is almost completely uninhabited and unbuilt (Fig. 38).

The ecological status of the water is however presently not good, mainly because of anthropogenic nutrient loading caused by wastewater from settlements and industry, as well as rivers carrying nutrients from more remote agricultural areas. This makes the water in the inner archipelago relatively turbid, especially in late summer (Fig. 9). During the past 5 years the state of the area has been slightly improved, apparently because the nutrient loading from the River Neva has decreased, due to the improved wastewater treatment in St. Petersburg area.

Zebra mussel (*Dreissena polymorpha*) has during the last decades dispersed to the area, occurring in the inner parts of the archipelago. The zebra mussel colonies might, if the salinity continues to decline, replace naturally the blue mussel colonies occurring in the area. Furthermore, some of the marine algal species, e.g., bladder wrack and some red algal species, may disappear if salinity is reduced.

EU Marine Strategy Framework Directive ([2008/56/EC](#)), and the HELCOM Baltic Sea Action Plan (HELCOM 2007), oblige Finland to improve the state of the marine environment by 2020 and 2021, respectively, e.g. by decreasing the amount of nutrient loading from land, so the water quality in the Gulf of Finland will probably gradually start improving enabling the macrophytes to increase their growing depth.

In addition to the national biodiversity inventories, an extensive monitoring programme is annually conducted in the area, and reported to EU at regular intervals.

Assessment of the area against CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	Description (Annex I to decision IX/20)	Ranking of criterion relevance (please mark one column with an X)			
		No information	Low	Medium	High
Uniqueness or rarity	Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
<p>HIGH. The area is very specific, with unique geomorphological and habitat characteristics and a peculiar salinity level that affects species distributions. The area is important for the life cycles of many species, harbours a peculiar mix of marine and freshwater organisms, and a high number of rare species.</p> <p>General points</p> <ul style="list-style-type: none"> • EU Habitat directive Annex I habitats Boreal Baltic narrow inlets (1650), Coastal lagoons (1150) and large shallow inlets and bays (1160) are typical to inner archipelago (VELMU data; Fig. 3 & 4). • Underwater sandbanks (1110), reefs (1170), and Baltic esker islands with sublittoral vegetation (1610) exist in the area, especially in the outer archipelago (VELMU data; Fig. 3). • Many rare species exist in the areas (Fig. 14) • Extreme weather conditions for a European sea area: Ice covers the archipelago typically every winter (Fig. 10). • Salinity from nearly zero to 5 permille that results in a unique combination of marine, brackish and freshwater species (Fig. 8). • Many species live on the edge of their salinity distribution limits and at the margins of their physiological tolerance. This includes key species like <i>Fucus vesiculosus</i> and <i>Mytilus trossulus</i> (VELMU data; Fig. 23 & 24). • The diversity of HELCOM Underwater Biotope (HUB) classes is high across the area (Fig. 17). <p>Mammals</p> <ul style="list-style-type: none"> • A population of ringed seal (<i>Pusa hispida botnica</i>) lives in the area (Fig. 13). The species breeds on ice and therefore their existence relies on good ice winters (Ice cover: Fig. 10) <p>Birds</p> <ul style="list-style-type: none"> • High diversity of bird species (Finnish Bird Atlas; Fig. 16). • Arktika migration route of arctic birds and many other migration routes cross the area (Birdlife Finland; Fig. 12). • Sheltered bays and lagoons are important bird areas with high species diversities; there are 6 IBAs in the area (Fig. 11). <p>Fish</p> <ul style="list-style-type: none"> • Critically endangered (CR) sea trout (<i>Salmo trutta m. trutta</i>), vulnerable (VU) salmon (<i>Salmo salar</i>), and near threatened (NT) river lamprey (<i>Lampetra fluviatilis</i>), and near threatened (NT) lump sucker (<i>Cyclopterus lumpus</i>) are present in the area (Koljonen et al. 2013, Peuhkuri et al. 2014; Urho & Lehtonen 2016; ICES 2017). Vulnerable (VU) spined loach (<i>Cobitis teania</i>) is only encountered in the coastal areas of eastern part of the Gulf of Finland. <p>Plants and algae</p> <ul style="list-style-type: none"> • The area has high species richness of macroalgae compared to its salinity range (Fig. 19). • Fresh water species, especially charophytes and vascular plants are plentiful, and their species richness is high, especially in the sheltered bays and lagoons of the inner archipelago (Fig. 18 & 20). • Several rare charophytes, such as <i>Nitellopsis obtusa</i> (NT), <i>Nitella hyalina</i> (VU) and <i>Chara braunii</i> (VU) exist in the area (Fig. 15). • Macroalgal species composition is unique: many red algal species are absent, while green algae, such as <i>Cladophora rupestris</i>, occur abundantly (VELMU data). • Many species of water mosses, that normally only occur in fresh water, are present in the inner archipelago (Fig. 28). 					

<p>Invertebrates</p> <ul style="list-style-type: none"> The Baltic blue mussel that occurs in the area is genetically distinct from both Atlantic <i>Mytilus edulis</i> and Atlantic/Pacific <i>Mytilus trossulus</i>, and probably has rapidly evolved to a new local taxon, as an adaptation to the peculiar Baltic Sea environment. The species is nowadays described either as <i>Mytilus trossulus</i> x <i>M. edulis</i> hybrid swarm, or simply <i>M. trossulus</i> (Väinölä & Strelkov 2011). This highlights the importance of these low-salinity Baltic Sea areas as centers of species evolution. <i>Macrolea pubipennis</i> (VU/DD), a leaf beetle species of the subfamily Donaciinae that is endemic to Finland, has recently been found to have viable populations in the area (VELMU data). <p>Geology</p> <ul style="list-style-type: none"> Large areas of sandbanks (Fig. 3) Hundreds of rocky reefs (Fig. 3) Rapakivi is the main rock type in the area (Fig. 5) Rocky seafloor is typical (Fig. 6) 					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
<p>HIGH. The area is very important for several life history stages of a large number of taxa:</p> <p>Mammals</p> <ul style="list-style-type: none"> A population of ringed seal (<i>Pusa hispida</i>) lives in the area and the breeding success relies on good ice winters (Fig. 13). Grey seal (<i>Halichoerus grypus</i>) exist in the area and the seals are found in the moulting (during spring) and hauling-out areas in the outer archipelago (Halkka & Tolvanen 2017). <p>Birds</p> <ul style="list-style-type: none"> The marine and coastal habitats typical to the area provide important resting and feeding areas for the migrating birds; several migration routes cross the area (Fig. 12). Certain vulnerable (VU) bird species, such as velvet scoter (<i>Melanitta fusca</i>) and common eider (<i>Somateria mollissima</i>), are breeding on the rapakivi granite islets typical to the outer archipelago of the area (Hokkanen 2012) <p>Fish</p> <ul style="list-style-type: none"> The area has a variety of excellent reproduction habitats, such as shallow bays and inlets, lagoons and estuaries, as well as sandy and rocky bottoms, for many productive fish species including pike (<i>Esox lucius</i>), perch (<i>Perca fluviatilis</i>), pikeperch (<i>Sander lucioperca</i>), Baltic herring (<i>Clupea harengus membras</i>), roach (<i>Rutilus rutilus</i>), smelt (<i>Osmerus eperlanus</i>), spined loach (<i>Cobitis taenia</i>) and gobies (<i>Potamoschistus</i> spp.) (Fig. 30-36). 					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
<p>HIGH. A high number of near threatened or vulnerable species, such as:</p> <p>Mammals</p> <ul style="list-style-type: none"> A population of ringed seal (<i>Pusa hispida botnica</i>) lives in the area and the breeding success relies on good ice winters (Fig. 10 & 13). <p>Birds</p> <ul style="list-style-type: none"> Certain vulnerable (VU) bird species, such as velvet scoter (<i>Melanitta fusca</i>) and common eider (<i>Somateria mollissima</i>), are breeding in the area (Hokkanen 2012). 					

<p>Fish</p> <ul style="list-style-type: none"> Vulnerable (VU) salmonids species, salmon (<i>Salmo salar</i>), sea-spawning whitefish (<i>Coregonus lavaretus f. pallasii</i>) (VU) and anadromous whitefish (<i>Coregonus lavaretus f. lavaretus</i>) (EN), eel <i>Anguilla anguilla</i> (EN), sea trout (<i>Salmo trutta</i>) (CR), and a near threatened river lamprey (<i>Lampetra fluviatilis</i>) (NT) are at least occasionally found in the specific habitats of the area. This is the only coastal area in Finland, where the spined loach (<i>Cobitis taenia</i>) (VU) is found and reproducing. <p>Plants</p> <ul style="list-style-type: none"> Several rare charophytes, such as <i>Nitellopsis obtusa</i> (NT), <i>Nitella hyalina</i> (VU) and <i>Chara braunii</i> (VU) exist in the area (Fig. 15). Their main habitats, sheltered bays and lagoons (Fig. 27), are threatened by eutrophication and dredging (VELMU data). A water-nymph <i>Najas tenuissima</i> (EN) is only found in few locations in the inner archipelago of the area, and in some lakes in Eurasia (Fig. 15). <p>Invertebrates</p> <ul style="list-style-type: none"> <i>Macrolea pubipennis</i> (VU/DD), a leaf beetle species of the subfamily Donaciinae that is endemic to Finland, has viable populations in the area (VELMU data; not presented in map service). In Europe the species only exists in Finland and Sweden; the other main area in the World is in China (Saari 2007). 					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
<p>MEDIUM. The boreal Baltic narrow inlets, coastal lagoons and large shallow inlets and bays inhabit rare aquatic plants, a rich bird fauna and are nursery areas for fish. Such areas are vulnerable for human disturbance, e.g. high nutrient loads, dredging (Fig. 39), overfishing and excess boat traffic. The sea ice is vulnerable for anthropogenic climate change, which affects the viability and resilience of the ringed seal population in the area. When such habitats and environments are degraded, their recovery may be slow.</p>					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
<p>MEDIUM. The area has a comparatively high biological productivity. The lagoons, inlets and bays have a high primary and fish production. Marine birds, especially sea ducks nest abundantly in the outer archipelago (Fig. 16). Benthic invertebrates have medium average biomass in the area (Fig. 22). Infaunal bivalves <i>Macoma baltica</i>, <i>Mya arenaria</i> and <i>Cerastoderma glaucum</i> have medium densities in the area (Fig. 29). Aquatic plants and macroalgae can colonise large areas due to shallowness of the area providing also habitats for invertebrates and small fish (Fig. 25 & 26).</p>					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
<p>MEDIUM. The area has a high biodiversity for a brackish-water ecosystem (Fig. 17-21). This is because both marine and freshwater organisms thrive in the area.</p> <ul style="list-style-type: none"> Freshwater species include a large number of aquatic vascular plants, charophytes, water mosses, invertebrates and freshwater fish (percids, cyprinids). Marine species include marine brown algae (<i>Fucus vesiculosus</i>), invertebrates (<i>Mytilus trossulus</i>) (VELMU data). 					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
<p>MEDIUM. The inner archipelago is quite much used and burdened with human influence, while the outer archipelago is in a relatively natural state.</p> <ul style="list-style-type: none"> The inner archipelago is densely built with summer cottages and other settlements or constructions (Fig. 					

38). Most of the cottages are however mainly used in summer, and during the rest of the year human disturbance is low. The outer archipelago is virtually inhabited, and does not have much human disturbance during most of the year.

- The water is turbid in the inner archipelago (Fig. 9) due to nutrient loads from land, but biodiversity is not much affected (VELMU data).
- Several non-indigenous invertebrate species have been established in the area during the past 20 years, but have not replaced any native species in the area (Leppäkoski & Olenin 2000).

Sharing experiences and information applying other criteria (Optional)

Other Criteria	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Medium	High
<i>Add relevant criteria</i>					
<i>Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)</i>					

References

(e.g. relevant documents and publications, including URL where available; relevant data sets, including where these are located; information pertaining to other relevant material, models, etc.)

Birdlife

Fauna Europaea https://fauna-eu.org/cdm_dataportal/taxon/1cd8581b-67c9-4455-a2f5-6629b84048c8

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Maps and Figures



Figure 1. EBSA proposal for the Finnish Eastern Gulf of Finland.

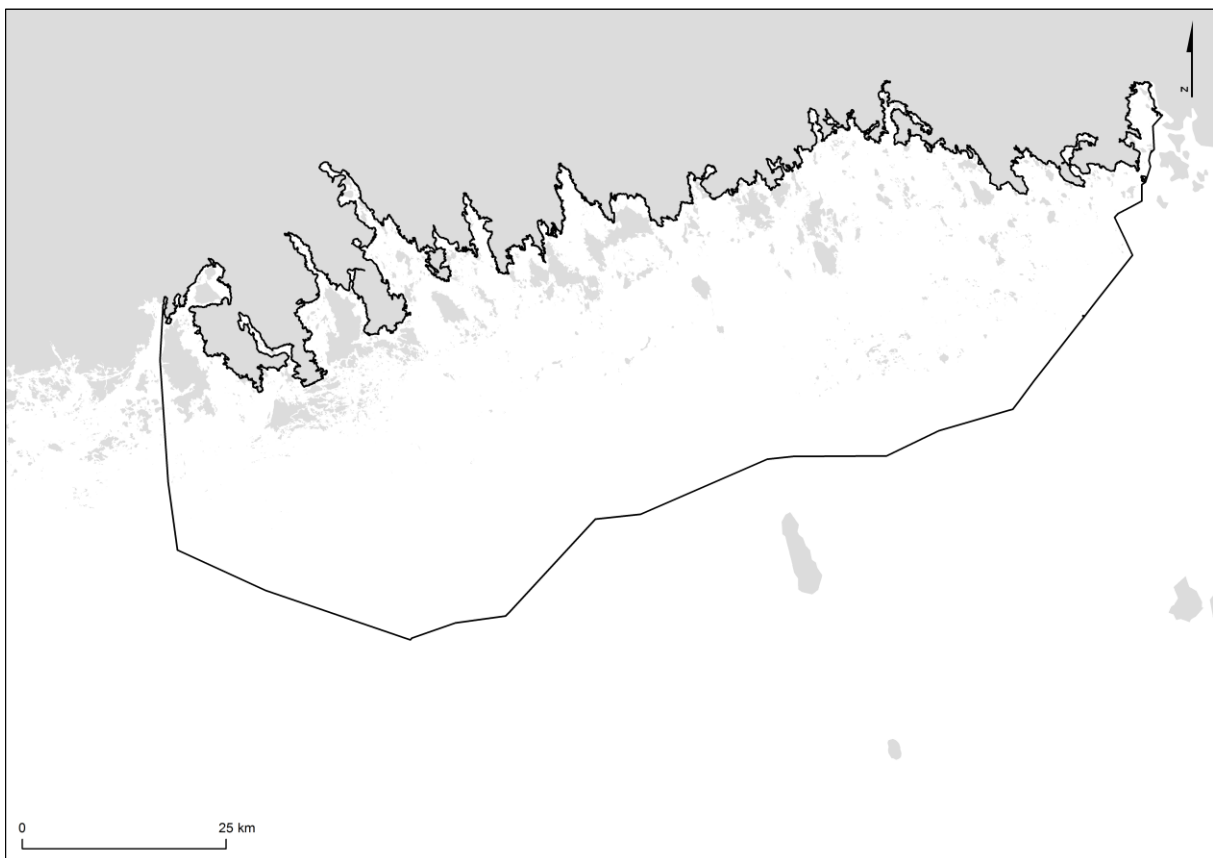


Figure 2. EBSA proposal.

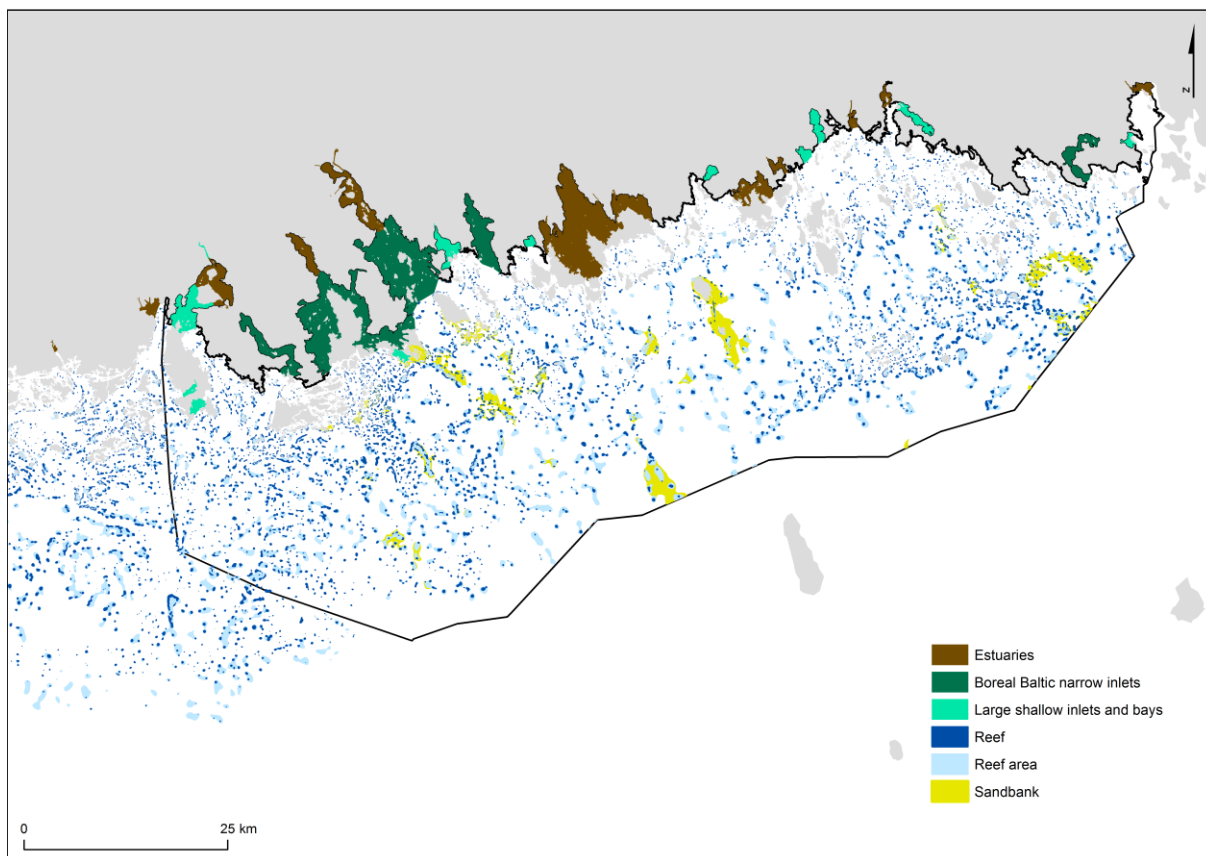


Figure 3. Potential habitats described by EU Habitats directive (92/43/EEC). Finnish Environment Institute & Geological Survey of Finland.

