A5.1 Deliverable - Assessing current marine biodiversity related legislation

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Abbreviations

BD – Birds Directive, Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

BSAP – Baltic Sea Action Plan

CC – Climate change

EBA – Ecosystem-based approach

EEZ – Exclusive economic zone

EIA – Environmental impact assessment

ELY centre – Centre for Economic Development, Transport and the Environment

EUBDS – EU Biodiversity Strategy for 2030

GEcS – Good ecological status

GEnS – Good environmental status

HD – Habitats Directive, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

LUBA – Land Use and Building Act

Metsähallitus – Metsähallitus Parks & Wildlife Finland

MoE – Ministry of the Environment Finland

MPA – Marine Protected Area

MS – Member State

MSFD – Marine Strategy Framework Directive, Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)

MSP – Maritime (marine) spatial planning/plan

MSPD – Maritime Spatial Planning Directive, Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning

NCA – Nature Conservation Act (Luonnonsuojelulaki, Naturvårdslagen)

PA – Protected area

RED – Renewable Energy Directive, Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources

Syke – Finnish Environment Institute

VMJL – Act on the Organisation of River Basin Management and the Marine Strategy (1299/2004)

WFD – Water Framework Directive, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

1 Background

1.1 Why is the assessment necessary?

Marine biodiversity is gaining attention as anthropogenic activities are in increasing fashion reaching the marine space (e.g. IPBES 2019). The increased human activity at sea in turn leads to increased pressures coupled with the exacerbation of deterioration of the marine environment. Further, as impacts from human activities intensify, there is an increasing need to evaluate the cumulative effects of human activities. The Finnish legislation has been considered lacking regarding the assessment of cumulative effects (e.g. Laamanen et al. 2021; Kuismanen et al. 2022, Pappila and Puharinen 2022).

Recently, more ambitious goals have been set for the increased level of protection of marine areas globally, within the EU as well as nationally. Various measures have been implemented nationally through different (legislative) instruments to achieve these goals. Finland has reached the 10% marine protected area threshold set by Aichi target 11 (10% marine and coastal areas protected by 2020); the next targets are, however, 30% spatial conservation coverage in marine and coastal areas of the EUBDS (of which a third is to be strict protection), and certain restoration targets, such as ensuring that 30% of species and habitats presently in unfavourable status are restored to favourable status or at least show a positive trend, as well as improved management of PAs (EC 2020a). Currently approximately 11% of marine areas are under protection in Finland (Virtanen, Forsblom, et al. 2022). Furthermore, so-called Other Effective area-based Conservation Measures (OECMs) (IUCN-WCPA Task Force on OECMs 2019; Laffoley et al. 2017) may be counted toward the goal of 30% PA coverage. However, one third, 10%, of the EUBDS conservation target is to be strictly protected. No guidelines define exactly what strict protection implies, but EC (2022a) describes some criteria for the identification of areas under strict protection, such as the ecological criteria, as well as habitats and habitat types that should be strictly protected. The EC guidance document (EC 2022a), in the context of the EUBDS, defines strictly protected areas as follows: "*Strictly protected areas are fully and legally protected areas designated to conserve and/or restore the integrity of biodiversity-rich natural areas with their underlying ecological structure and supporting natural environmental processes. Natural processes are therefore left essentially undisturbed from human pressures and threats to the area's overall ecological structure and functioning, independently of whether those pressures and threats are located inside or outside the strictly protected area*". The 30% conservation target, which includes the 10% strict protection target, as well certain restoration targets, are also shared on a regional level in the Baltic Sea, through the Baltic Sea Action Plan (BSAP; HELCOM 2021a).

In December 2022, the 15th Conference of Parties (CoP) to the United Nations (UN) Convention on Biological Diversity (CBD) took place, and the Kunming-Montreal *Global Biodiversity Framework* (GBF) was adopted (CBD 2022). The GBF includes four goals to be reached by 2050 as well as 23 targets to reach by 2030. The GBF calls for similar targets as the EUBDS – 30% effective conservation and management of lands, inland waters, coastal areas and oceans, but not the strict 10 % target (Target 3). Further, the GBF prioritizes ecologically representative, well connected, and equitably governed systems of PAs and OECMs, as part of Target 3. There is an emphasis on "areas of particular importance for biodiversity and ecosystem functioning and services." Target 1 of the GBF also encompasses spatial planning and stipulates that all areas are to be under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.

EU legal regulations are to be implemented through national legislation, and some central EU legal instruments along with national implementations, as well as other important national legislation, are presented in Table 1. All the instruments listed in Table 1 have an important role in the safeguarding

of the marine biodiversity and the sustainable use of the marine resources and areas in the territorial waters, as well as the exclusive economic zone (EEZ). The Finnish NCA was recently updated, and the new NCA (9/2023) entered force on the 1st of June 2023. Some key changes in the NCA regarding marine conservation included, e.g., the addition of two underwater habitats (eelgrass *Zostera marina*, and sheltered charophyte meadows) to the protected habitats (64 §), non-commercial fish species no longer fall under the purview of the NCA (NCA 68 §), and voluntary ecological compensation (chapter 11); other changes are presented in sections 2.4.4 and 2.5.

In June 2022, the European Commission (EC) proposed an EU Nature Restoration Regulation**,** which targets the restoration objectives of the EUBDS. The restoration targets include habitats found in marine environments, both within as well as outside PAs. The effects can be both indirect and direct, e.g., restoring the health of a lagoon, or restoration activities upstream, which also affect the status downstream. In its proposal, EC (2022c) proposed quantitative targets, including, e.g., that restoration measures should be in place on at least 30% of areas of each habitat group listed in HD Annex I not in good condition by 2030, and that MS are to put in place restoration measures which cumulatively shall cover at least 20% of the EU's land and sea areas by 2030, and all ecosystems in need of restoration by 2050. MS will be expected to submit national restoration plans showing how targets will be achieved to the EC within two years of the regulation entering force (EC 2022c).

The proposal for the Finnish national biodiversity strategy for 2035 (MoE 2022) was sent out for opinions of the public in December 2022. The national proposal included restoration targets similar to the EC's proposal, such as the status improvement of weakened ecosystems by 2030 (15/20%); a decision was made as part of the national HELMI programme, to restore 80 flads and gloes by 2030 (MoE 2022). Other proposed objectives in the national biodiversity strategy regarding the Baltic Sea included the reduction of pressures identified in the national marine strategy action programme, and that extensive catchment area-specific measures are to be implemented to improve water quality by 2030.

1.1.1 Scope and goals of the study

In this task (Action A.5.1), we address specific questions related to marine conservation in Finland. This base-line study is required to address actions C1 and C2 of the BIODIVERSEA LIFE-IP.

Current legislations and practices have been analysed and evaluated for Finland previously in several projects (e.g., Tila2/Merisuojelu, Meriavain, SmartSea), and recommendations related to, e.g., MPA-MSP relationships, sustainable use of marine resources, as well as how MPAs contribute to achieving good environmental status (GES) in the Baltic Sea, have been given. Similar analyses have not yet been conducted for the Åland Islands. The produced information is, overall, not yet sufficient to function as a decision-base for new conservation measures.

Findings and recommendations from, for example, the above-mentioned or other research projects, and adapting those into concrete actions can only be put in practice once it is recognized who the main actors are and their impact on the environment (BIODIVERSEA LIFE-IP Action A.5.2, Clarifying/assessing roles and responsibilities of marine actors), along with related regulations. In terrestrial ecosystems it is nationally quite well understood who the key actors are and their impact on the biodiversity, but this is not the case in marine ecosystems. Therefore, it is also necessary to study the roles and responsibilities of different marine actors, which is done in conjunction with this action (A.5.1) and action A.5.2.