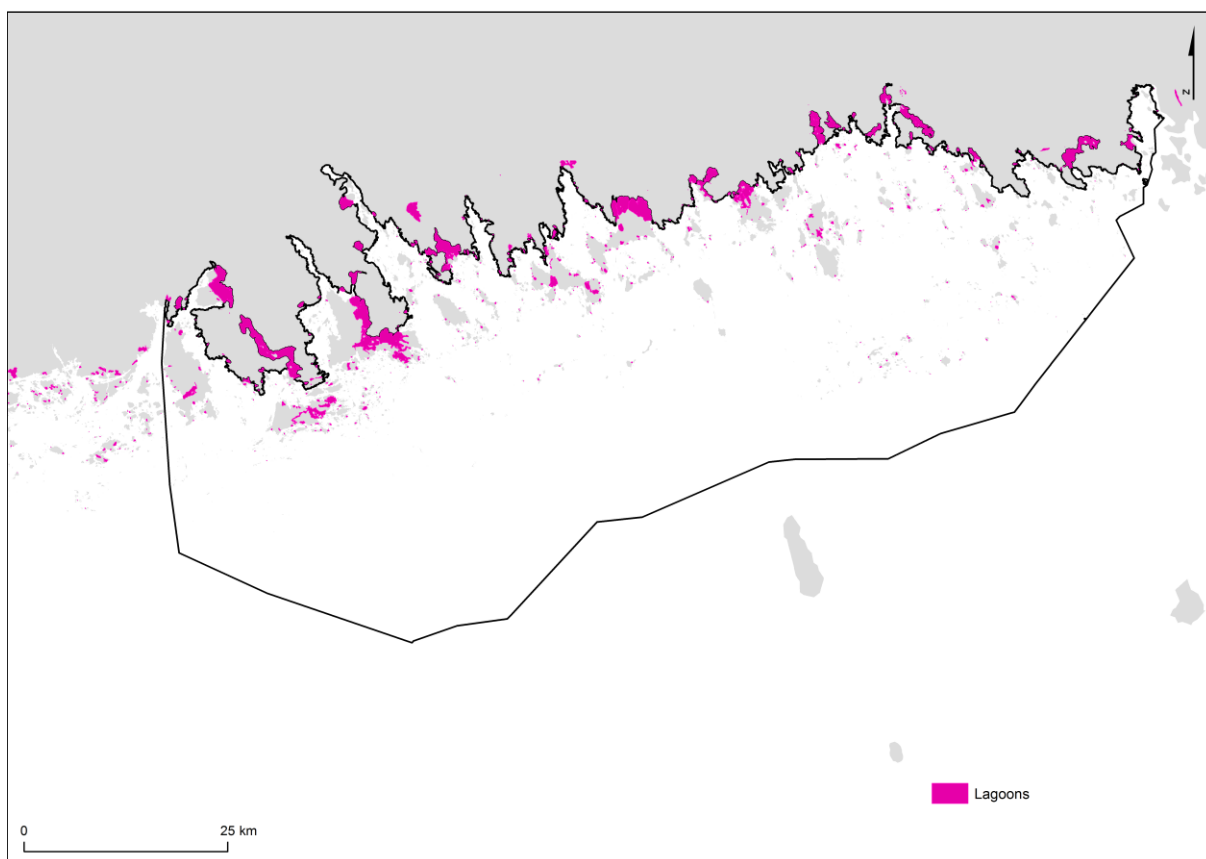


Figure 4. Potential coastal lagoons (1150) described by EU Habitats directive (92/43/EEC). Finnish Environment Institute.

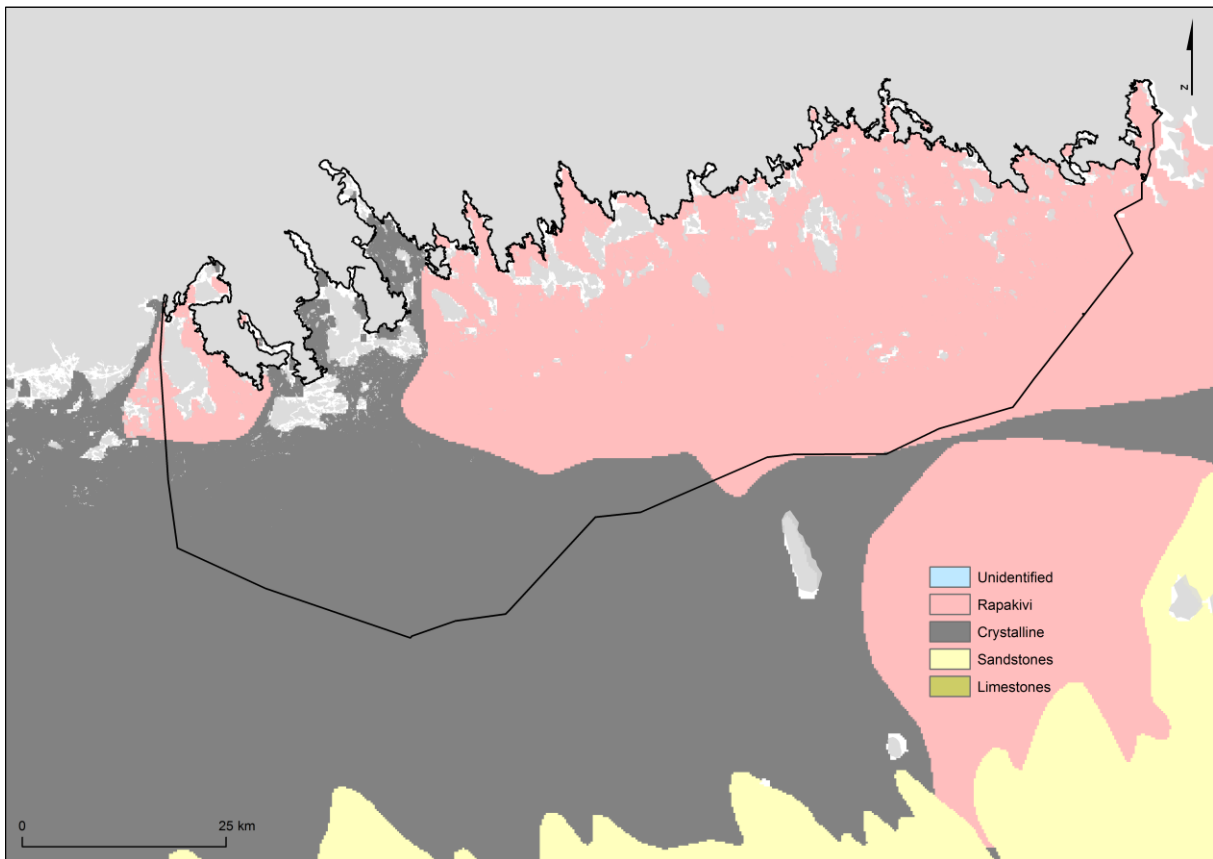


Figure 5. Rock type. Geological Survey of Finland.

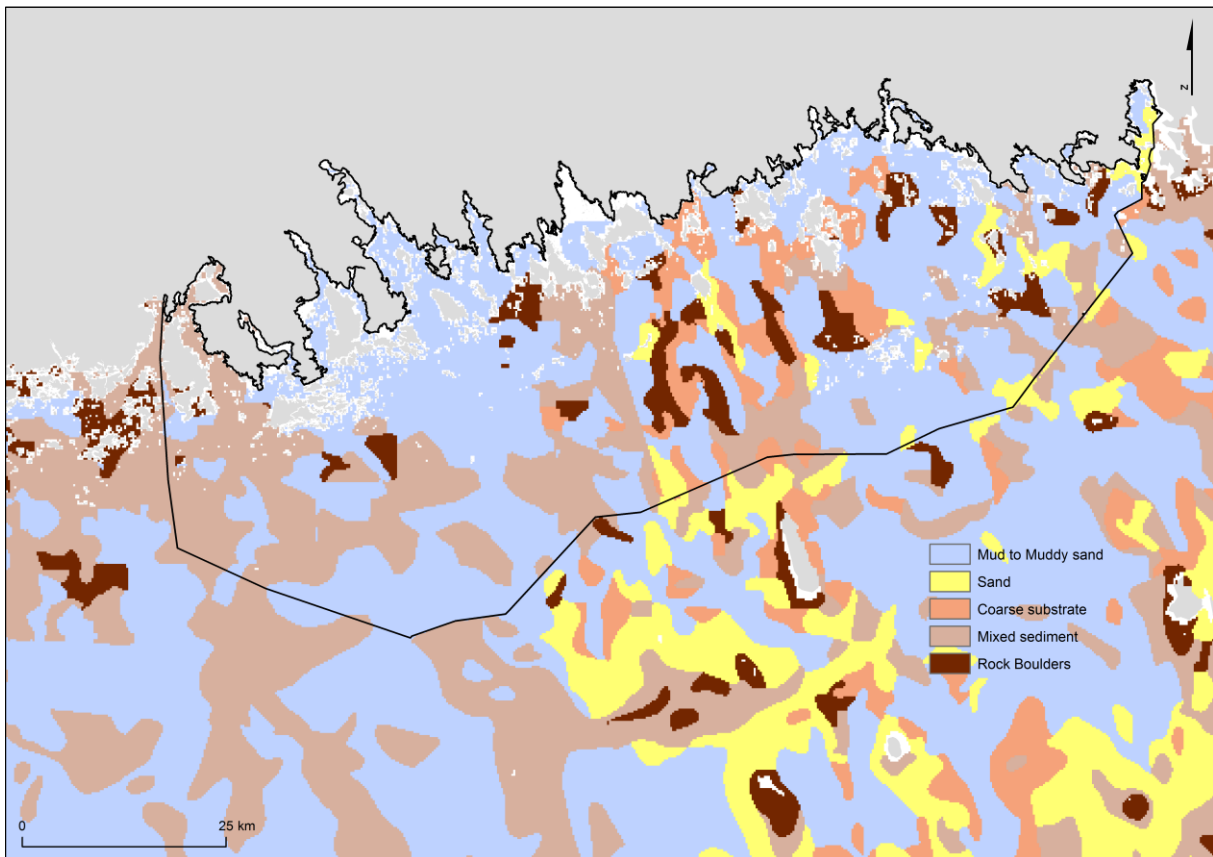


Figure 6. Seabed substrate. Geological Survey of Finland.

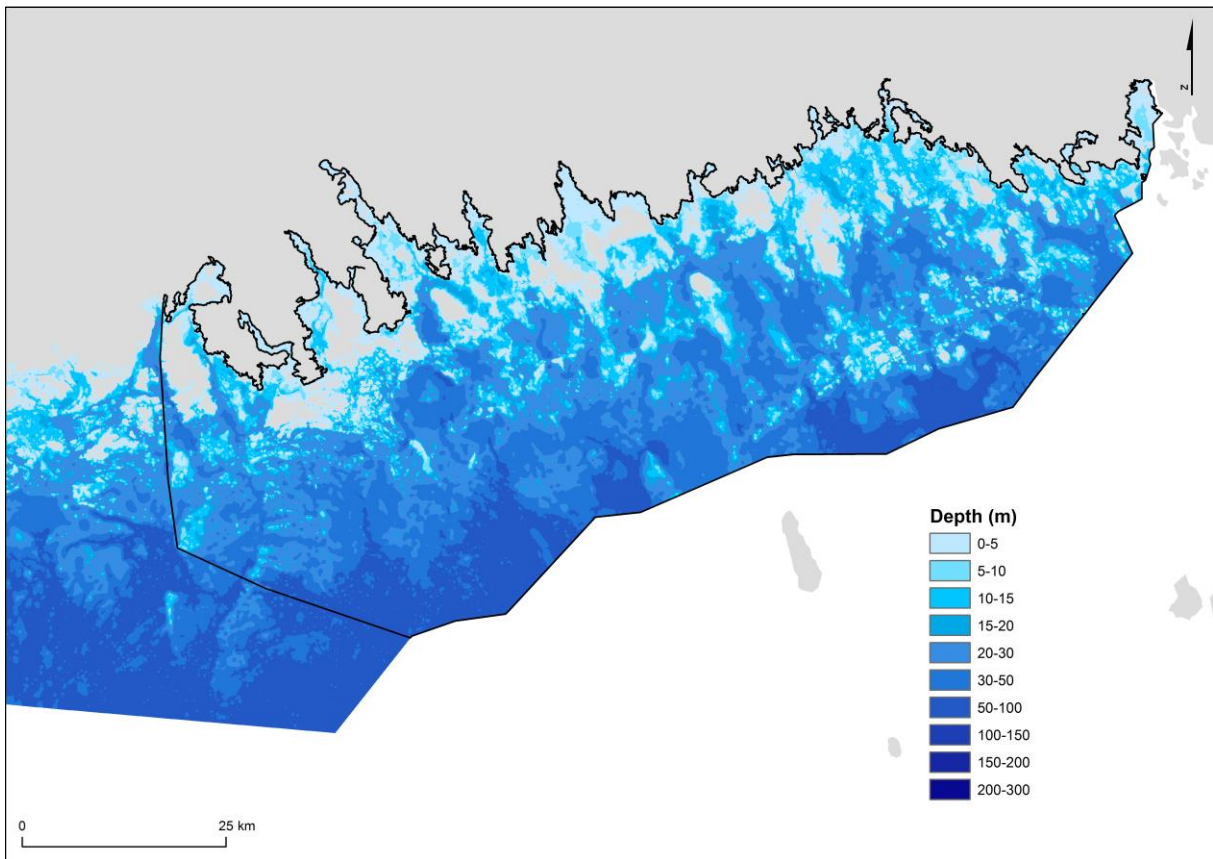


Figure 7. Water depth. VELMU / Finnish Environment Institute.

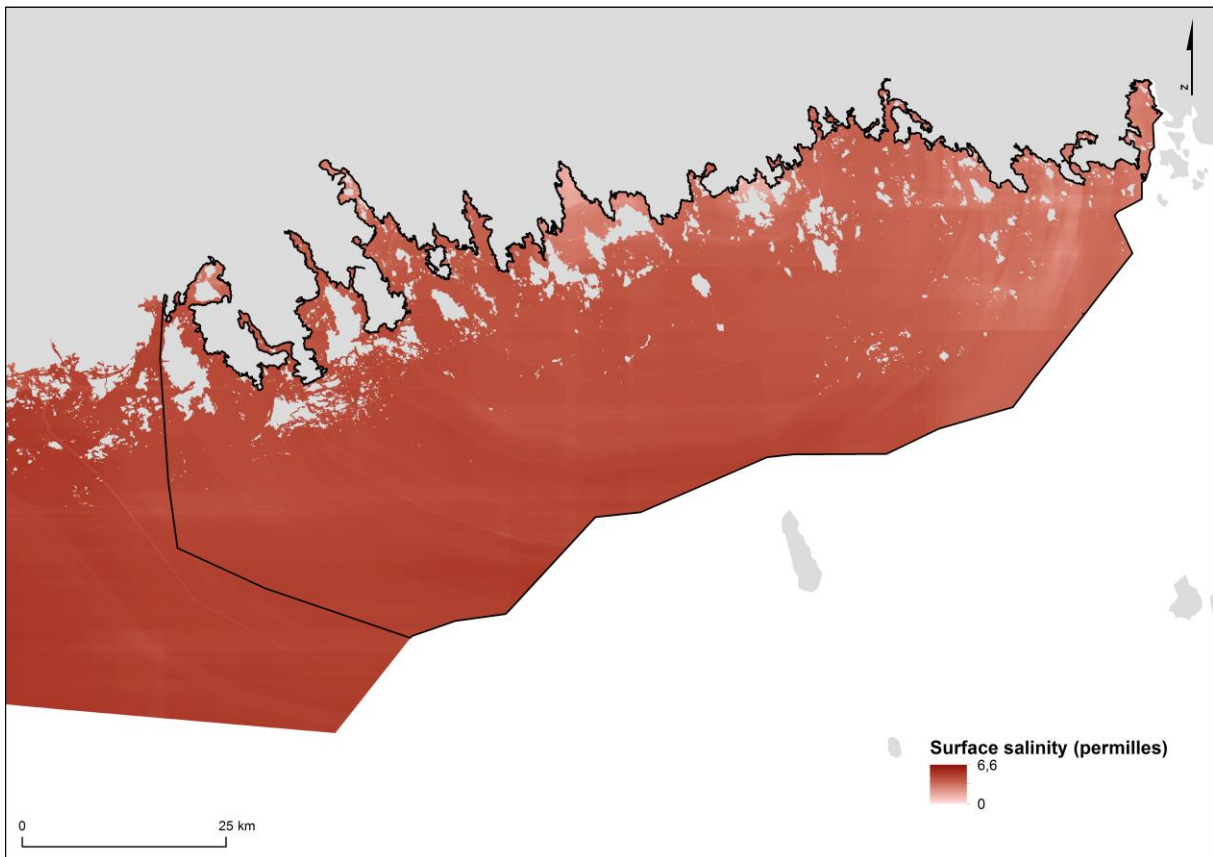


Figure 8. Surface salinity. VELMU / Finnish Environment Institute.