Pappila and Puharinen (2022) have recently evaluated the coordination of marine nature protection, marine management, and water management of EU law**,** as well as related Finnish law. Thus, a smaller focus will be given this topic. Some conclusions from the report included:

- The MSFD has had little effect on the conservation of the marine environment.
- The WA is lacking with regards to, e.g., the assessment of cumulative environmental effects.
- No planning system through which human activities could be directed away from the most sensitive and pressurised areas exists. Further, the maritime spatial plans as well as regional

land-use planning should be developed toward implementing the environmental objectives of the MSFD.

- Area-based conservation measures should be developed, in order to fulfil the MSFDs objectives concerning MPA networks. Both the spatial coverage, and the conservation measures, i.e., the ability of the measures to address significant pressures both inside and outside the protected areas should be developed.

The goal of this assessment is to answer certain questions related to Finnish national legislation regarding the level of protection that the Finnish marine protected area (MPA) network offers with regards to the de facto regulation, derived from the EU as well as national legislation, and agreements. The discussion will aid the work performed in tasks C1 (Developing management and roles in MPAs and in support of Green infrastructure) and C2. The specific questions are addressed in chapter 2.

1.2 Marine conservation in Finland

National legislation such as the Nature Conservation Act (NCA 9/2023), the Nature Conservation Act for the province of Åland (ÅFS 1998:82; NCAÅ), the Water Act for the province of Åland (ÅFS 1996:61; WAÅ), the Act on the Organisation of River Basin Management and the Marine Strategy (VMJL; 1299/2004), the Water Act (WA), Fishing Act (379/2015) and Decree (1360/2015) as well as EU legislation and strategies (e.g. the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, Habitats Directive, HD; Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, CFP) have an important role in safeguarding the marine biodiversity and sustainable use of marine resources in Finland's territorial waters and exclusive economic zone (EEZ). Other relevant legislation, EU instruments and their national implementations, are listed in Table 1.

Table 1. Some key EU legal instruments and their national implementations, as well as other important national legislation are presented. Translations of some national legislation were made by the author.

European Union legal instruments	**National implementation and important legislation**
Habitats directive, HD (92/43/EEC) Birds directive, BD (2009/147/EC)	Nature Conservation Act, NCA (9/2023) Nature Conservation Decree, NCD (1066/2023) Nature Conservation Act for the province of Åland, NCAÅ (ÅFS 1998:82) Nature Conservation Decree for the province of Åland, NCDÅ (2023:88)
Maritime Spatial Planning Directive, MSPD (2014/89/EU)	Land Use and Building Act, LUBA (132/1999) Water Act for the province of Åland, WAÅ (ÅFS 1996:61)
Marine Strategy Framework Directive, MSFD (2008/56/EC)	Act on the Organisation of River Basin Management and the Marine Strategy, VMJL (1299/2004) The Governments Decree on the Organisation of the Marine Strategy (980/2011) Water Act for the province of Åland, WAÅ (ÅFS 1996:61)
Water Framework Directive, WFD (2000/60/EC)	Act on the Organisation of River Basin Management and the Marine Strategy, VMJL (1299/2004) Government Decree on Water Resources Management (1040/2006) Government Decree on Water Resources Management Regions (1303/2004) Water Act for the province of Åland, WAÅ (ÅFS 1996:61) Water Decree for the province of Åland (2010:93)
Common Fisheries Policy, CFP (1380/2013)	Act on the Sanctioning System and Supervision of the Common Fisheries Policy (1188/2014) Act on the National Implementation of the Common Fisheries Policy of the European Union (1048/2016) Fishing Act, FA (379/2015) Fishing Decree, FD (1360/2015)

	Act on the Implementation of the Common Fisheries Policy of the European Union on the Åland Islands (2015:49)
	Fishing Act for the province of Åland (1956:39)
	Provincial Decree on the enforcement and application of the provincial Fishing Act on Åland (1957:35)

Other important national legislation
Water Act (WA)
Environmental Protection Act, EPA (527/2014)
The Governments Decree on Environmental Protection (713/2014)
Environmental Protection Act for the province of Åland, EPAÅ (2008:124)
Hunting Act (615/1993)
Hunting Decree (666/1993)
Hunting Act for the province of Åland (1985:31)
Act on Metsähallitus (234/2016)
Act on Environmental Impact Assessments (252/2017)
The Governments Decree on Environmental Impact Assessments (277/2017)
Act on Environmental Impact Assessments and Environmental Assessments for the province of Åland (2018:31)
Decree on Environmental Impact Assessments and Environmental Assessments for the province of Åland (2018:33)

Many types of conservation schemes exist in Finland. Natura 2000 sites (hereafter N2K) are protected areas which serve as the national implementation of the EU´s Habitats Directive. The N2K network of Finland could be considered the backbone of the marine protected area (MPA) network, due to its coverage, and overlaps with many other types of protected areas (PAs) and schemes. Many large N2K sites consist of a mosaic of state and private nature reserves. At national level, the Ministry of the Environment (MoE) is the authority responsible for the implementation, monitoring, evaluation and reporting of the N2K network. Regionally, the Centres for Economic Development, Transport and the Environment (ELY centres) and Metsähallitus Parks & Wildlife Finland (hereafter Metsähallitus) are responsible for the coordination of conservation and management measures including monitoring of the N2K sites, regardless of whether they are state- or privately owned. The private property owners include, e.g., citizens, participant's associations, cities, municipalities, or companies. Metsähallitus also governs and manages the state-owned areas and is involved also in the planning and operational management of private nature reserves, in cooperation with municipalities and private property owners. Over 95% of the national protected areas on privately owned marine (including land and water) areas are included within the N2K network. The independent government of the Åland Islands is responsible for the N2K sites within the province, in accordance with their own nature conservation legislation.

Marine protected areas (MPAs) that concern private properties are established as permanent or fixed term nature conservation areas, mainly through the NCA. A private property owner can sell a site that is part of a national nature conservation programme or the N2K network to the state, or designate it as a privately owned nature conservation area, in which case the ownership remains with the property owner. If an area is established as a fixed-term PA (maximum 20 years at a time), the property owner and ELY centre form an agreement regarding conservation measures, but the fixed-area is not considered a nature conservation area per se. Fixed-term PAs do not exist in Finnish marine areas. A nature conservation area can be designated either at the initiative of the property owner or the ELY centre, but the decision is made by the latter. A property owner can apply for the establishment of a PA or give his or her consent for the ELY centre to make a proposal.

The ELY centre can protect an area included in a nature conservation programme approved by the Government or the N2K network even without the property owner's application or consent. The conservation regulations of the area cannot, however, restrict area use more than the conservation programme requires (concerns all area-use decisions). This was not always the case, however, and especially older designations may contain restrictions not matching the protected features' needs and are currently being reviewed in BIODVIERSEA LIFE-IP Action A4 (Analysing the sufficiency of the marine protected area network). Movement within the area can only be restricted if the vegetation or animals require it.

If the property owner sells an area to the state, the state purchases it for the current price. The property owner and ELY centre agree on a price. The property owner can also, if desired, be compensated for the designation of a private PA or fixed-term PA, if economic losses are incurred. The compensation is agreed upon between the property owner and ELY centre prior to the designation of the area. If the PA was designated without the property owner's consent, compensation will be paid when significant harm is caused by the conservation. The ELY centres are responsible of the coordination, management, and surveillance of the privately owned nature conservation areas, in cooperation with landowners and Metsähallitus.

The national protected areas and the N2K network are managed using an integrated GIS-based information system, ULJAS, that includes data on all national protected areas, including private nature conservation areas. The system is maintained by Metsähallitus and is used by the whole nature conservation administration. Detailed conservation objectives and necessary measures (e.g., restrictions) are set for MPAs in their enactment documents - reflecting the criteria by which the area is established and considering prohibitions and/or restrictions arising from general conservation legislation - as well as, in site management plans. Planning is databased and unified; tools include e.g., N2K site condition assessments (NATA), strategic and participatory management plans (HKS) and/or operational management plans (TPS).

The N2K areas are also evaluated regionally in N2K general plans, in which the state of management and comprehensiveness are presented, and area-specific planning needs and urgency is outlined (ELY centre 2017). The NATA assessment is conducted for all N2K sites in Finland on a regular basis and the need for further site-specific management planning (HKS/TPS) is defined during the assessment process. In the latest general plans from 2016-2017 (available from the regional ELY centres), the state of planning has overall (both terrestrial and marine N2K areas) been assessed as good by the MoE; 58% of Natura spatial coverage had up to date and sufficiently comprehensive, 7% were considered to not have planning needs, 25% required new plans or significant supplementation of old plans, and 10% were considered to require minor revisions (MoE 2023b). Many marine N2K areas, however, were assessed as requiring a (new) plan (see regional N2K general plans: EPOELY 2016; KASELY 2016; LAPELY 2016; POPELY 2016; UUDELY 2016; VARELY 2016)[1]. Targets and monitoring indicators are set for key management measures and are followed up in the NATA re-assessments. Both the implementation and effectiveness of management plans are assessed and updated regularly. Where appropriate, planning is supported by cooperation groups, involving key stakeholders, or expert groups tackling specific themes. The NATA assessment are done in collaboration between Metsähallitus and ELY centres. All NATA assessments are cross-checked by these organisations securing coherent quality of the assessments.

On the Åland Islands site assessments are currently based on individual site inventories and consistent N2K assessments are not made. However, the Åland Islands will initiate NATA assessment of N2K sites in coming years as they will gain access to the ULJAS GIS system (SASS, SAKTI, LajiGIS) used by environmental authorities in Finland.

[1] ELY centres of South Ostrobothnia (EPOELY), Southeast Finland (KASELY), Lapland (LAPELY), North Ostrobothnia (POPELY), Uusimaa (UUDELY), Southwest Finland (VARELY).

The planning system described above focuses on requirements of the EU Nature Directives (HD and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Birds Directive, BD)) and the N2K network, but practical management planning is done in an integrated manner, considering overlapping national and international designations and objectives (i.e., national parks, nature and wilderness reserves, Ramsar sites, Helcom MPAs) and, to some extent, the privately protected areas not included within the N2K network. In some larger N2K sites, general plans for habitat management are prepared, guiding also specifically the management of the private nature reserve(s) within the site. Operations on privately owned properties are always planned in cooperation with and implemented with the consent of landowners.

Finland has a major asset facilitating ecosystem-based marine management and conservation planning. The National Inventory Programme for the Underwater Marine Diversity (Velmu) has since 2004 mapped benthic species and habitats, including spawning habitats of some fish species, but otherwise excluding fish, birds and marine mammals, in the Finnish sea area. The Velmu programme plays a major role in the implementation of the HD and assessing the effectiveness of the Finnish MPA network. The first comprehensive evaluation of the ecological effectiveness of Finnish MPAs for underwater nature was completed in 2018 (Virtanen et al. 2018), using an openly available conservation planning and spatial prioritization software Zonation (e.g. Lehtomäki and Moilanen 2013; Moilanen 2007; Moilanen et al. 2022). The analyses included the evaluation of the present MPA network, identification of the most valuable underwater areas for conservation, assessment of the quality and protection level of habitat types, and suggestion for MPA expansions. According to the study, only 27% of the ecologically most valuable species, habitat types and HD Annex I habitats, as well as fish reproduction areas, were covered by the current MPA network. This has been explained by the fragmented nature of the Finnish underwater marine biodiversity and by the fact that most MPAs have been established before 2000 with very little or without prior knowledge of the underwater nature. Analyses could still be further developed, for instance with more detailed information of the anthropogenic pressures and by including connectivity measures related to the dispersal traits of species. The analyses by Virtanen et al. (2018) included only underwater benthic diversity, while MPAs can also be established for mobile species, such as protecting the habitats or areas used by birds or mammals, in which case protected area design should also include biodiversity above the sea level (e.g. islets, islands). In general, conservation of marine areas should move on from suboptimal protection, such as protection of species or habitat types, to ecosystem entities, including the land-sea interaction and ecosystem functionality (Virtanen and Moilanen 2023; Jantunen et al. 2020). The conservation planning analysis was rerun in 2022 and some improvements to the MPA network were observed, although it could still be improved, by, e.g., acquiring information or accounting for previously mentioned factors (Virtanen, Forsblom, et al. 2022).

The results from the first Zonation analysis (Virtanen et al. 2018) were further utilized in 2019 to identify 87 ecologically significant marine underwater areas (EMMAs) in Finland (Lappalainen, Kurvinen, and Kuismanen 2020; Kuismanen et al. 2023). The EMMAs were described by using similar methods and criteria that have been globally used by the Convention on Biological Diversity (CBD) to describe Ecologically or Biologically Significant Marine Areas (EBSAs). The EMMA process combined the vast amount of VELMU mapping data gathered over a decade, and local knowledge of marine experts, and collated in a form suitable for the purposes of maritime spatial planning (MSP). The EMMA data was compiled into a simple spatial data set and area description forms, and it has already been used in the development of Finnish maritime spatial plans (MSP). The EMMAs were delineated based on species and environmental data, without consideration of administrative borders, such as those of MPAs. Many sites are largely overlapping with the current MPA network but several EMMAs are also found outside the current MPA network. In the future, as mapping data increases or monitoring of past mapping sites is implemented, it will be possible to identify more EMMA candidates or modify the EMMAs to be more dynamic due to e.g., climate change, as many of the recognition criteria applied were related to species and habitats that are prone to changes because of changing climate, especially to warming. The EMMA areas can be utilised in the sustainable planning of the sea through different processes, such as permitting, conservation planning, or

zoning. It should be noted that the EMMA areas have no legal status, and mainly compile marine nature information.

A modelling exercise similar to the previously mentioned Zonation analysis, with the goal of identifying possible expansions of the MPA network on the Åland Islands was conducted in 2022 by Salovius-Laurén and Weckström (2022), using the modelling software Marxan. The modelling procedure was, however, restricted to the administrative area of Åland. Further work regarding the expansion of the MPA network on Åland is undertaken during the BIODIVERSEA LIFE-IP project, in other actions such as A4 (Analysing the sufficiency of the marine protected area network) and C2 (Development of the network of marine protected areas (MPAs) in Finland). The legislation regulating the protection of the marine biodiversity on the Åland Islands is mainly stipulated in the NCAÅ, supplemented by the Nature Conservation Decree for the Åland Islands (ÅFS 2023:88, NCDÅ), which lists the protected habitats and species worth protection, with some more specific stipulations in other legislation as well (e.g. WAÅ 5:25 §). The NCDÅ was recently revised from the previous decree (1998:113), which then included the Baltic ringed seal (*Pusa hispida botnica*) as the only marine species. The NCDÅ (ÅFS 2023:88) now includes many more marine species and habitats, from e.g., the Annexes of the HD, such as the harbour porpoise (*Phocoena phocoena*), European eel (*Anguilla anguilla*), river lamprey *(Lampetra fluviatilis*), the aquatic leaf beetle *Macroplea pubipennis*, some bird species, three *Chara* species, flads and gloe lakes in natural state, eelgrass communities, and littoral and sublittoral reefs with algae and benthic communities. The NCAÅ is the basis for the establishment of nature conservation areas on the Åland Islands (Nature reserves, translated from *naturreservat* (Swedish); see section 2.1.3.5). Protected features are specified in the establishment and management documents of the (PAs and include area-specific restrictions and prohibitions within the area.

Presently, the Velmu database consists of more than 170 000 underwater observations. More data has accumulated especially from areas under anthropogenic influence, and much more detailed information on human activities has been collected using, for instance, aerial photographs. The newly accumulated data, as well as the EU Biodiversity Strategy (EUBDS) that proposes 30% of marine areas in the EU are to be protected, of which 10% should be strictly protected by 2030, calls for an updated evaluation of the Finnish MPA network. How this process will proceed, will be clarified when countries give their pledges toward the objectives of the EUBDS.