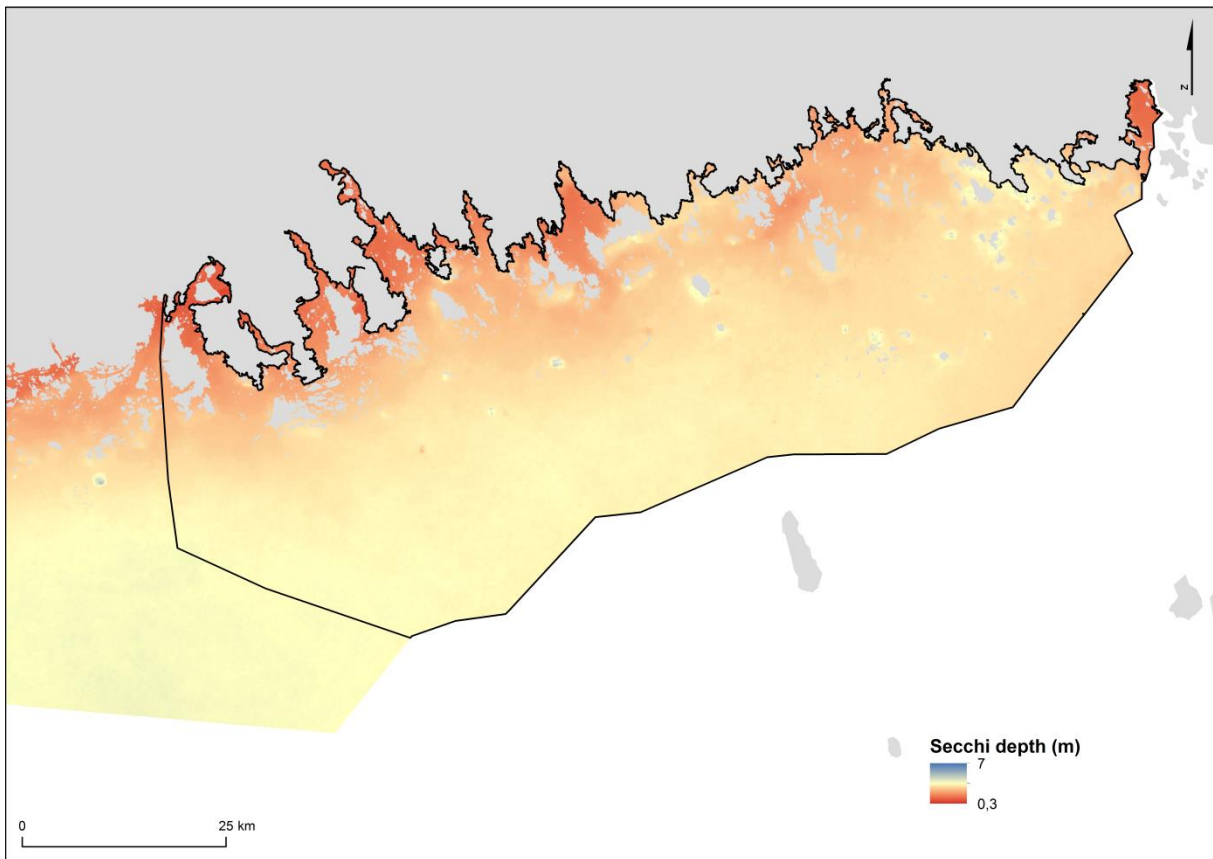


Figure 9. Secchi depth derived from Envisat-1 MERIS satellite images for the summer period 2003-2011. VELMU / Finnish Environment Institute.

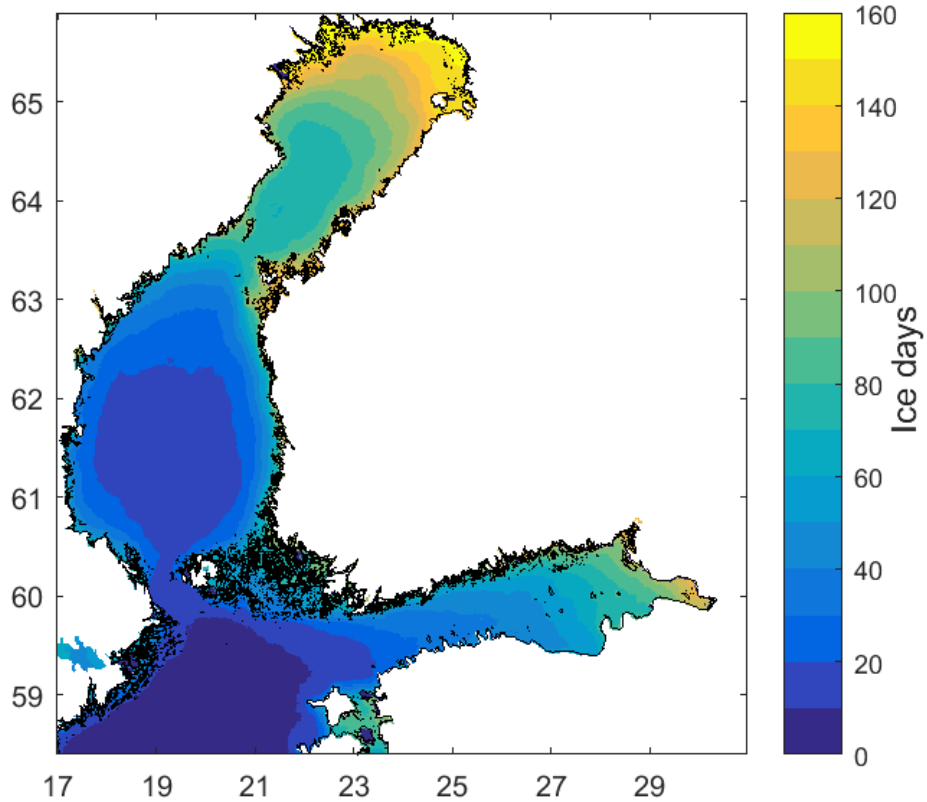


Figure 10. Average number of ice days during winters 2002/2003-2015/2016. Finnish Meteorological Institute.

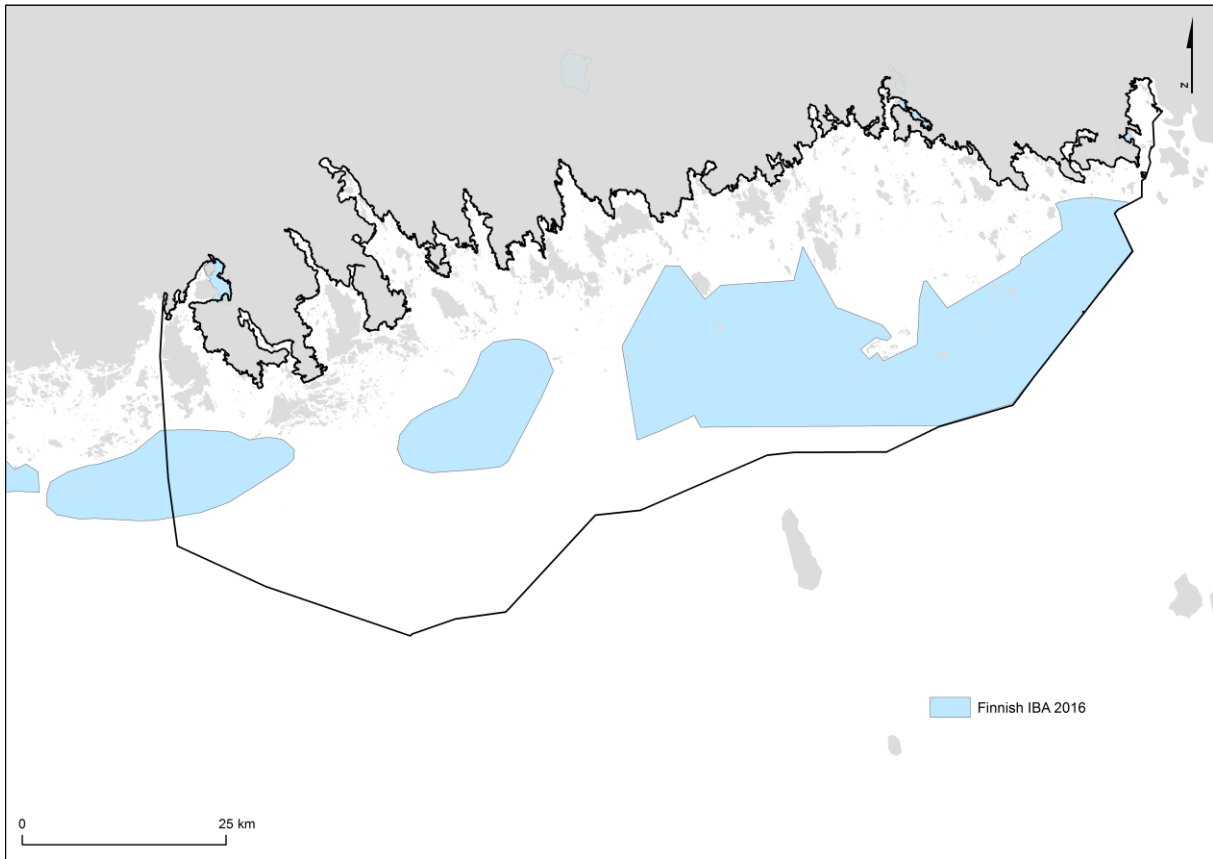


Figure 11. Important Bird and Biodiversity Areas (IBA). BirdLife Finland.

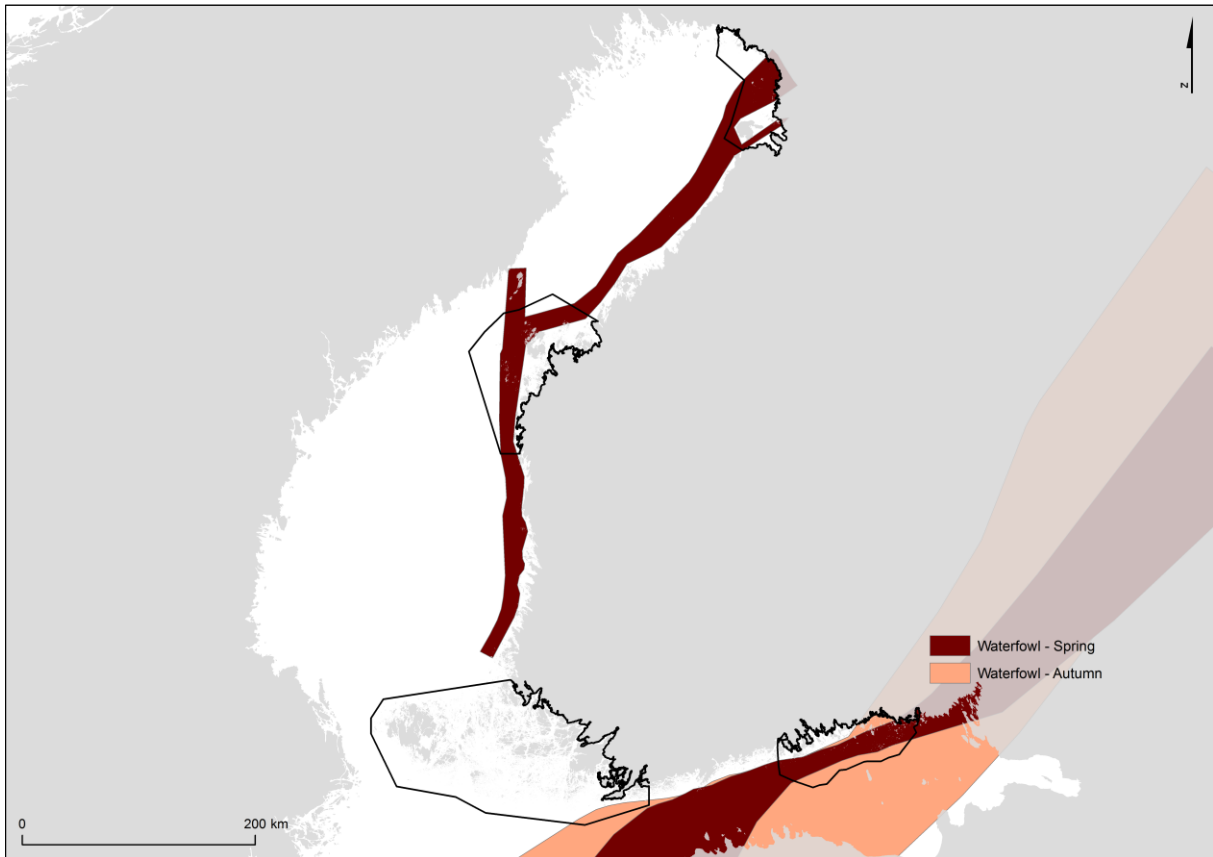


Figure 12. Migration routes of waterfowl. Birdlife Finland.

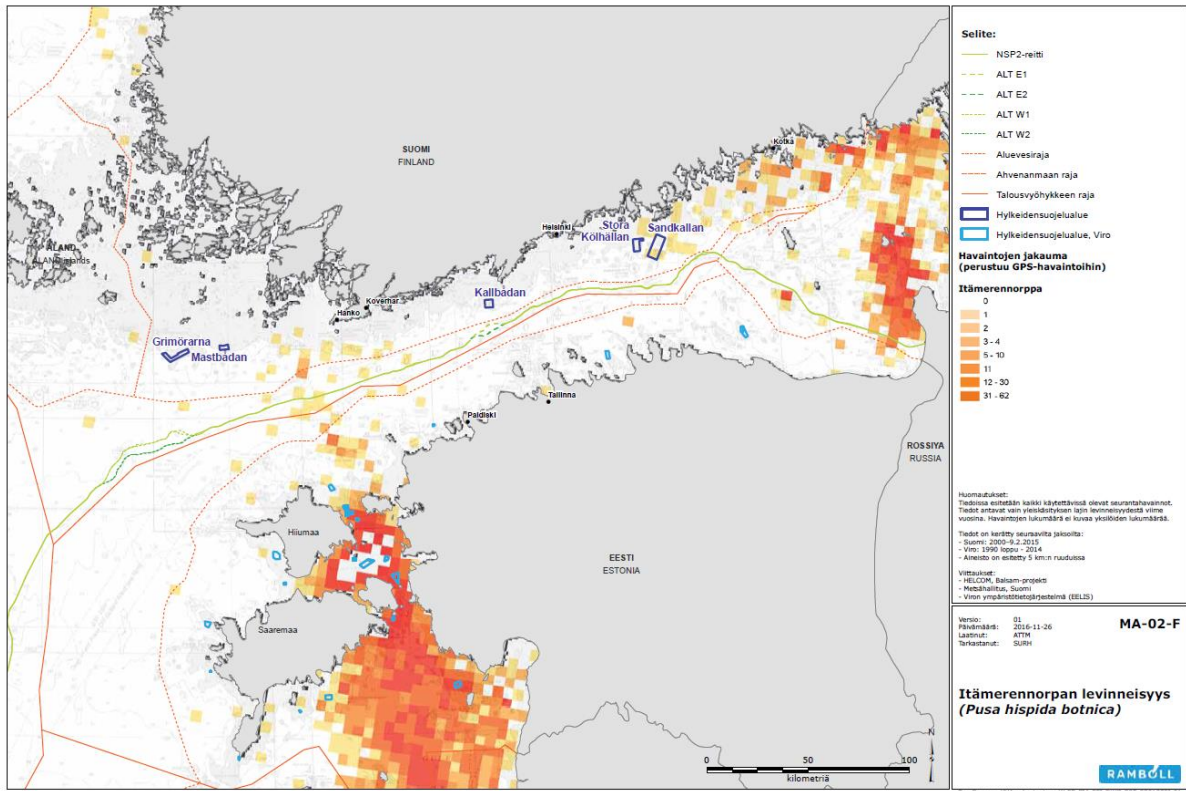


Figure 13. Distribution of ringed seal (*Pusa hispida botnica*). Nord Stream 2, W-PE-EIA-PFI-DWG-805-030100FI-01.

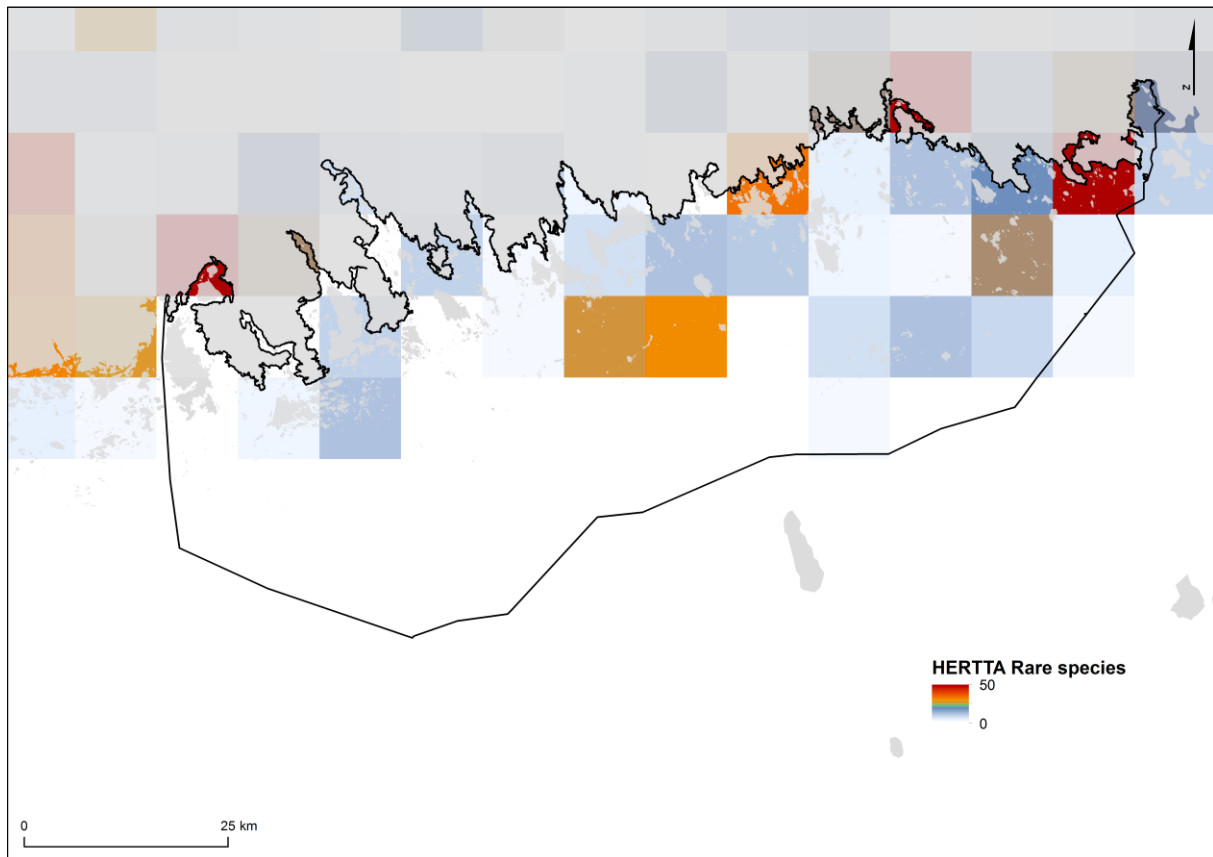


Figure 14. The number of observed rare species (Red list: RE, CR, EN, VU, NT) derived from HERTTA database for the years 1990-2015. Please note that all taxa from HERTTA database are included, also terrestrial species. Finnish Environment Institute.