1.3 Central directives regarding the marine environment in Finland

1.3.1 The Marine Strategy Framework Directive

The end goal of the Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, MSFD) is to achieve *good environmental status* (GEnS) by 2020 for all EU marine waters. The directive emphasises protecting the marine environment from human activities and pressures, such as pollution, and habitat degradation. Climate change is also mentioned in the directive, but only in the preamble of the directive, and not in the operative articles, thus climate change is not directly addressed in the directive. The improved consideration of climate change has been identified as a key reason to update the directive. Achieving GES has implications of improved water quality, increased biodiversity, and it supports the sustainable use of marine resources, thus it is a key directive regarding the marine areas in the EU. Further, the MSFD obligates MS to promote the objectives of the HD, BD, CFP, and Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (water framework directive, WFD) (Kostamo, Viitasalo, et al. 2020; Commission Decision (EU) 2017/848 of 17 May 2017).

The MSFD divides the marine environment into four regions: the Baltic Sea, the Northeast Atlantic Ocean, the Mediterranean Sea, and the Black Sea. Each MS within each region is required to identify the marine waters under their jurisdiction and divide them into a series of smaller assessment units (AUs), which can range in size from subregions and subdivisions to smaller-scale AUs. The size of

these assessment units can vary depending on the characteristics of the marine environment and the pressures it faces. The AUs in Finland are the Bothnian Bay, the Kvarken area, the Bothnian Sea, the Åland Sea, the Archipelago Sea, the northern Baltic Sea, and the Gulf of Finland. The division follows the basin division used by HELCOM and is further divided into coastal and open sea areas (Laamanen et al. 2021).

The Baltic Marine Environment Protection Commission

The Baltic Marine Environment Protection Commission, alternatively known as the Helsinki Commission (HELCOM) is a regional sea convention (RSC) and intergovernmental organization in the Baltic Sea area. Other RSCs in Europe are the Barcelona Convention (Mediterranean Sea), Bucharest Convention (Black Sea), and the OSPAR Convention (North-East Atlantic), There are 10 Contracting Parties (CPs), including Denmark, Estonia, the European Union, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden, each of which designates its own Head of Delegation as well as members of HELCOM's Working Groups and of the Expert Groups and Networks.

The work and meetings of HELCOM is coordinated by the HELCOM Secretariat, who also ensures that the CPs meet their obligations under HELCOM. The HELCOM Secretariat is situated in Helsinki, Finland.

HELCOM has designated HELCOM MPAs (previously Baltic Sea protected areas), a result of Article 15 of the 1992 Helsinki Convention, of which Finland is a signatory, which requires the Contracting Parties to take all appropriate measures to conserve natural habitats and biological diversity in the Baltic Sea. Th purpose is to designate sites with underwater nature values, and to manage human activities within those areas. There are 34 HELCOM MPAs in Finland (January 2024).

HELCOM is involved in the protection of the Baltic Sea in several ways, including, e.g.,

- Working groups (WGs), such as those on/for the Ecosystem Approach, Biodiversity, Protection and Restoration, Ecosystem-based Sustainable Fisheries, or the Joint HELCOM-VASAB Maritime Spatial Planning WG.
- Projects pertaining to the Baltic Sea.
- Recommendations, providing guidance regarding the protection of the Baltic Sea environment, that are implemented in the national legislation of the CPs.
- Regular meetings (also ministerial meetings), where the HELCOM bodies discuss issues at hand.
- Events, which HELCOM participates is or, e.g., organises for stakeholders.
- Publications, such as assessments (e.g., holistic assessments, HOLAS), guidelines, and action plans (e.g., the Baltic Sea Action Plan 2021).

The Baltic Sea Action Plan (BSAP; HELCOM, 2021a) is a key document for achieving good environmental status in the Baltic Sea. The BSAP was adopted by the HELCOM CPs in 2007 and updated in 2021. The BSAP has resulted in, e.g., improvements of the Baltic Sea environment, state of biodiversity, as well as maritime incidents and spills.

The status of the AUs is evaluated based on 11 qualitative descriptors, which in turn are described by certain indicators and thresholds (see e.g. Korpinen et al. 2018; Laamanen et al. 2021; Korpinen 2023):

1. Biodiversity – Biodiversity is maintained.
2. Non-indigenous species (NIS) – NIS do not adversely alter the ecosystem.

3. Commercial fish stocks – The population of commercial fish species is healthy.
4. Food web – Elements of food webs ensure long-term abundance and reproduction.
5. Eutrophication – Eutrophication is minimised.
6. Sea-floor integrity – The sea-floor integrity ensures functioning of the ecosystem.
7. Hydrographical conditions – Permanent alteration of hydrographical conditions does not adversely affect the system.
8. Hazardous substances – Concentrations of contaminants give no effects.
9. Hazardous substances in fish – Contaminants in seafood are below safe levels.
10. Litter – Marine litter does not cause harm.
11. Energy supply, including underwater noise – Introduction of energy (including underwater noise) does not adversely affect the ecosystem.

The Programme of measures of the MSFD in Finland (Laamanen et al. 2021) also lists some more general environmental objectives, through which, if achieved, we are expected to reach the above listed qualitative descriptors. These environmental objectives include, e.g., targets related to the PA networks and restoration, which are directly linked to descriptor 1 and indirectly to descriptors 3 and 4. The objectives include the now outdated target of reaching 10% PA coverage and for the PAs to form an ecologically coherent network, that the MPAs are transformed into efficient marine nature conservation areas, and that disturbing or harming movement is minimised (LUONTO1-LUONTO3 objectives; Laamanen et al. 2021).

The MSFD is implemented with a marine strategy required by the directive. The marine strategy considers the marine area from the coastline to the outer limit of the EEZ. The marine strategy is planned, implemented, and updated in three phases, in altogether six-year cycles (Figure 1; Korpinen et al. 2018), and is judicially regulated by the VMJL and the Government decree on the organisation of the development and implementation of the marine strategy (980/2011). The management cycles consist of the following steps (Figure 1), of which the first is currently in the process:

1. Assessment of the current state of the sea, definition of good status, and setting environmental targets and indicators,
2. Developing and implementing a monitoring programme,
3. Preparation and implementation of the program of measures.

Article 13(4) of the MSFD states that: "*Programmes of measures established pursuant to this Article shall include spatial protection measures, contributing to coherent and representative networks of marine protected areas, adequately covering the diversity of the constituent ecosystems, such as special areas of conservation pursuant to the Habitats Directive, special protection areas pursuant to the Birds Directive, and marine protected areas as agreed by the Community or Member States concerned in the framework of international or regional agreements to which they are parties.*" According to the Article, MS are to assess the ecological coverage and coherence of the MPA network, and supplement the network, if needed, on the basis of the assessment. The MPA networks should, according to the MSFD, be "*[…] holistic tools to address all major pressures, be effective and cover a fair representation of all marine habitats and ecosystem features*" (EC 2020b). In its Common Implementation Strategy (EC 2014), it is stressed, that the designation of the MPAs is a separate process from the marine N2K network (HD, BD), and should be on the basis of national or regional lists of species and habitats, as well. Due to, e.g., habitat definitions of the N2K habitats, many (threatened) habitats are not covered by any conservation scheme, and would thus require improvements to the MPA network as per the MSFD (Laamanen et al. 2021; Virtanen, Forsblom, et al. 2022). Denmark has, for example, began the process of designating "distinct" MPAs in order to amend the provision of the MSFD (reviewed by Pappila and Puharinen 2022). The focus in the designation of the new Danish MPAs has been habitats and species that have not previously been sufficiently protected by MPAs. The areas were planned as strictly protected or parts of the areas strictly protected.

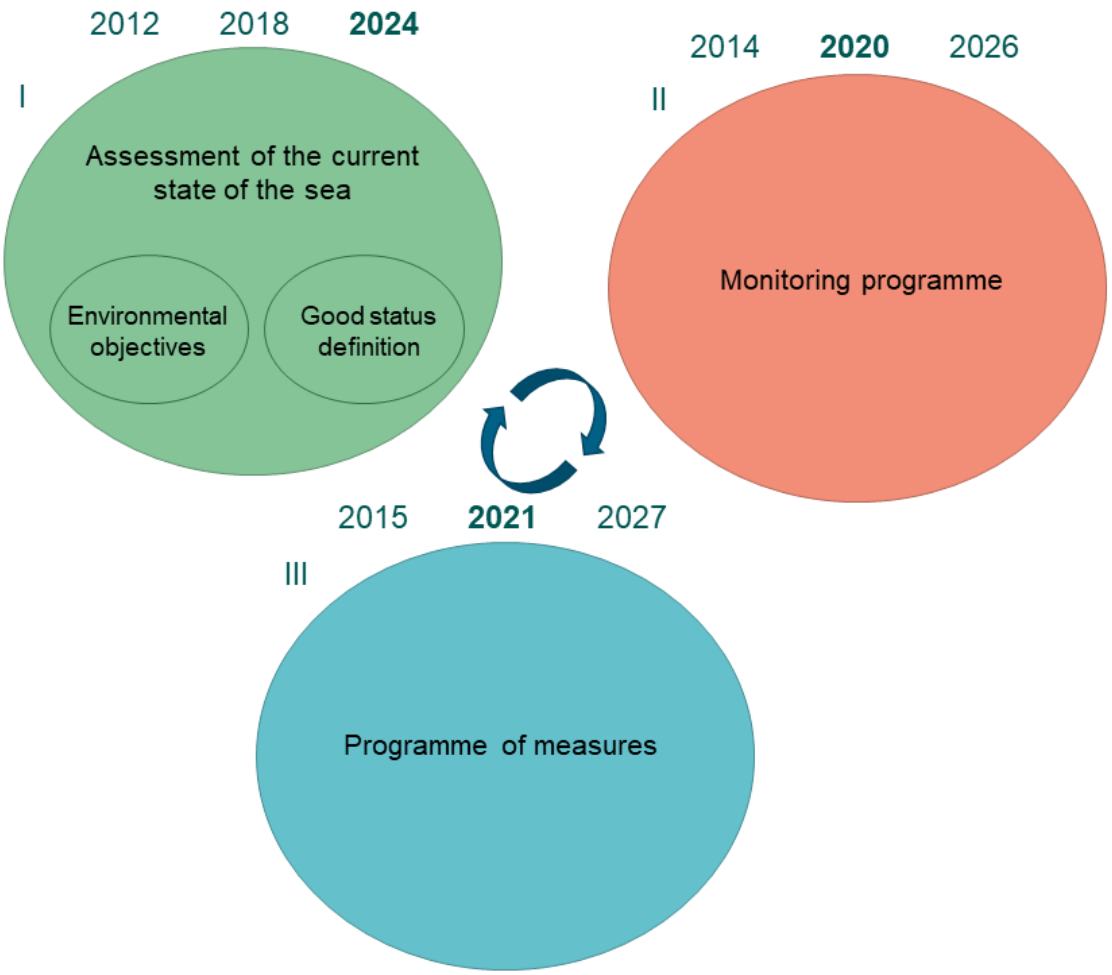

Figure 1. Flowchart describing the marine strategy process. The process has three steps (I-III), with the current or latest iteration indicated by the bolded year (the process of assessing the state of the sea is currently ongoing). Figure adapted from Korpinen et al. (2018).

1.3.2 Water Framework Directive

The goal of the WFD is to reach *good ecological status* (GEcS) and halt deterioration in all EU water bodies by 2027 (original target was 2015, but possible to postpone until 2027). Extensions to deviate from the goal are possible (Article 4(4) and other exemptions of Art. 4), but only for two management cycles, unless the natural conditions of the water body require an even longer time (e.g. the Baltic Sea and eutrophication) (Starke and Van Rijswick 2021). The objectives of the WFD include the protection of all forms of water, restoring the ecosystems in and around these bodies of water, reducing the pollution in the water bodies, and guaranteeing the sustainable use of water by individuals as well as businesses.

The focus is on protecting the quality and quantity of surface water, as well as the biodiversity and functioning of aquatic ecosystems. The benefits of reaching GEcS are similar to the GEnS: improved water quality, increased biodiversity, and improved human health. The spatial scale as well as the spatial coverage of the WFD AUs, however, differs compared to the MSFD AUs (differences of MSFD, WFD, and HD are discussed in section 2.3).

The WFD applies to all surface waters, and includes rivers, lakes, transitional waters, and coastal waters up to one nautical mile from the shore. MS divide their surface waters into a series of water bodies of various sizes (e.g., entire river basins, lake catchments, and smaller water bodies). Similar to the MSFD AUs, the sizes can vary depending on the characteristics of the surface water body and its pressures.

The WFD is implemented through river basin management plans. There are eight water management areas in Finland (one on the Åland Islands, seven in remaining Finland). The sea has been divided into coastal water bodies (AUs), which cover the innermost territorial waters and one nautical mile outward from them. The ecological status of the water bodies is assessed in six-year cycles. The WFD covers both marine and fresh water, and the WFD AUs partially overlap with the MSFD AUs (Kostamo, Viitasalo, et al. 2020). The AUs are evaluated based on biological elements and supporting elements and are listed in Annex V of WFD.

1.3.3 Habitats directive

Through the HD, MS aim to achieve and maintain *favourable conservation status* (FCS) for all EU species and habitats of community interest listed in the Annexes (I, II, IV, V)[2]. The emphasis is on protecting species and habitats appearing in the wild, that are rare or threatened, as well as their associated ecosystems. Benefits of achieving FCS include the preservation of biodiversity and services provided by the ecosystems (ecosystem services), as well as the cultural and aesthetic value of natural habitats. In practice, the HD (and BD) are implemented through the N2K sites and network as Sites of Community Interest/Special Area of Conservation (SCI/SAC, species and habitats) or Special Protection Areas (SPA, birds), along with other provision of the HD, such as Articles 12(1) and 12(2) on the protection of species listed in HD Annex IV.

SCI sites precede SAC sites. SCI areas have been accepted nationally by the Finnish Government and have been proposed to the EU Commission to be included in the N2K network. The SCI areas are thus only temporary and function as precursors to the following SAC areas. SAC areas are thus former SCI areas, that have been stipulated by a decree by the Finnish MoE, after the EU Commission has accepted the SCI area proposals. The marine N2K areas in Finland, in turn, have mainly been implemented through the NCA, WA, EPA, and LUBA (see N2K standard data forms). See section 2.1.2.1 for more information on N2K sites.

The conservation status is assessed in six-year cycles and is categorised into one of four classes based on the status. The evaluation criteria of habitats include distribution, range, function, as well as the assumed or forecasted development of the conservation status. The evaluation criteria for species include distribution, state of the population, state of the habitat, as well as the assumed or forecasted development of the state. The pressures and threats toward the species and habitats are also reported, and the conservation status is based on the lowest ranked component in the assessment (Kostamo, Viitasalo, et al. 2020).

Because the HD applies to the conservation of natural habitats and wild flora and fauna in the EU, the HD does not explicitly define AUs similarly to the MSFD and WFD. It does, however, require the MS to identify and designate areas that are important for the conservation of specific habitats and species, i.e., N2K sites (Article 3). Hence, these areas may range in size from individual sites to larger-scale networks of sites that cover entire ecosystems or landscapes, i.e., the N2K network.