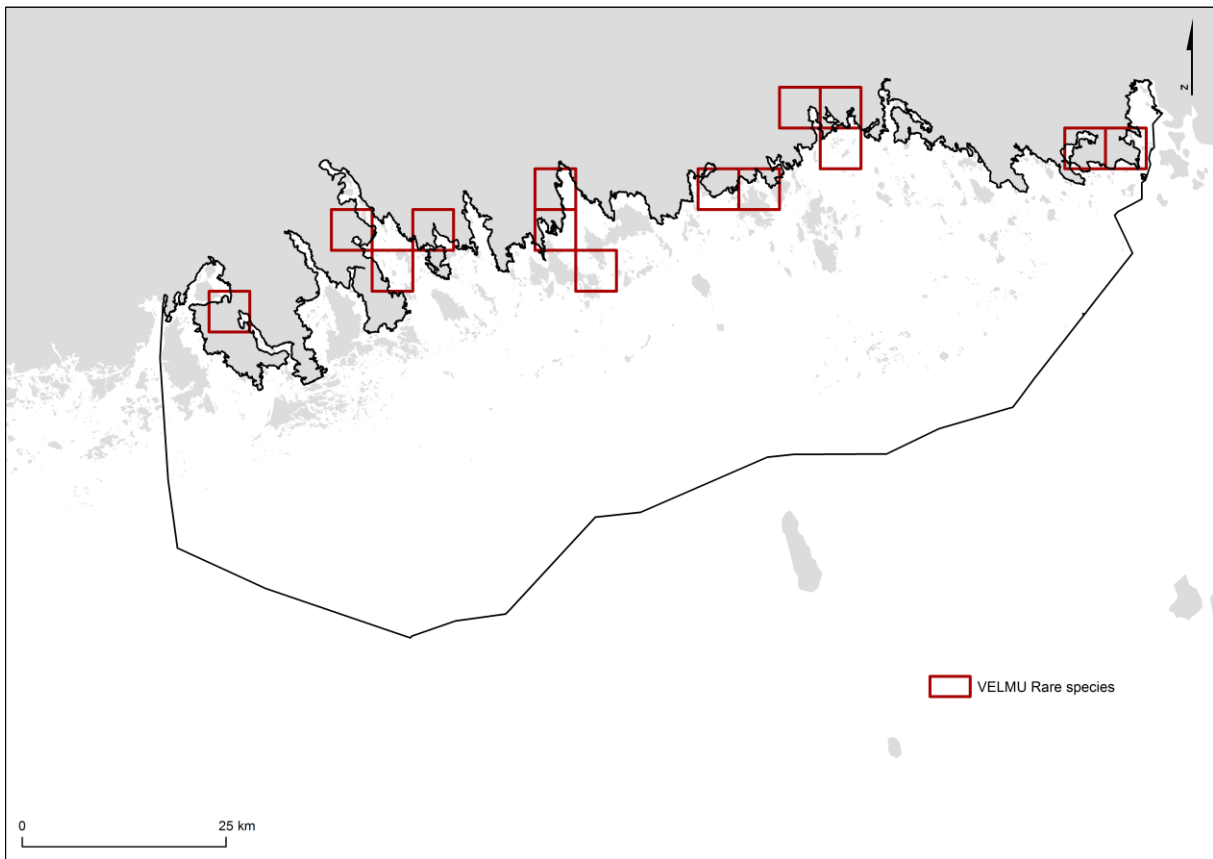


Figure 15. The occurrence of rare aquatic vascular plants and charophytes observed by VELMU programme. VELMU / Finnish Environment Institute.

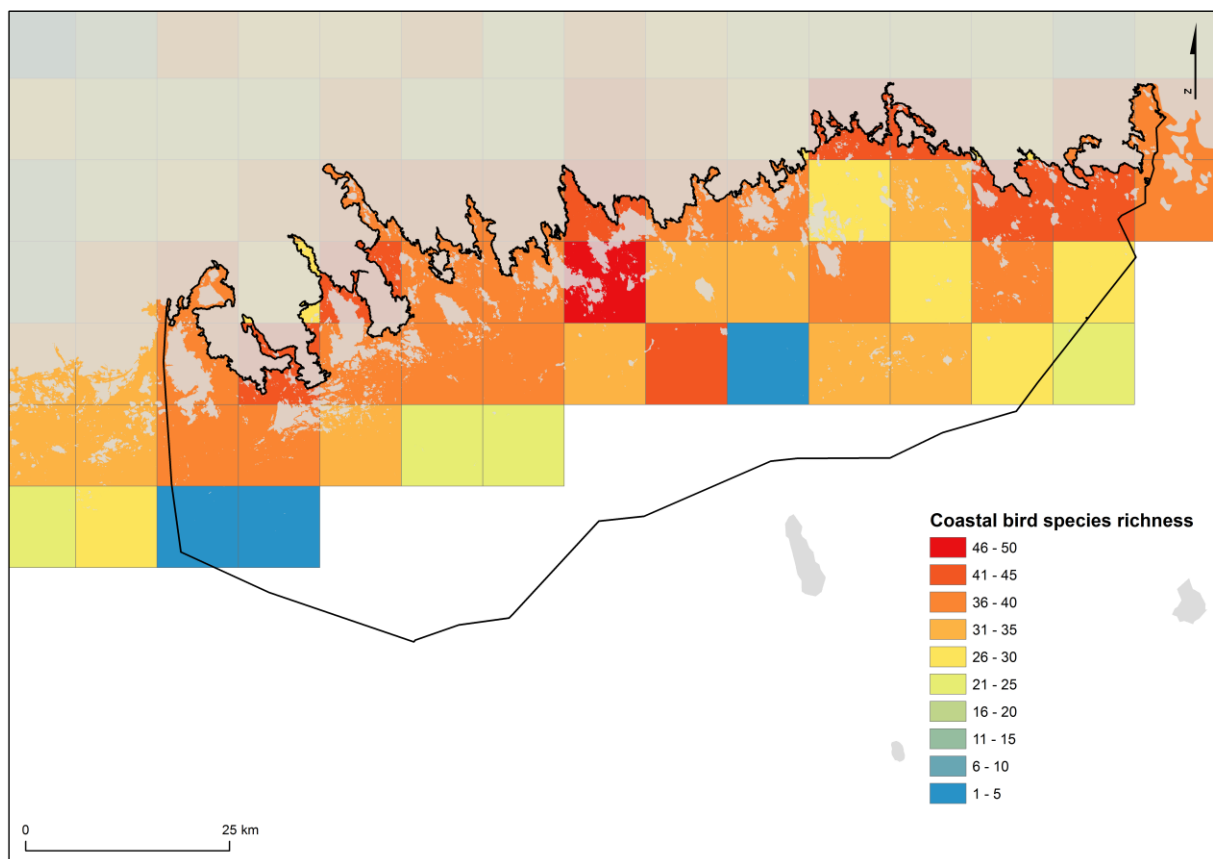


Figure 16. The number of breeding coastal birds. Finnish Bird Atlas & Metsähallitus Parks and Wildlife Finland.

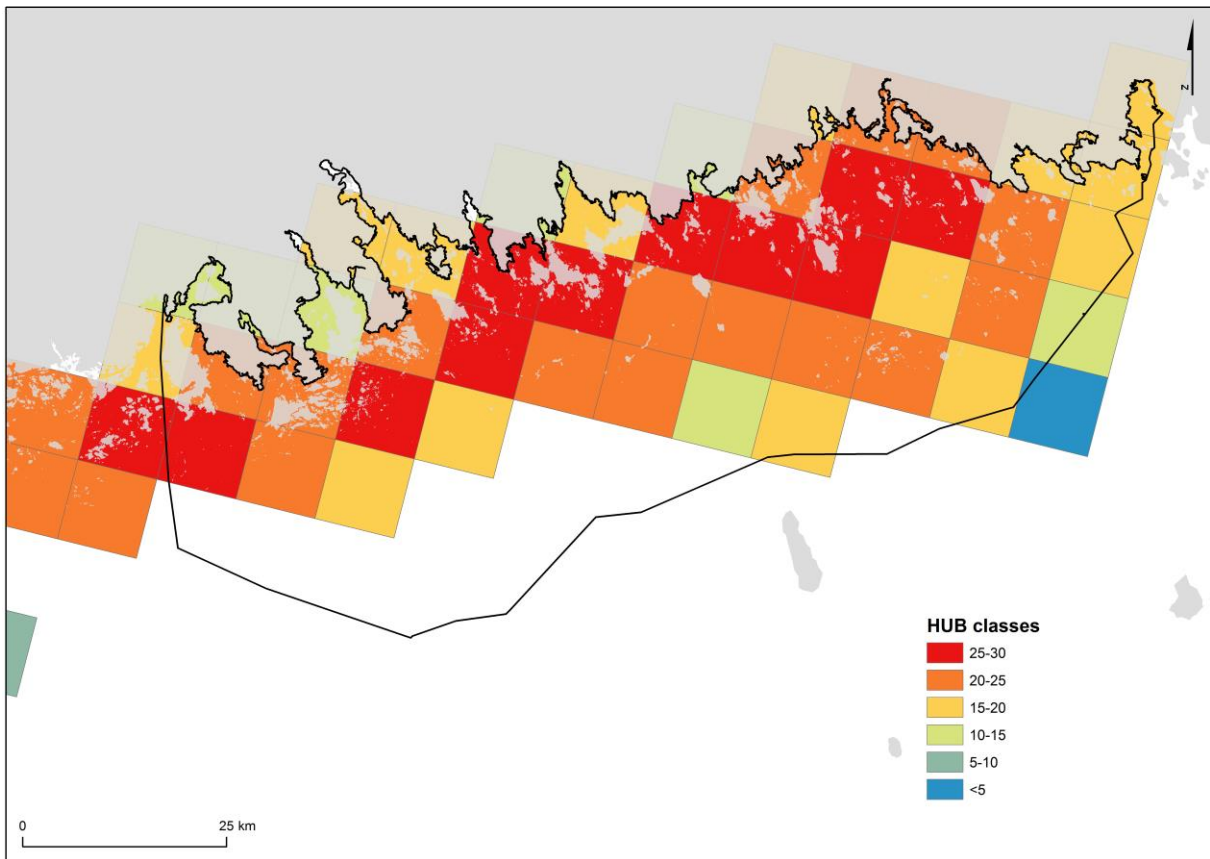


Figure 17. The number of observed HELCOM HUB classes. Based on VELMU inventories 2004-2016. Metsähallitus Parks and Wildlife Finland & Finnish Environment Institute.

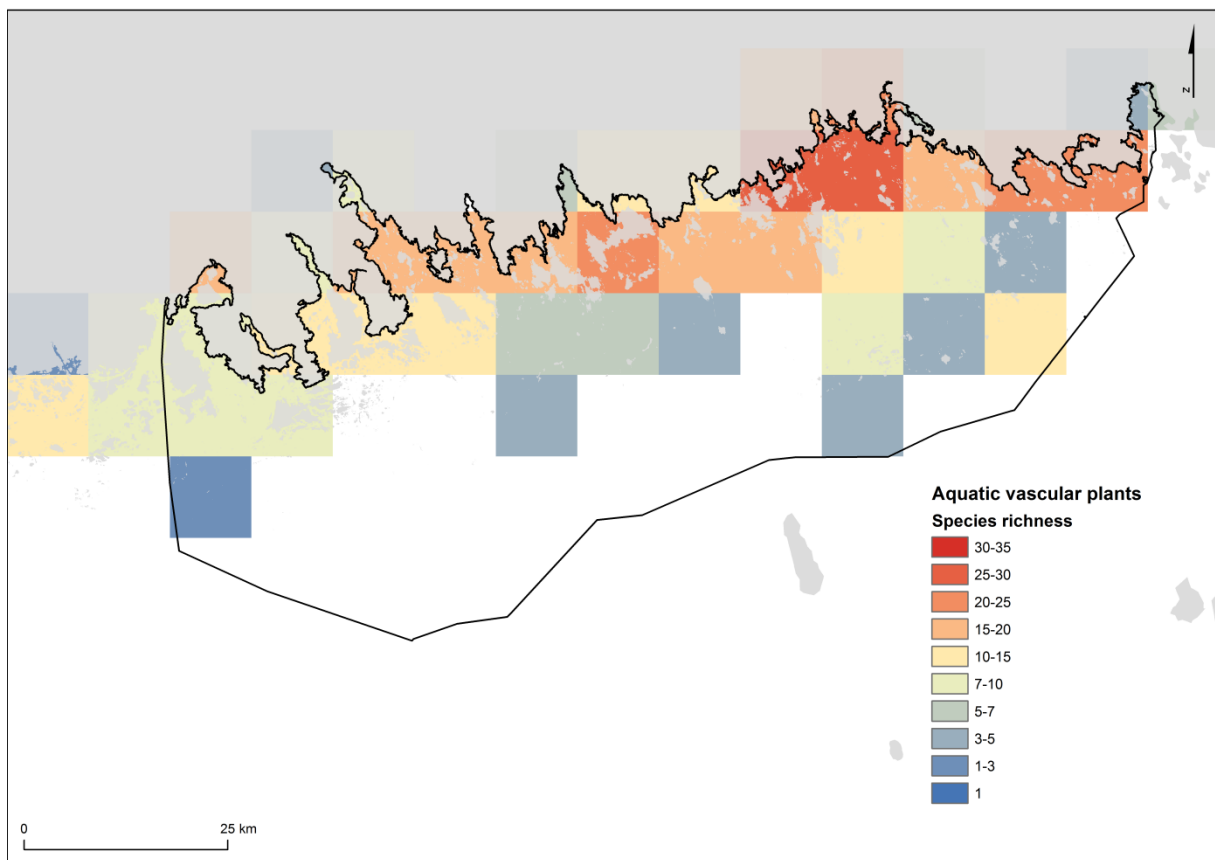


Figure 18. The species richness of aquatic vascular plants. Based on VELMU inventories 2004-2016. VELMU / Finnish Environment Institute.

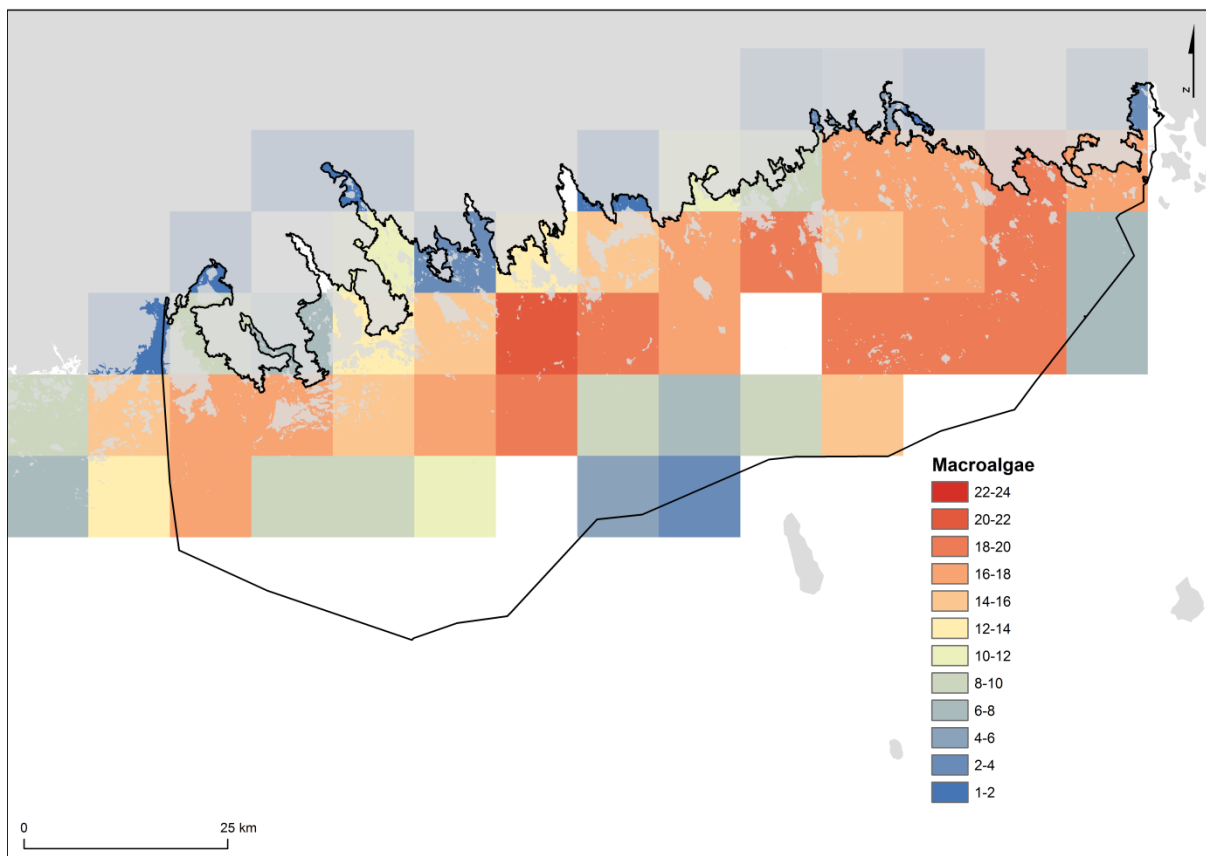


Figure 19. The species richness of macroalgae. Based on VELMU inventories 2004-2016. VELMU / Finnish Environment Institute.