1.3.4 Regulation of fishing

The main tools of regulating fishing in Finland are the Fishing Act (379/2015, FA) and the Fishing Decree (1360/2015), while the Common Fisheries Policy (CFP) regulates fishing on the EU scale, and strongly affects fishing in Finland. Additionally, the FA was completely reformed some years ago, and is constantly being reviewed for possible loopholes, and is also changed according to perceived needs, e.g., in the monitoring group for the implementation of the FA under the Ministry of

[2] Annex I: Natural habitat types of community interest whose conservation requires the designation of species areas of protection;
Annex II: Animals and plant species of community interest whose conservation requires the designation of special areas of conservation;
Annex IV: Animals and plant species of community interest in need of strict protection
Annex V: Animals and plant species of community interest whose taking in the wild and exploitation may be subject to management measures

Agriculture and Forestry (MMM), which broadly includes all fisheries stakeholders. The EU MS are obligated to implement the CFP and monitor compliance. The objectives of the CFP include the conservation of marine biodiversity and sustainable fishing. The Fishing Act strives to provide the tools for organising sustainable fisheries and restoration of weakened and threatened fish stocks and supports the natural reproduction of fish, while ensuring the preconditions of recreational and commercial fishing. Healthy fish stocks ensure that fishing can take place. The Fishing Decree implements the objectives of the Fishing Act, through regulation related to the protected species, fishing instruments, and stipulating catch-sizes for listed species. The Ministry of Agriculture and Forestry of Finland (MMM) coordinates the control of commercial fisheries and prepares the related national legislation (MMM 2023b). Commercial fishing at sea is controlled by the ELY centre of Southwest Finland, the Provincial Government of Åland, and the Finnish Border Guard.

In Finland, overfishing has not been a problem (WWF 2017), and the aim is to avoid overfishing. Managing and preventing overfishing is done through, above-mentioned instruments; the Common Fisheries Policy (CFP), multi-year management plans, and national legislation. The fishing intensity between 2010 and 2022 has been described in Lappalainen et al. (2023). The Finnish Baltic herring (*Clupea harengus membras*) and European sprat (*Sprattus sprattus*) trawling fleet has had a somewhat decreasing trend since 2017, due to quotas, decreasing from approximately 100 million kg/year to 63 million kg/year (Lappalainen et al. 2023).

The process for setting fishing quotas for certain commercial species is as follows. The International Council for the Exploration of the Sea (ICES) annually reports on the state of Baltic Sea fish stocks, and based on this recommends fishing quotas to the European Commission. Additionally, the European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF), and the Baltic Sea Advisory Committee gives their views the quotas. Based on the recommendations, the European Commission suggests species-specific maximum catches. The decision on quotas is made by the EU countries' ministers responsible for fisheries affairs at a Council meeting. In Finland, the responsible ministry is the MMM (SAKL 2020).

Annual country-specific quotas (total allowable catches, TAC), which are reported as tonnes or number of catches, are set for the most important fish species in the Baltic Sea (quota species), through which overfishing is prevented. Quotas can be traded among countries, and when quotas are reached, fishing is to cease. National quotas are further distributed among fishers, in practise among fishing companies. In Finland, the implementation is monitored by the ELY Centre and the Government of Åland (SAKL 2020). Commercial fishing is monitored strictly. The fishing company must report its catch to the authorities within 48 hours (SAKL 2020; ELY centre 2023).

The quota species in Finland are Baltic herring, European sprat, cod (*Gadus morhua*), salmon (*Salmo salar*), and European plaice (*Pleuronectes platessa*). In the case of salmon, there are also restrictions concerning recreational fishing. Regarding the herring and sprat, fishing has been too efficient (the MSFD criteria will not reach good status (YHA 2023a)), and thus restrictions to the fishing of said species were set (Directorate-General for Maritime Affairs and Fisheries 2023). The two monitored salmon stocks in the Bothnian Bay (Tornio River and River Simojoki) are in good condition (YHA 2023b). The cod's status is weak, but it does not face much fishing pressure in Finland, either (Luke 2023c; YHA 2023b). The regulations regarding the European eel (*Anguilla anguilla*) were recently tightened and the legislation changed (full fishing prohibition 1st of August to 30th of June; recreational fishing allowed in inland waters, never marine waters; commercial fishing allowed in August in both marine and inland waters (Government Decree 756/2022 amending sections 1 and 4 of the Governments Decree on Fishing (1360/2015)) (MMM 2023a; EC 2023d, 2023e).

Fishing for coastal species is regulated nationally. Angling is relatively free, especially if an angling permit is purchased. Fishing with traps requires the permission of the owner of the water area. The information regarding catches of recreational fishing (Luke 2023d) is still lacking, and in some cases recreational fishing catches can be larger than those of commercial fishing. The lack of information of recreational catches is being amended by the Omakala data collection. The aim of the existing

Omakala service is to acquire information on the quality and quantity of recreational fishing, which is poorly known. A new regulation on the obligation of recreational fisheries to report certain catches is being planned; the to-be reported species are salmon, landlocked salmon (*Salmo salar m. sebago*), trout, European eel, and grayling (*Thymallus thymallus*) caught in the sea, and Arctic charr (*Salvelinus alpinus*) and pink salmon (*Oncorhynchus gorbuscha*) in some areas. The planned reporting obligation for trout and salmon is also planned to be implemented in the Omakala service, as well. The Natural Resources Institute Finland also collects data on recreational fishing with, e.g., surveys, but the full picture cannot be acquired this way. The state of the pikeperch (*Sander lucioperca*) in the Archipelago Sea and the anadromous whitefish (*Coregonus lavaretus f. lavaretus*) in the Bothnian Bay is weak (YHA 2023c). Measures that have been taken or are planned regarding these stocks are listed in the marine strategy status assessment (YHA 2023a; Laamanen et al. 2021). Coastal species also have certain local fishing restrictions during reproduction periods; fisheries areas can apply for these in their own areas, and the ELY centre grants them if they deem them suitable and justified.

Bycatching is regulated in, e.g., the FA (62 §; owner of fishing gear must report seals and harbour porpoises caught in gear to the Natural Resources Institute Finland immediately), and in Act on the national implementation of the Common Fisheries Policy of the European Union (1048/2016; 18 §), and the Act on the sanction system and supervision of the Common Fisheries Policy (1188/2014; 21-22 §§). Bycatching occurs in Finland, but the information regarding bycatches is lacking. For example, knowledge gaps exist regarding bycatches of seals, birds, and trout with their fat-fin intact (caught in e.g. nets), although some published information exists (e.g. Vanhatalo et al. 2014; HELCOM 2021b; Almeida et al. 2017; Olin et al. 2021). One key challenge regarding bycatching is the subject of compliance with the bycatch reporting obligations. Attempts to reduce bycatching has been made, e.g., by regulating fishing in river mouths, and mesh size limitations of surface nets. Based on the latest state assessment of the marine strategy (YHA 2023b), the state of natural stocks of sea trout is still weak. In the case of trout and salmon, a catch reporting obligation is planned for recreational fishers as well (one must report whether the fish was released, for example).

The European Commission recently published an action plan on the protection and restoration of marine ecosystems for sustainable and resilient fisheries (EC 2023c). It sets, for example, the following two targets to be reached by the end of March 2024, in order to reach the 30% conservation objective of the EUBDS:

- "*adopt national measures or, where appropriate, propose joint recommendations to the regional groups to prohibit mobile bottom fishing in the MPAs that are Natura 2000 sites designated under the Habitats Directive that protect the seabed and marine species. Also, mobile bottom fishing should not be allowed in any newly established MPAs.*", and
- "*provide an overall outline of how each of them intends to ensure that by 2030 mobile bottom fishing is phased out in all MPAs. They should provide, for at least 20% of each Member State's marine waters, a more detailed plan of national measures and joint recommendations to be developed including, at least, details to identify the areas where mobile bottom fishing should be prohibited, and details on the Member States and fleets concerned by the measures in those areas.*"

As well as:

- "*Adopt national measures or submit joint recommendations to the Commission to minimise by-catch (or reduce it to the level that enables the full recovery of the populations) of:*"
    - "*by the end of 2023: harbour porpoise in the Baltic Proper and the Black Sea, the Iberian Atlantic and the common dolphin in the Bay of Biscay*"

The Commission (EC 2023c) also calls for MS to aid the fisheries communities in the transition to more selective, less harmful and less fuel-consuming fishing practices. How these will be implemented and what the effect is remains to be seen.