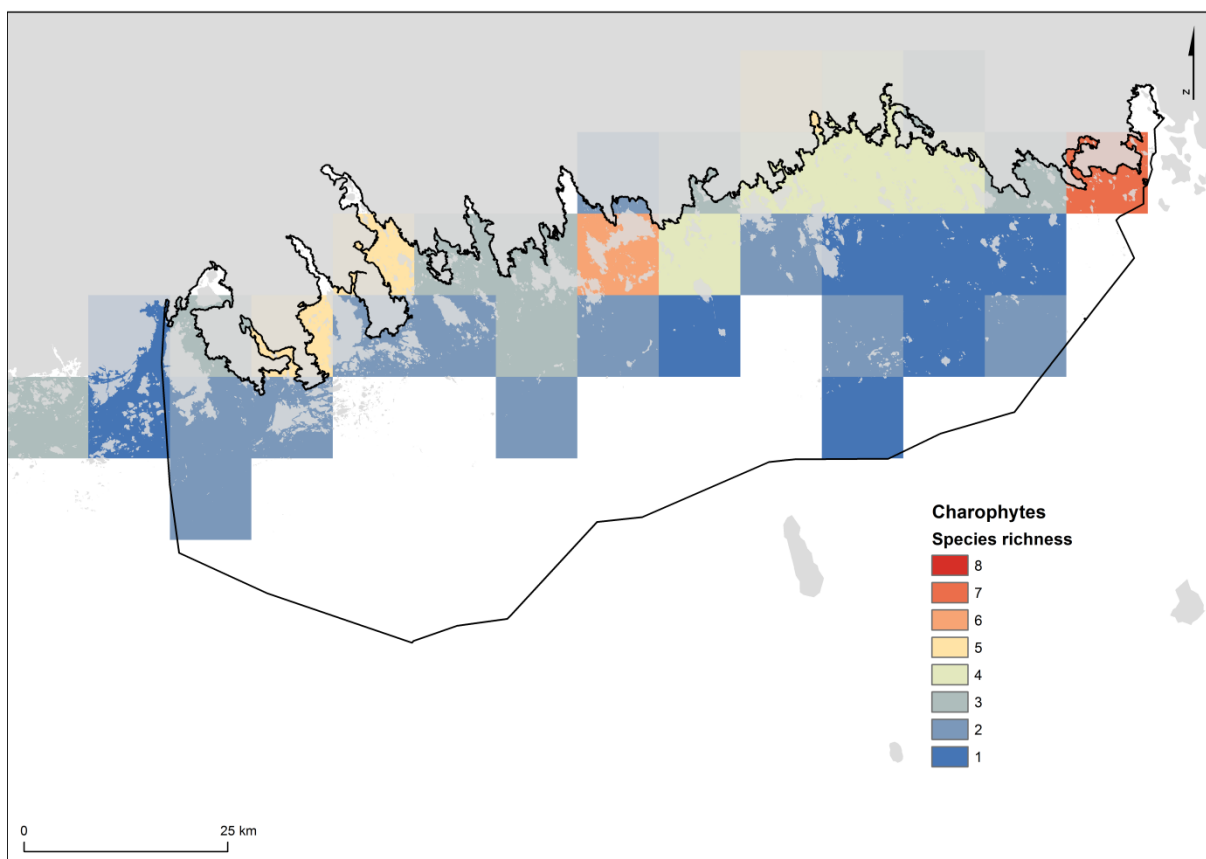


Figure 20. The species richness of charophytes. Based on VELMU inventories 2004-2016. VELMU / Finnish Environment Institute.

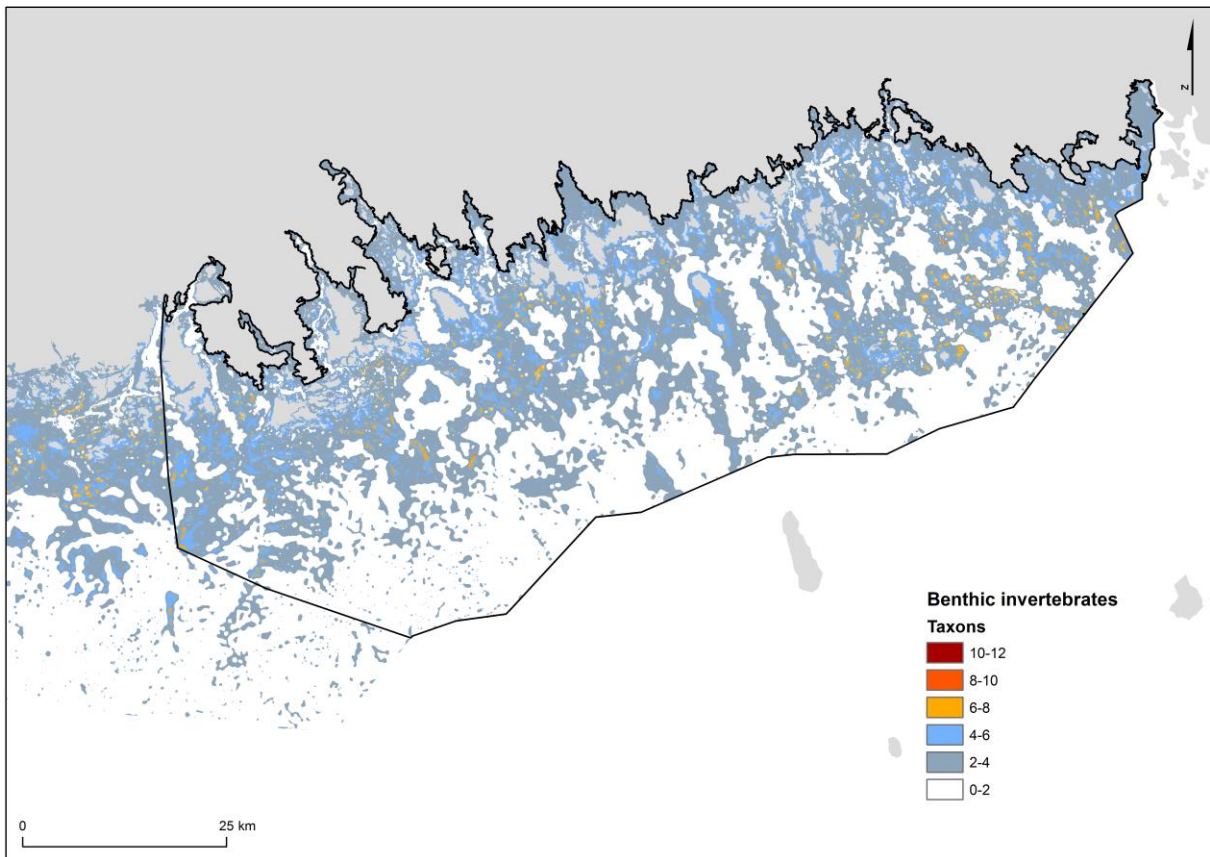


Figure 21. Modelled number of benthic invertebrate taxa. Based on VELMU inventories 2004-2016 and HERTTA Pohje database. Finnish Environment Institute.

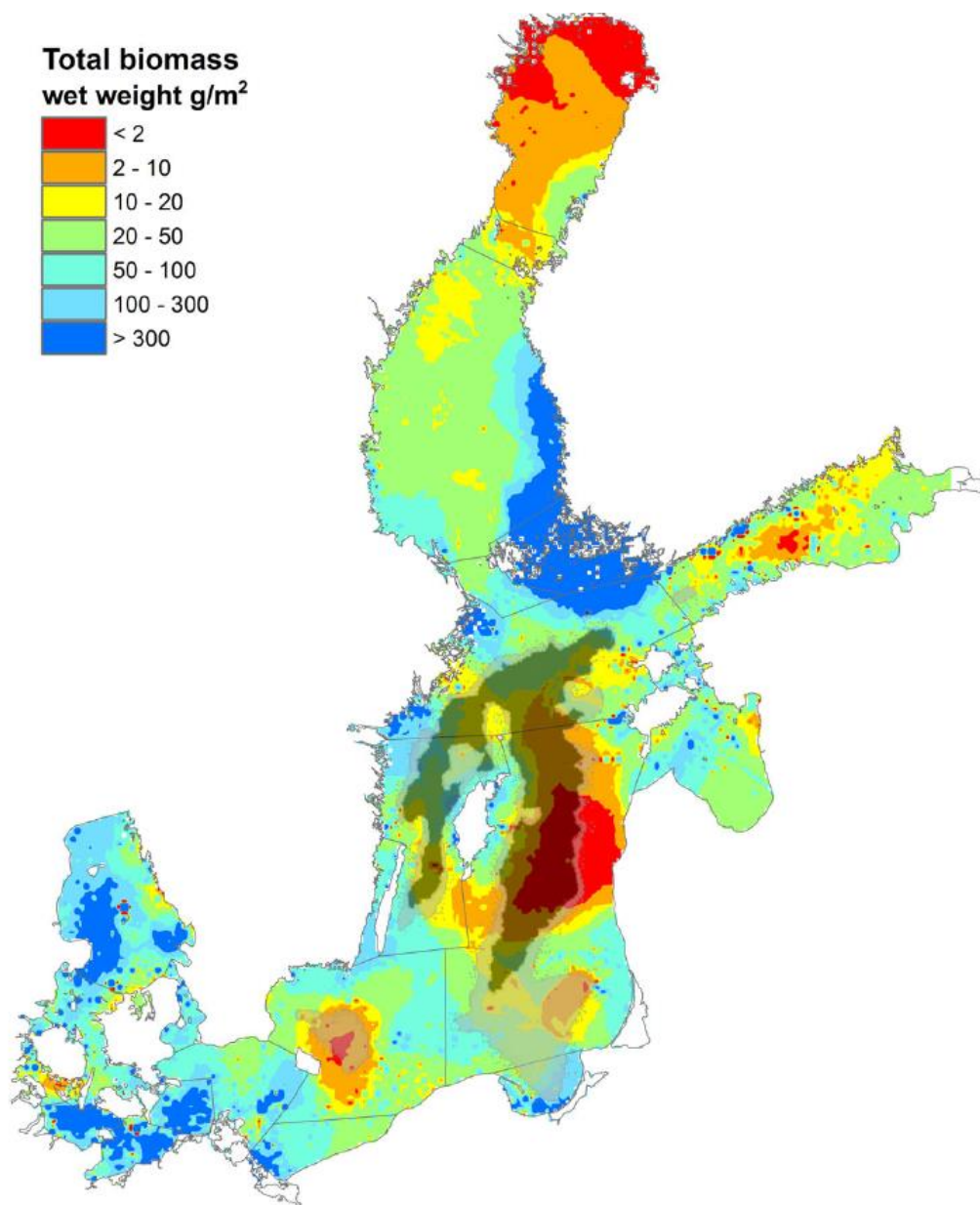


Figure 8. Distribution of interpolated total wet weight biomass, derived using ordinary kriging interpolation of available biomass data averaged per 5×5 km grid cell. Transparent light grey and dark grey areas mask out the deep water hypoxic and anoxic oxygen conditions. Note that at the areas where biomass data are lacking in interpolation artefacts are evident, for instance, values at the shallow parts of the Eastern Gotland Basin at the west coast off Latvia are presumably too low. This figure is available in black and white in print and in colour at *ICES Journal of Marine Science* online.

Figure 22. Total biomass of benthic invertebrates. Gogina et al. 2016.

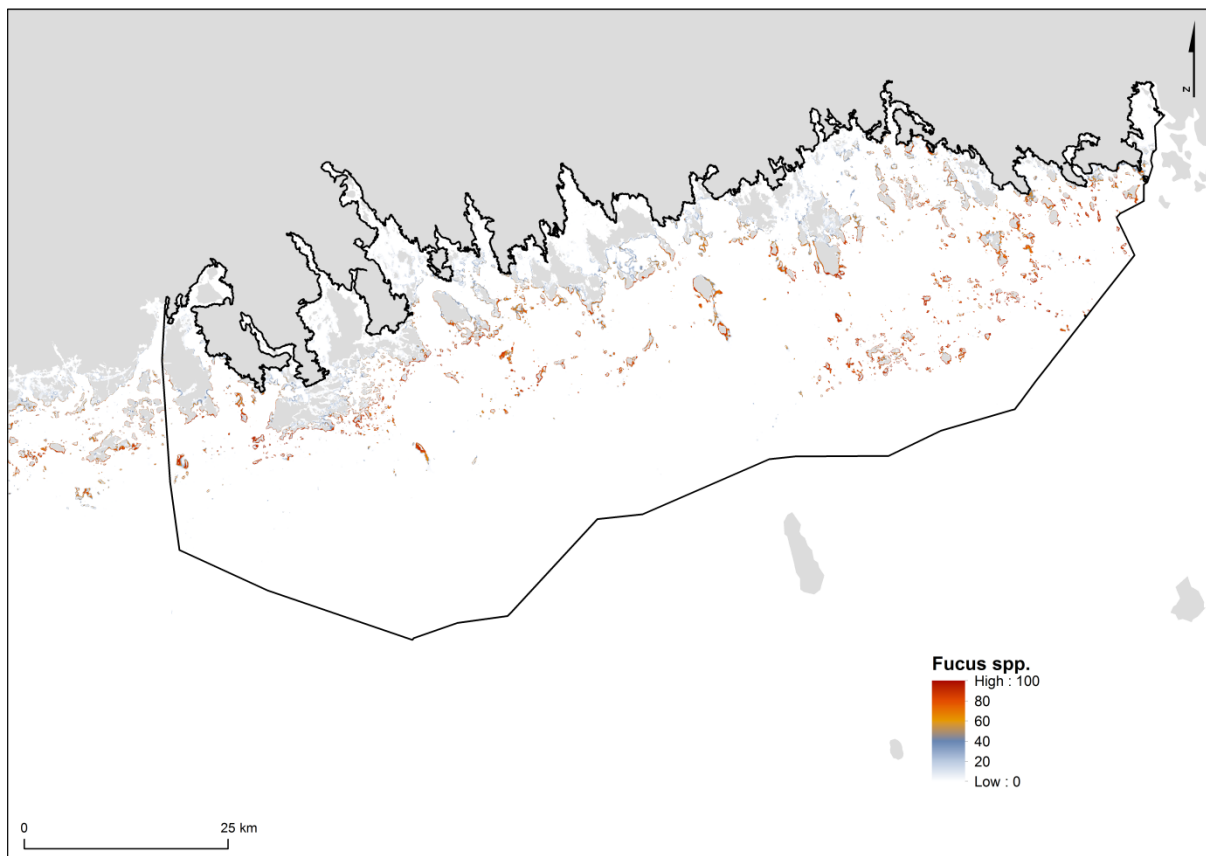


Figure 23. Modelled distribution of bladder wrack (*Fucus* spp.) as probability of occurrence (0-100%). Based on VELMU inventories 2004-2016. Finnish Environment Institute.

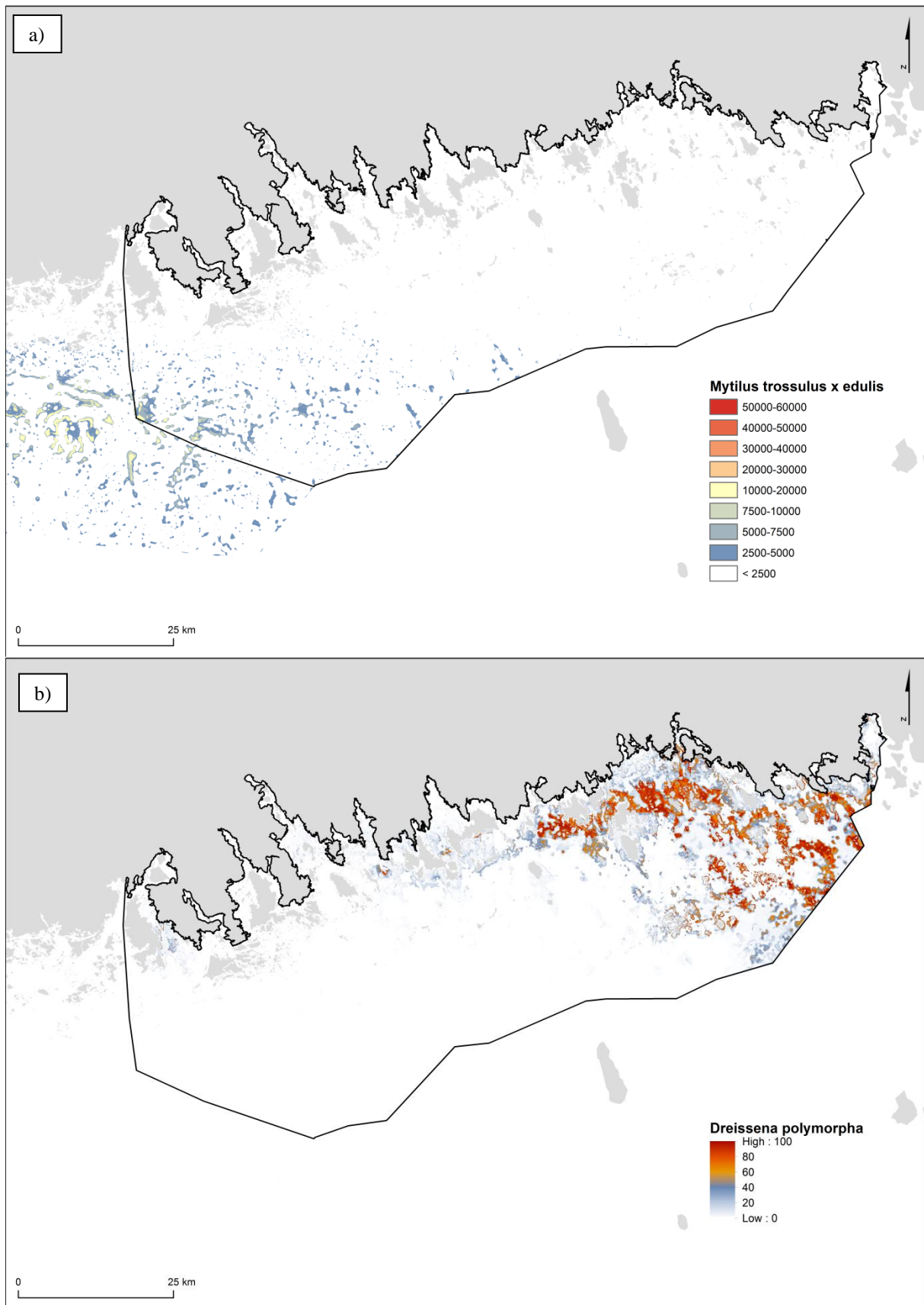


Figure 24. a) Modelled individual density (individuals m⁻²) of blue mussel (*Mytilus trossulus*). Based on VELMU inventories 2004-2016 and HERTTA Pohje database. Finnish Environment Institute. b) Modelled distribution of zebra mussel (*Dreissena polymorpha*) as probability of occurrence (0-100%). Based on VELMU inventories 2004-2016. Finnish Environment Institute.

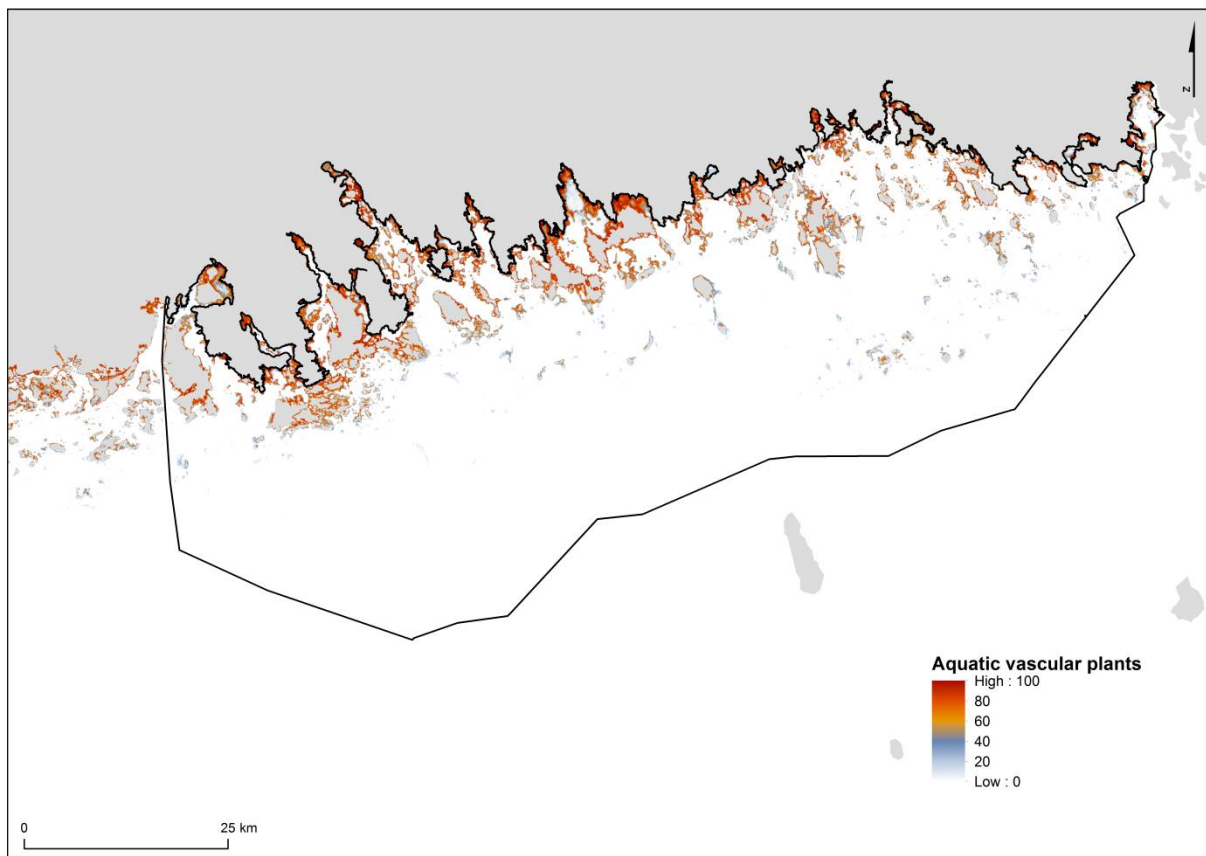


Figure 25. Modelled distribution of aquatic vascular plants as probability of occurrence (0-100%). Based on VELMU inventories 2004-2016. Finnish Environment Institute.

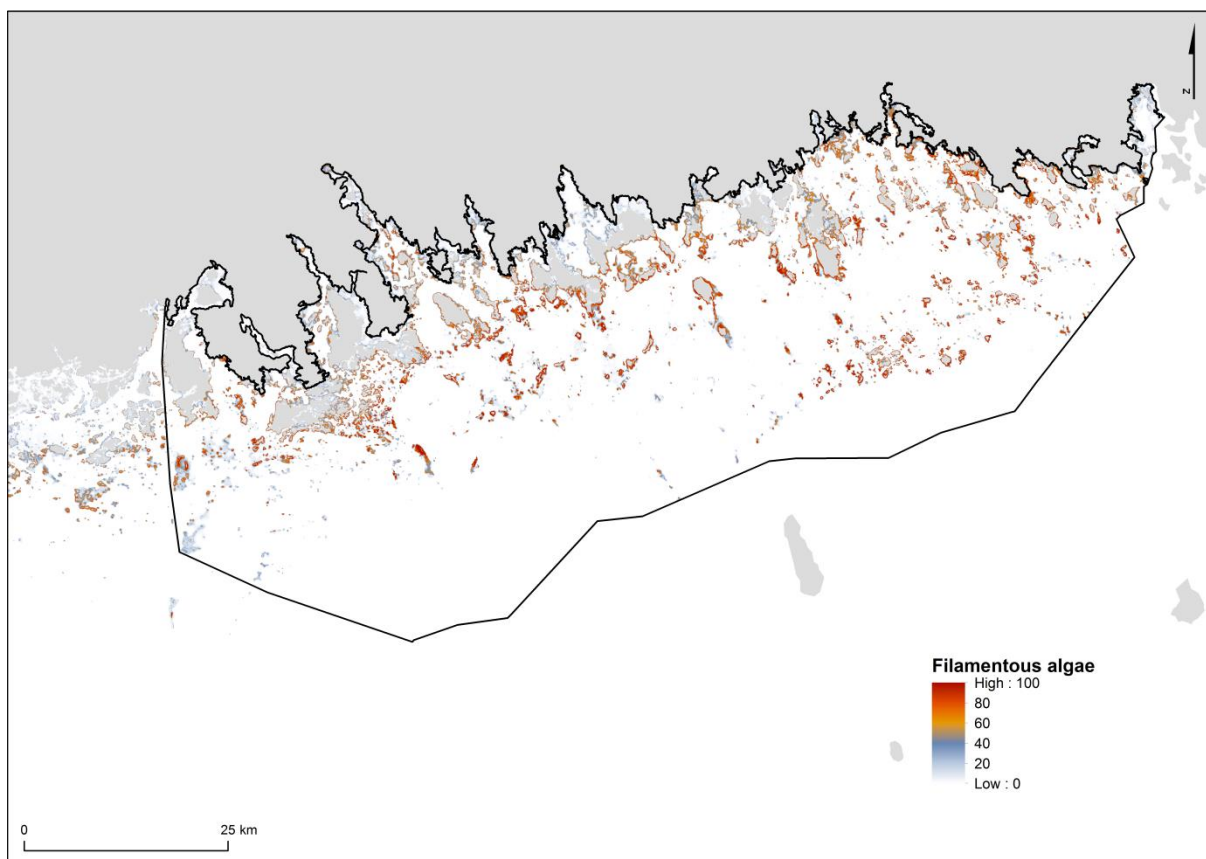


Figure 26. Modelled distribution of filamentous algae as probability of occurrence (0-100%). Based on VELMU inventories 2004-2016. Finnish Environment Institute.

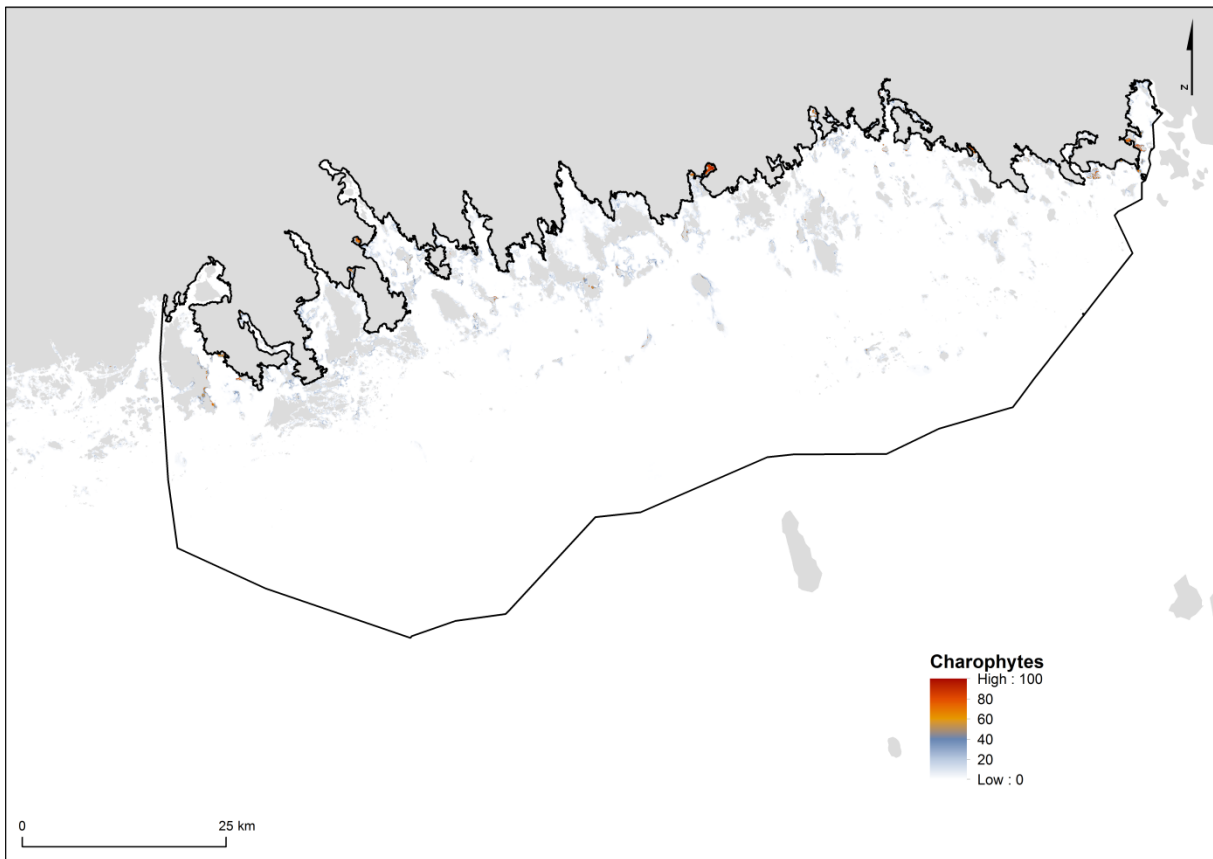


Figure 27. Modelled distribution of charophytes as probability of occurrence (0-100%). Based on VELMU inventories 2004-2016. Finnish Environment Institute.

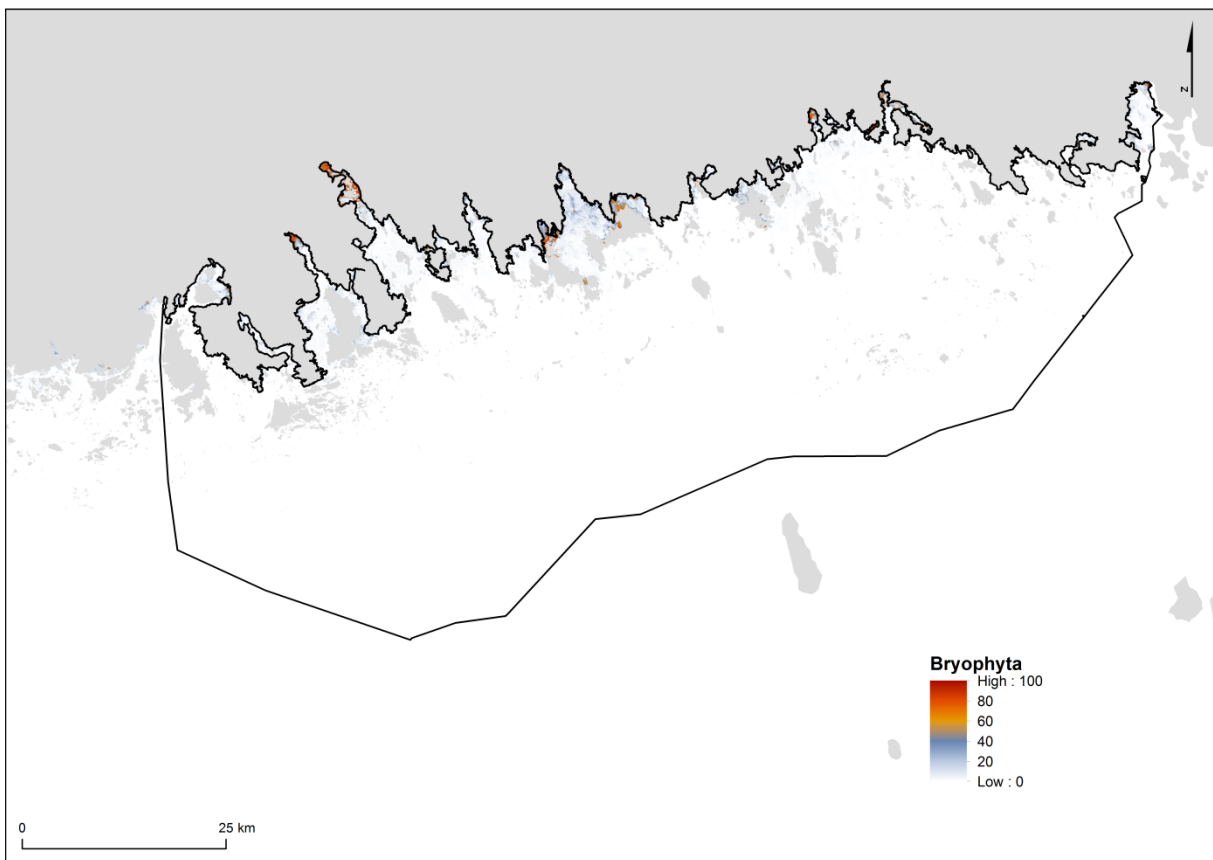


Figure 28. Modelled distribution of water mosses as probability of occurrence (0-100%). Based on VELMU inventories 2004-2016. Finnish Environment Institute.

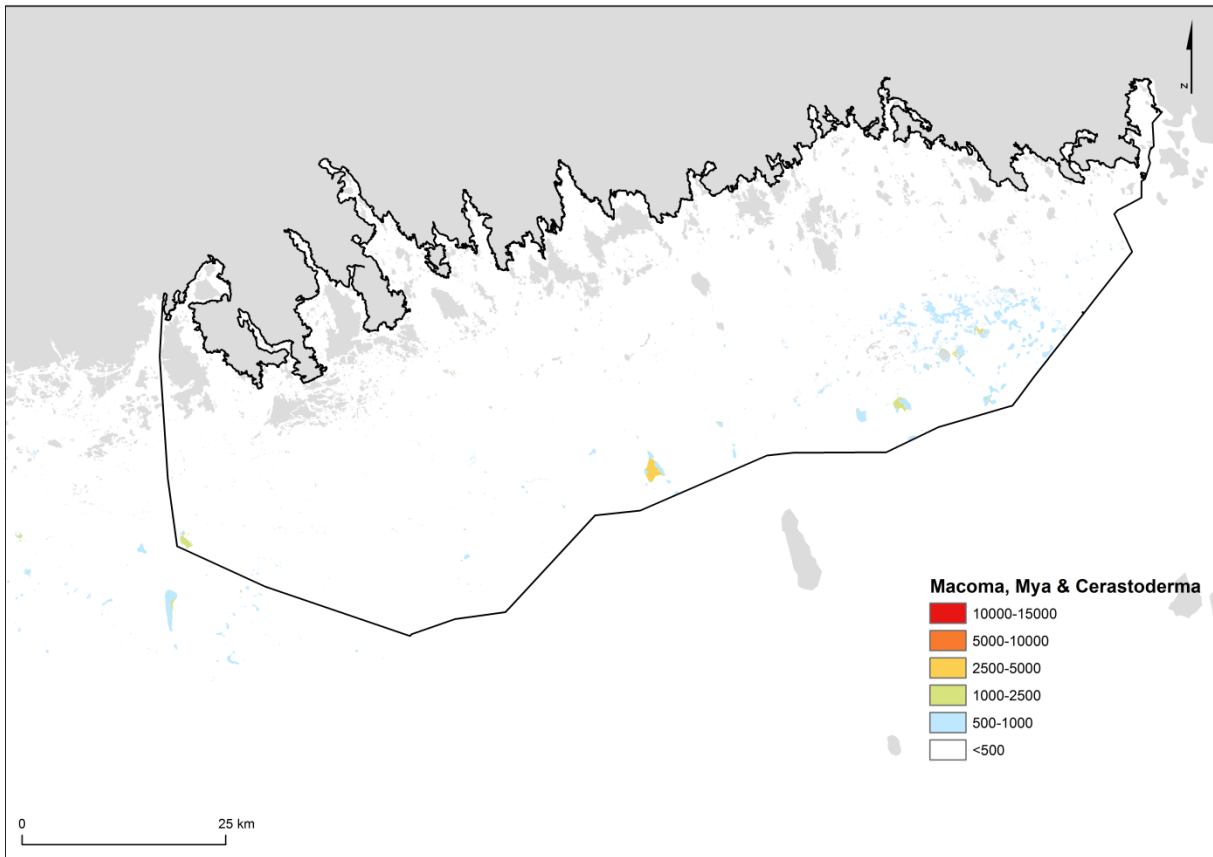


Figure 29. Modelled distribution of infaunal bivalves *Macoma baltica*, *Mya arenaria* and *Cerastoderma glaucum* as density (individuals m⁻²). Based on VELMU inventories 2004-2016 and HERTTA Pohje database. Finnish Environment Institute.