While bottom trawling is not explicitly forbidden in the Finnish Fishing Act (379/2015; FA), it is not a utilized fishing method, although pelagic trawls can reach close to the seabed (Lappalainen et al. 2023). The FA forbids the use of fishing gear that unnecessarily injure or kill fish or endanger the preservation of the fish stock or are harmful to biodiversity (FA 46.9 §). Commercial fishing in Finland is mostly comprised of trawling for small pelagic fish, such as Baltic herring and sprat, and vendace (*Coregonus Albula*) in the Bothnian Bay (Luke 2023b). Additionally, small-scale coastal and freshwater fisheries target species such as perch, vendace, and whitefish.

A problem has however been the fishing pressure on some endangered species, such as salmon, sea trout and eel (WWF 2017), but the annual fish stock assessments and the ICES stock assessment process strongly regulates catches, and as previously mentioned, the regulation concerning European eel was considerably tightened.

The Natural Resources Institute Finland (Luke) monitors the state of fish stocks in Finland (e.g. Lappalainen et al. 2023). Luke monitors, for example, salmon (VU) (Luke 2022) and sea trout (EN) (Luke 2023a) migrations to rivers. In 2022, the numbers of juvenile salmon were high in Tornio River and River Simojoki (Bothnian Bay), although they were smaller than recent years (Luke 2022, 2023c). The most productive Baltic Sea salmon stocks are however in a biologically sustainable state, and even the smaller stocks have strengthened, and many are in a sustainable state (Luke 2021). The Teno and Näätämö River salmon stocks have declined significantly (Luke 2023c).

A key threat to migratory fish species is preventing them from reaching their habitats of reproduction. The problem of declining migratory fish stocks has in Finland not been overfishing, but the construction of hydropower as well as other physical changes to the natural environment, preventing the fish from reaching their reproduction habitats, causing a decline of migratory fish stocks. Hydropower plant permits have a certain permanency and are challenging to make changes to (Soininen et al. 2018). Further, migratory fish species and their vitality is considered in the biological quality elements of the WFD and are considered in the assessments of ecological status (Soininen et al. 2018). The upkeep of fish stocks has been managed by stocking hatchery-grown fish, which has often led to increased fishing (WWF 2017). Effective fisheries management measures, such as improved legislation and strategies like the national fish passage strategy for enhancement of the viability of threatened and endangered migratory fish stocks (such as MMM 2011, 2015) have been shown to allow fish stocks to recover (Hilborn et al. 2020; FAO 2020).

The fishing legislation also stipulates for example:

- Prohibitions to types of fishing, catching methods and fishing equipment (FA 46 §)
- Chapter 6 of the FA controls and regulates fishing and is supplemented by the Fishing Decree (1360/2015) specifies, e.g., catch-sizes, general regulations regarding catches, and monitoring.
- The protection of fish species and stocks are specified in the Fishing Decree 1 §, and FA 59 § stipulates some further measures to ensure the protection of endangered species.

1.3.5 Maritime spatial planning

Maritime (or marine) spatial planning (MSP) is the planning process regarding marine areas, based on the MSP directive (MSPD, Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning), and is becoming an increasingly recognised tool in the planning of marine areas (e.g. Ehler, Zaucha, and Gee 2019). The MSPD has two main objectives: the Member States (MS) are to implement Blue Growth into MSP, and to coordinate or support the different sectoral uses of the marine areas. Blue Growth strives toward economic, social, and environmentally sustainable development and growth in the maritime sector. Further, the promotion of Blue Growth is not to risk the achievement of GEnS (MSFD), nor the marine ecosystem's capacity to respond to human-induced changes (Haapasaari

and van Tatenhove 2022). The MSPD does not, however, give guidelines as to how MSP is to consider trade-offs between the Blue Growth and GEnS targets (Westholm 2018; Haapasaari and van Tatenhove 2022).

The MSPD also mentions the use of the ecosystem-based approach (EBA). The EBA is a holistic approach of planning the use and management/governance of areas, in which humans are considered a central part of nature and thus affects its functioning (e.g. Kostamo, Viitasalo, et al. 2020). By including the human aspect into the planning approach, it will be possible to evaluate possible conflicts regarding the utilization of ecosystem services, in relation to strategic or binding goals. The sustainable development and growth, in marine areas as well, is made possible by exercising the precautionary principle in addition to the prevailing ecological, social, cultural, and economic aspects (Kostamo, Viitasalo, et al. 2020). The MSPD, however, leaves the interpretation of the EBA vague and up to the MS (MSPD Art. 5). The MSPs of Finland and the Åland Islands are not judicially binding and could thus be considered more adaptable than a binding MSP. The MSPs are instead considered strategic development documents. One of the strengths of the Finnish MSP was its ability to bring different sectors together, which may bring forth cooperation among the different actors, which in turn could enable certain sector-transcending synergies (Airaksinen et al. 2020).

The regional councils of the coastal areas and the Provincial Government of the Åland Islands are responsible for preparing the MSP, and the work is overseen by the MoE. In Mainland Finland, the plan is split up into three parts (Gulf of Finland, the Archipelago Sea and southern Bothnian Sea, and the northern Bothnian Sea, Kvarken and Bothnian Bay), but it is considered as one plan. The Provincial Government of the Åland Islands produces the MSP for the Åland Islands. The MSPD required the coastal states of the EU to prepare maritime spatial plans by the end of March 2021. The MSPs were approved in December 2020 in Mainland-Finland, and in March 2021 on the Åland Islands. The process of MSP has been implemented into chapter 8 a of the LUBA in Mainland-Finland, and the 5th chapter's 24a and 24b §§ in the WAÅ on the Åland Islands. The LUBA, like the MSPD, does not regulate what the MSP is to contain, nor does it reference the MSFD GEnS targets or the targets of the marine strategy of Finland (Pappila and Puharinen 2022).

The MSP sets general guidelines for coordinating the use of maritime space by different sectors, including energy production, maritime transport, fishing and aquaculture, tourism and recreation, as well as the conservation, protection and improvement of the natural environment (MoE 2023a). The Finnish MSP covers both the territorial waters and exclusive economic zone (EEZ), while the Åland Islands' MSP excluded the territorial waters due to the coastal municipalities performing land use planning within their districts. The MSP process in Finland is participatory in nature and is a broad cooperation among the regional councils and stakeholders from different sectors.

2 Questions regarding marine conservation

The current legislation regulating the protection and status of the marine biodiversity and environment has been considered lacking (e.g. Kuismanen et al. 2022; Pappila and Puharinen 2022; Laamanen et al. 2021; Soininen and Pappila 2023). This can be attributed to factors such as the complex nature and the accessibility of the marine environment compared to the terrestrial environment, leading to gaps in knowledge, perhaps also reflected in the current national legislation, with regards to, e.g., cumulative effects of activities on the biotic and abiotic environment. Many of the current regulating laws have come into force during a time when the marine environment was relatively unexplored (cf. Velmu programme started in 2004). Marine biodiversity, compared to the terrestrial counterpart, is relatively absent from national legislation. Two underwater habitats were, however, recently added to the new NCA (eelgrass and sheltered charophyte meadows), and some species and habitats were added to the NCDÅ, but the Red List statuses of for example Baltic Sea habitats have been assessed as 34% NT-EN, 33% as LC, and 33% DD (Kotilainen et al. 2019).

This begs the question of how well the protection of marine areas is regulated, further complicated by the numerous strategic documents, agreements, and scattered information. Here, the author attempts to shed some light on certain key questions, each processed by itself in chapters 2.1-2.6.

2.1 Are Natura 2000 and other MPAs effective tools to conserve marine biodiversity?

2.1.1 Background on the regulation of Natura 2000 areas and other MPAs in Finland

The northern Baltic Sea hosts many scattered but widespread species communities in its diverse habitats. The ecological features are sensitive to different kinds of human activities, and thus the types of marine protected areas (MPAs) in Finland also reflect this fact. The types or restrictions of MPAs vary depending on, inter alia, the target features of the protection, the regulated activities, or their legislative standing, which also affects their jurisdictional ensembles and thus the uses of the areas (Arnkil et al. 2019). In practice, the protection is executed based on direct as well as indirect restrictions of area use.