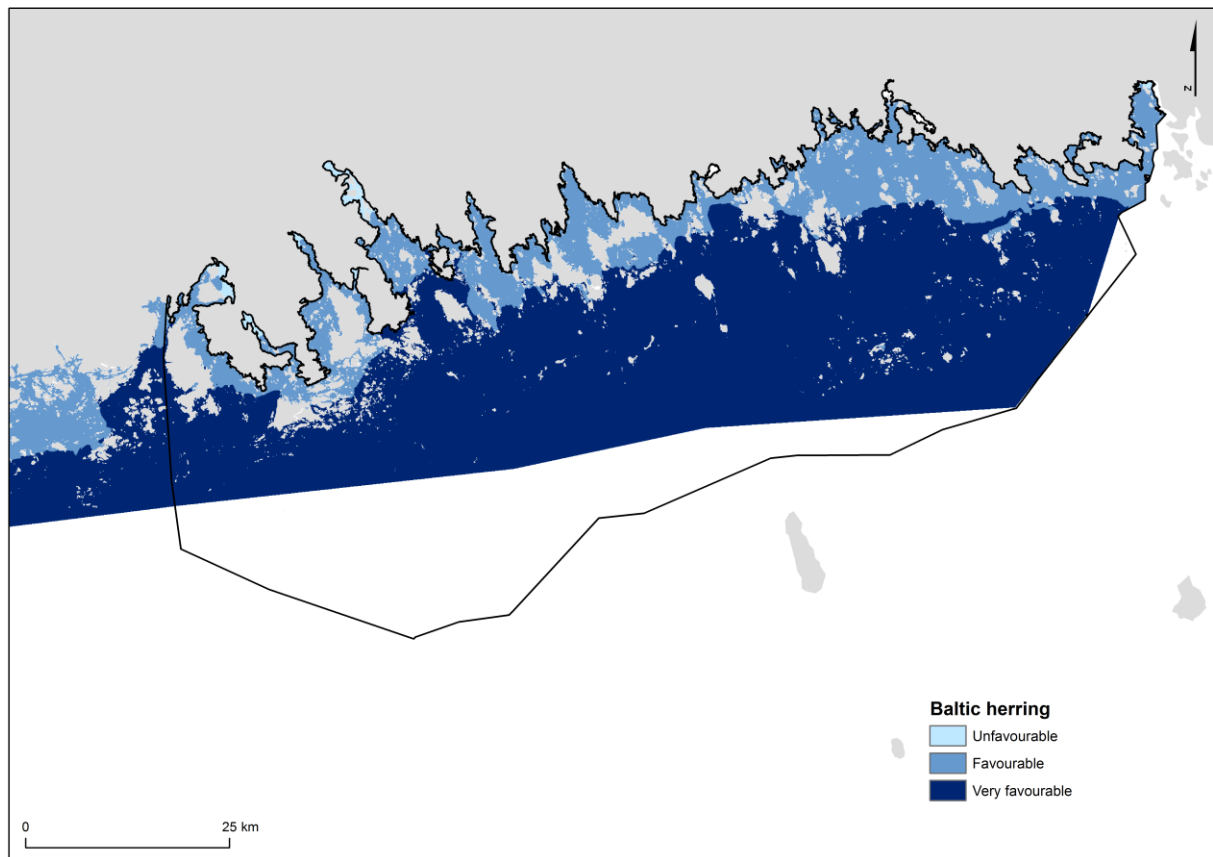


Figure 30. Reproduction area of baltic herring (*Clupea harengus membras*). National Resources Institute Finland & VELMU programme.

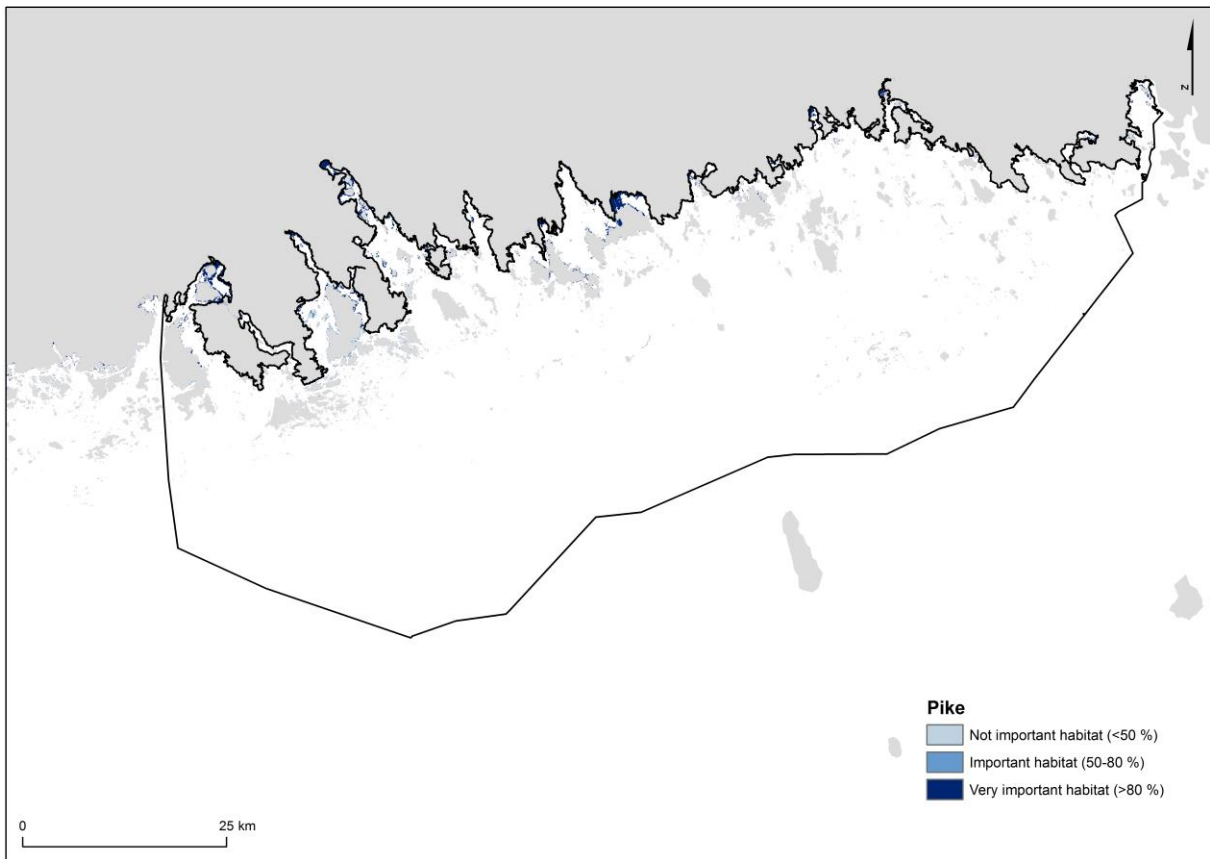


Figure 31. Potential distribution of juvenile pike (*Esox lucius*). National Resources Institute Finland & VELMU programme.

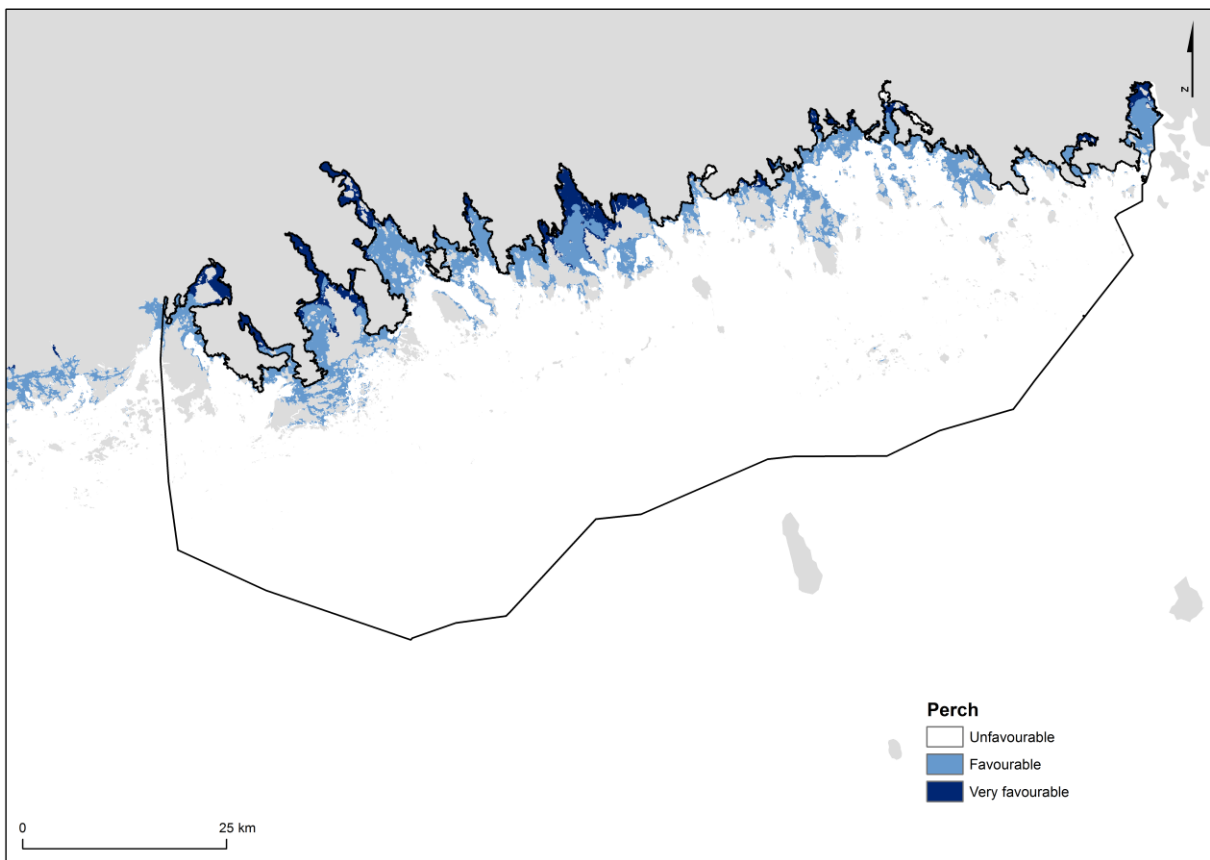


Figure 32. Reproduction area of perch (*Perca fluviatilis*). National Resources Institute Finland & VELMU programme.

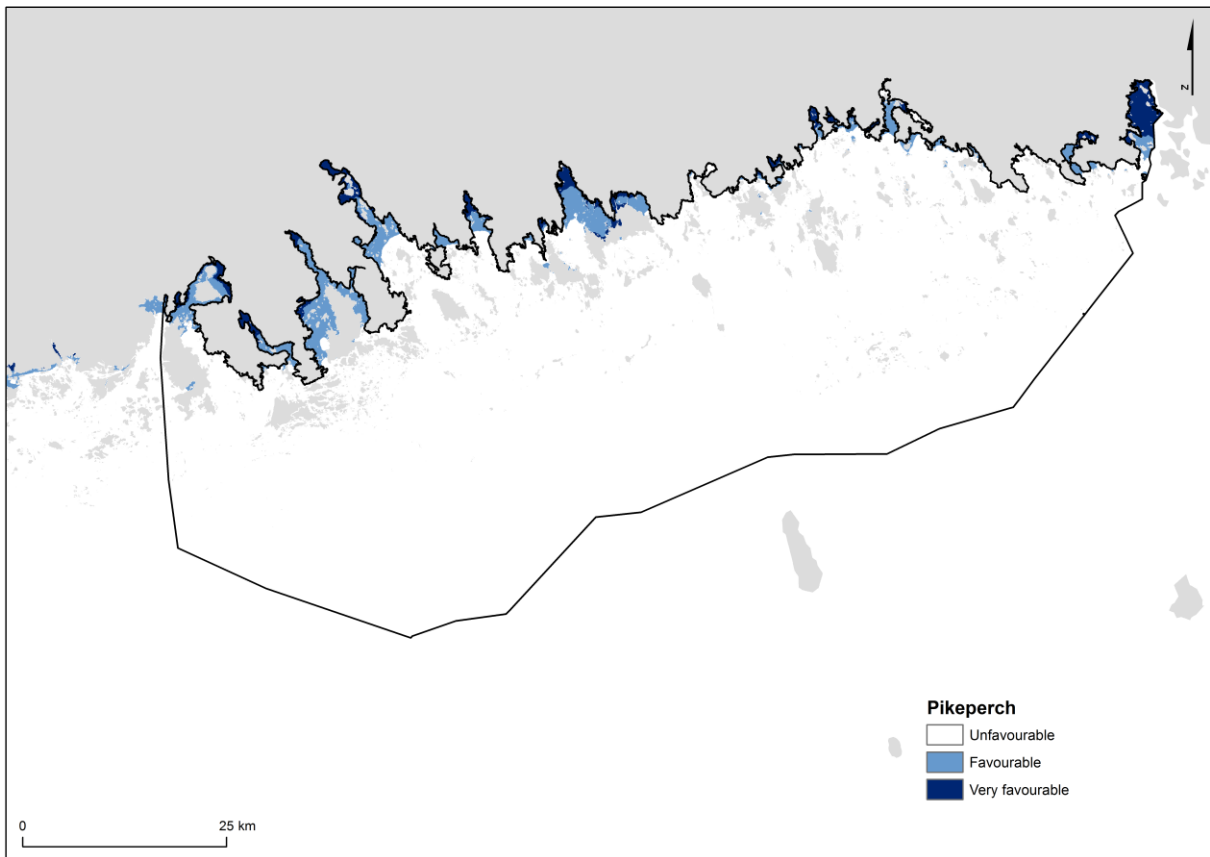


Figure 33. Reproduction area of pikeperch (*Sander lucioperca*). National Resources Institute Finland & VELMU programme.

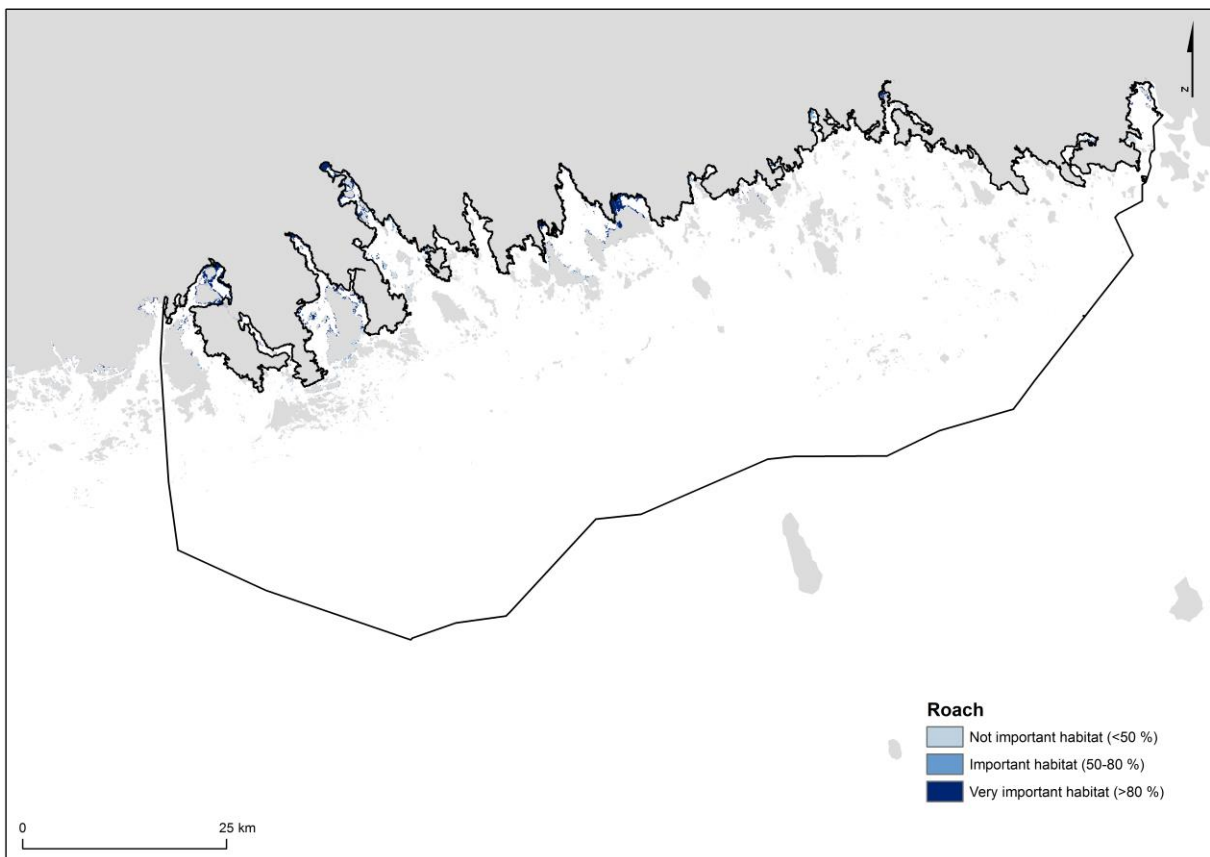


Figure 34. Potential distribution of juvenile roach (*Rutilus rutilus*). National Resources Institute Finland & VELMU programme.

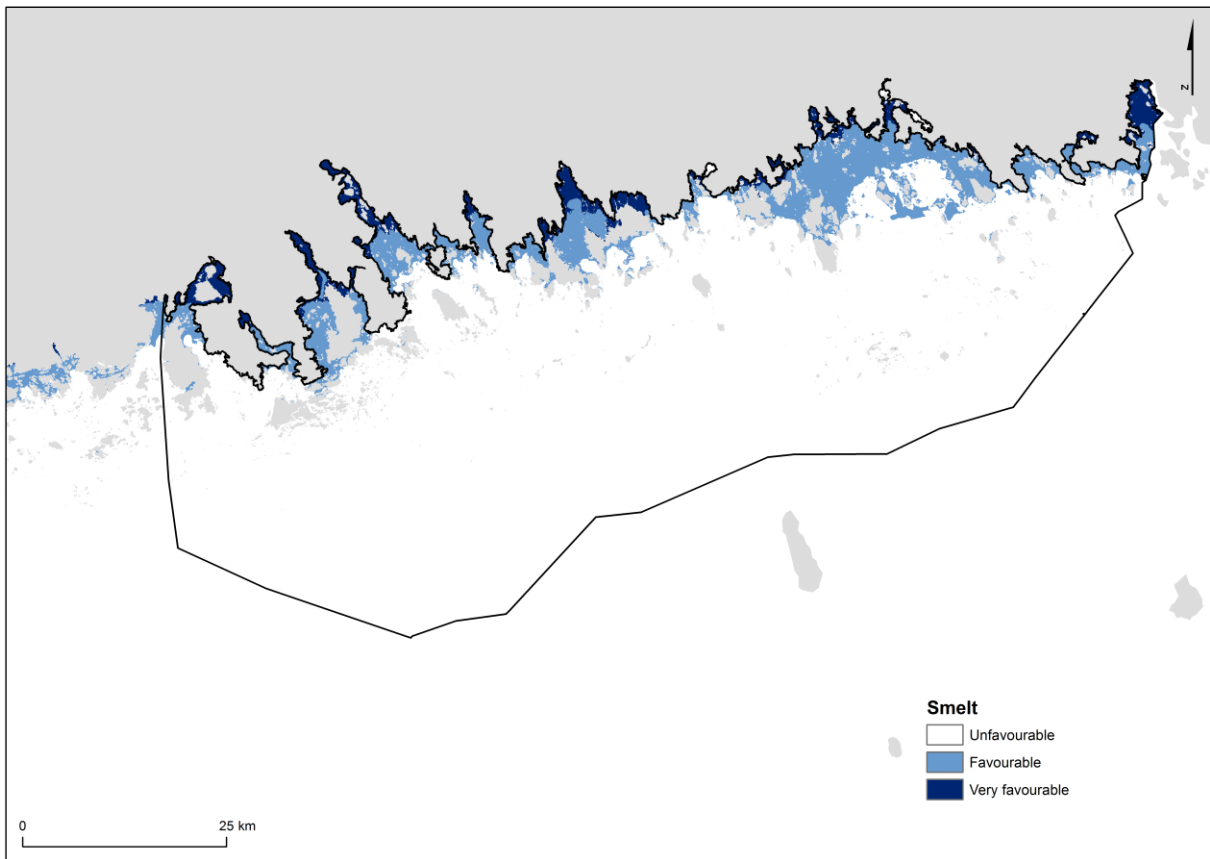


Figure 35. Reproduction area of smelt (*Osmerus eperlanus*). National Resources Institute Finland & VELMU programme.

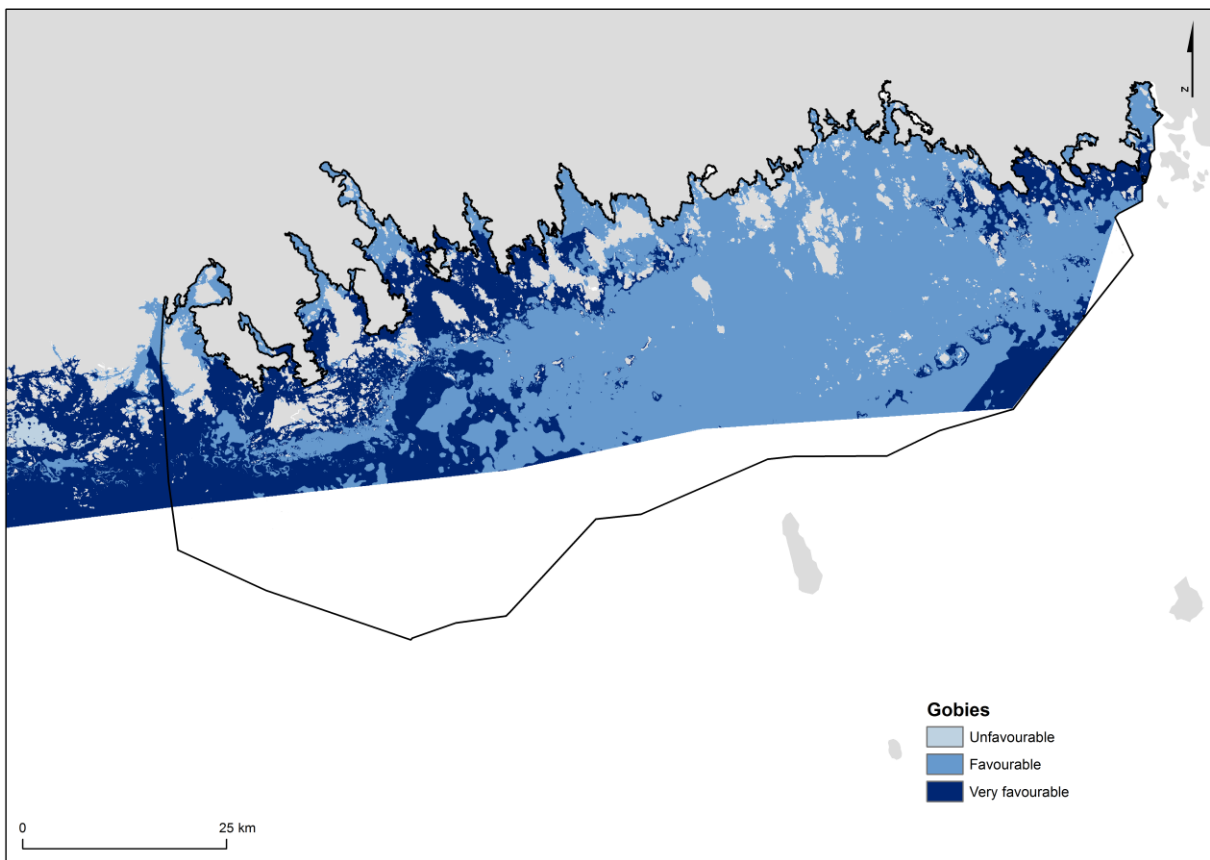


Figure 36. Reproduction area of gobies (*Pomatoschistus* spp.). National Resources Institute Finland & VELMU programme.

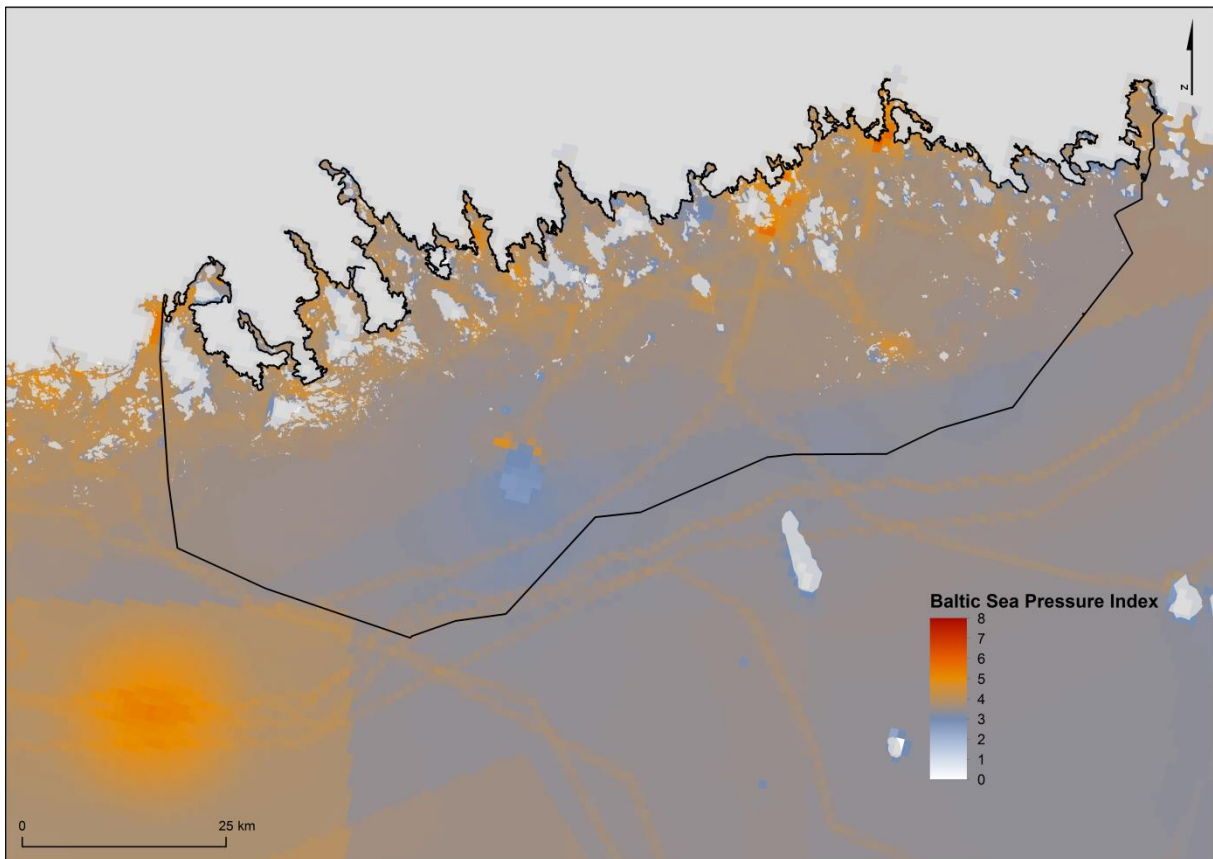


Figure 37. Baltic Sea Pressure Index. HELCOM 2016.

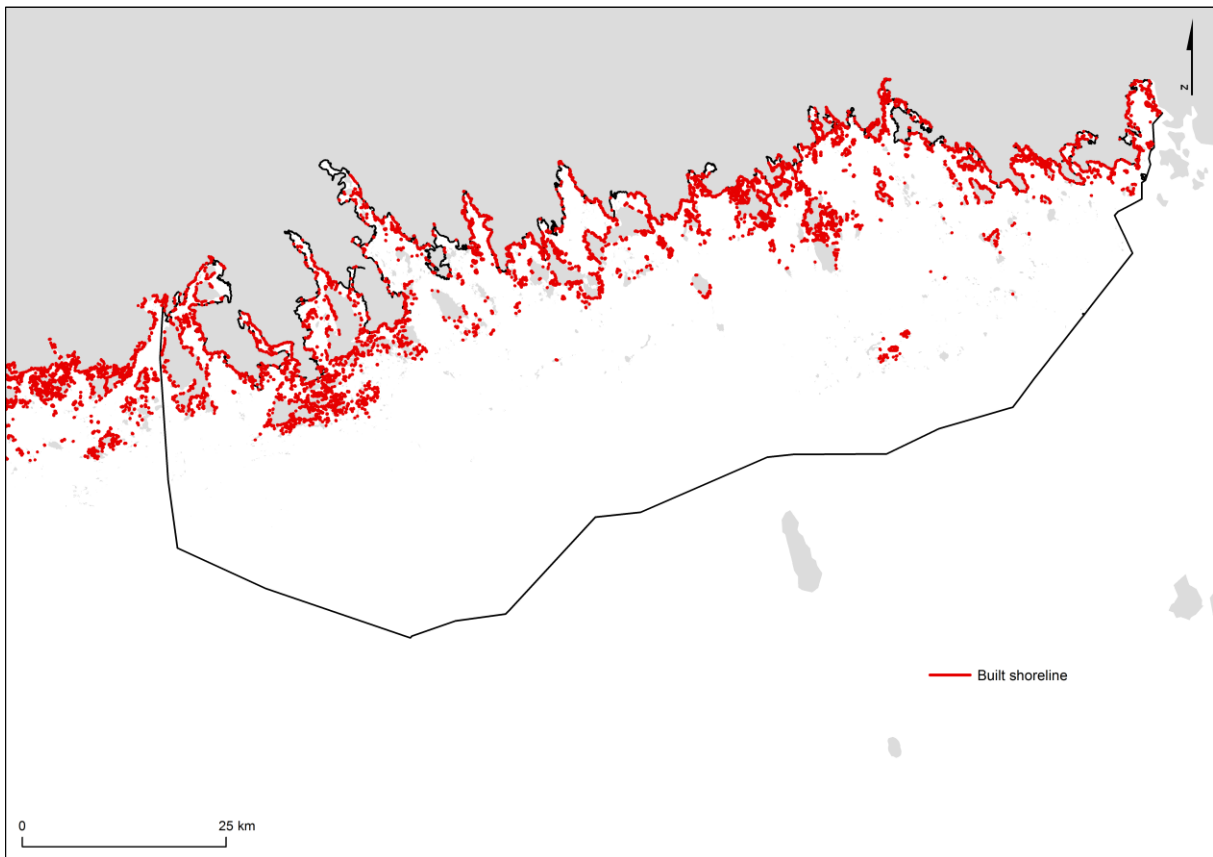


Figure 38. Built shoreline. Data was obtained from Building and Dwelling Register 2016 (BDR) by Population Register Centre. Shoreline having constructions within 100 m buffer zone was classified as built. Finnish Environment Institute 2017.

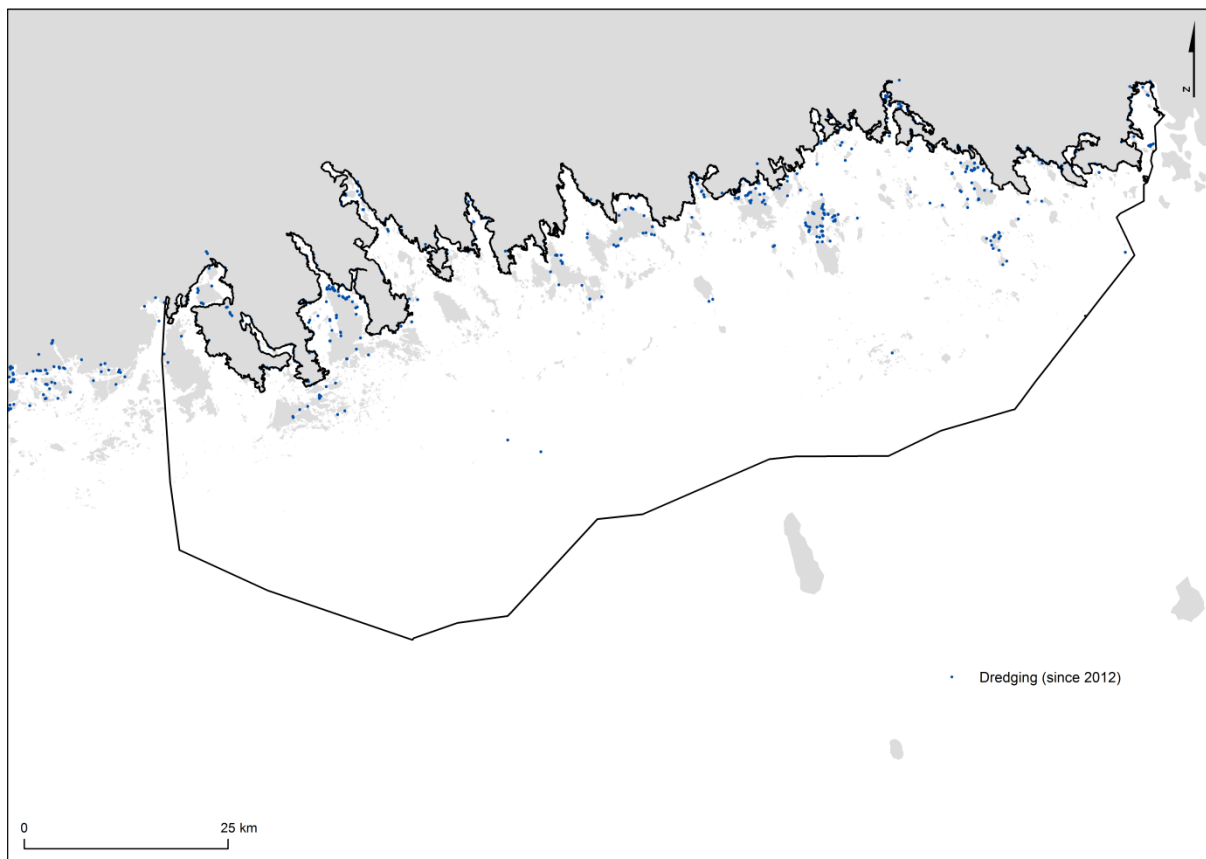


Figure 39. Dredging since 2012.

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