The different types of MPAs are the results of, e.g., the EU level HD and BD, or the regional Baltic Sea level HELCOM MPAs. National schemes in the marine realm include, e.g., nature conservation areas or national parks. The different types of MPAs can overlap with one another, and the resulting combinations of regulations are numerous. This results in the overlapping parts of the different MPA types to have an increased level of protection, but the regulations become complex. Further, as some of the national MPA types overlap with areas belonging to international agreements or programmes (listed above), the obligations of those are to be accounted for in the management and planning of said areas (Metsähallitus 2023a).

More comprehensive information about the various types of protected areas and their networks in Finland are described by Arnkil et al. (2019), hence the majority of the coming sections (2.1.2-2.1.3) will be based on this aforementioned report, with parts translated into English.

2.1.2 International protected area networks – dissemination of efficacy

The international PA schemes in Finland include the Natura 2000 areas, HELCOM MPAs, Ramsar areas, and a marine UNESCO World Heritage Site, the last of which is technically not considered a PA. International legally binding obligations are to be implemented into the national legislation in a legally binding format. Unless the international schemes are implemented through, e.g., national legislation or other judicially binding instruments, the international networks may have weaker legal standing and restrictions to activities may not be realised. If the nature features that the MPAs have been established due to deteriorate “enough”, the protected status of the areas run the risk of being removed.

For example, the N2K network has been nationally implemented into the NCA and NCAÅ. The implementation method of N2K areas is however not necessarily the NCA. In marine areas, N2K areas are, in fact, often implemented through, e.g., the WA or EPA (Virtanen, Forsblom, et al. 2022).

The Helsinki Convention has also been implemented into the national legislation (Decree on the entry into force of the 1992 Convention on the protection of the marine environment of the Baltic Sea region (2/2000)) and is thus legally obligating. HELCOM MPAs have been designated as an implementation measure of the Helsinki Convention, with the goal of protecting underwater natural values.

2.1.2.1 Natura 2000 sites

The Natura 2000 (N2K) network of protected areas are based on the EU HD and BD, with the goal of halting biodiversity loss. There are approximately 60 N2K sites consisting of 75% marine area (Arnkil et al. 2019). There are however more N2K sites with less marine area that include marine

habitats listed in the HD (list below). The marine N2K sites (including N2K sites with marine habitats) have been implemented using different legislation, such as the NCA, WA (regulates the use of and construction of water and water areas), EPA (regulates e.g., environmental deterioration, emissions, noise), LUBA (land-use planning, zoning), or in some cases, contracts with the property owner(s).

The protected marine features of the SCI and SAC areas are the marine habitats listed in the HD Annex I, and the marine species listed in the Annexes II, IV, and V. The bird species protected in the SPA areas are listed in the Annex I of the BD. All the N2K areas have a Standard Data Form (SDF), in which every area's protected features are listed, along with other information about the area. The marine habitats listed in the HD are defined based on their geomorphological features, and the HD habitats recognised in the Finnish part of the Baltic Sea are (habitat code in parentheses):

- sandbanks (1110),
- boreal Baltic narrow inlets (1650),
- reefs (1170),
- large shallow inlets and bays (1160),
- coastal lagoons (1150, VU),
- estuaries (1130, EN),
- the underwater parts of boreal Baltic islets and small islands (1620), and
- the underwater parts of Baltic esker islands (1610).

The habitats of the HD have been considered to not appropriately describe the marine biological diversity in Finland, and to not function very well as proxies for describing species' habitats (Virtanen et al. 2018). For example, species communities of sandy bottoms, that are not classified as sandbanks (1110), fall outside of the HD habitat classifications. Similarly, species of rocky or stony bottoms that do not form reef-like ensembles, fall outside of the scope of the HD (Virtanen, Forsblom, et al. 2022). The species listed in the HD annexes are also lacking regarding the Baltic Sea, and very few species of the Baltic Sea are listed. The MSFD, however, includes marine species more broadly.

In Mainland Finland, the N2K areas are regulated by the general conservation stipulations of the NCA (9/2023), based on HD Articles 6.1 and 6.2), as well as its other stipulations, and other legislation, which might have been used to implement parts of N2K areas (Arnkil et al. 2019). According to the non-deterioration requirement (NCA 34 §), the nature values due to which an area has been included in a N2K network area cannot be significantly deteriorated. Effects of activities are to be evaluated case-by-case in terms of the deteriorating effect they may have on the habitats protected by the N2K area in question and applies to factors both inside as well as outside of the area in question that potentially affect the nature values. Hence, the prohibitions of activities vary, depending on the protected nature values and an area's unique conditions. According to NCA 39 §, an authority cannot grant a permit nor adopt or ratify a plan in the area or in the vicinity of the area, if the assessment procedure or the requested opinion referred to in NCA 35 §, paragraphs 1 and 2, indicates that the project (by itself or cumulatively with other projects or planned projects) or planned activity significantly deteriorates the natural values of the area, due to which the area has been included or proposed to be included in the N2K network. The protection of a specific zone within a N2K area is further dependent on the implementation method (as well as the stipulations, area-specific establishment regulations, or rules of conduct of other possibly overlapping MPA types), and may, e.g., be realized in the permitting processes of said implementation method. Because of this, permitting procedures are a key factor when considering the activities affecting the natural values (Kuismanen et al. 2022). The implementation and a review of the HD (Art. 6.2) non-deterioration requirement implemented into the NCA has been further reviewed in section 2.4.

In N2K sites, the implemented conservation measures must correspond to the ecological requirements of the habitat types and species that are the basis of protection within a site. If needed,

management plans, action plans, and/or more comprehensive development plans are compiled for an area or area ensembles. N2K site status assessments (NATA) can also be drawn up for areas, to, along with previously listed planning tools, define area-based measures or plans to preserve or reach the protection goals of the areas. The management plans of larger, multiple area (or area type) ensembles, such as national park management plans, can also cover N2K sites and other nature conservation areas, if the national park area contains these categories of areas. The need for different planning solutions or needs are evaluated approximately every ten years, in the N2K general plans. The general plans were last updated in 2016-2017 by the regional ELY centres (EPOELY 2016; KASELY 2016; LAPELY 2016; POPELY 2016; UUDELY 2016; VARELY 2016).

The broader development plans concern especially the N2K sites which have been implemented completely or largely by other means than the NCA. These implementation methods in the marine areas, in addition to the WA, EPA, and LUBA, can be planning processes regarding forestry or water management. The protection in areas implemented through other means than the NCA is based on the non-deterioration requirement due to which the non-deterioration requirement is to be considered in the permitting processes related to the implementation method, and could imply, that the level of protection is relatively low, especially because cumulative effects of activities have seldom been evaluated in permitting processes (Kuismanen et al. 2022). The protection provided by the N2K sites has been considered lacking regarding the protection of marine features (Laamanen et al. 2021), which is also apparent considering that the state of many of the marine N2K habitats is unfavourable or deteriorating (Kotilainen et al. 2019, Pappila and Puharinen 2022). An increase in the protection level would be to, e.g., implement a larger portion of the N2K sites with the NCA, as the NCA stipulations could be considered the strongest regulating stipulations (Pappila and Puharinen 2022).

Management plans are not legally binding, unlike the conservation stipulations or rules of conduct in nature conservation areas and national parks. In areas where conservation stipulations are defined and in force, not even everyman's rights may apply in their normal capacity, as they are overridden by the conservation stipulations or rules of conduct (Metsähallitus 2023a; Virtanen, Forsblom, et al. 2022). The management plans function as guidelines for authorities in their decision-making, and do not bind private property owners, either. The management plans may be needed if, e.g., the state of the habitats in the area are at risk of deterioration.

Many N2K sites containing marine habitats also have management plans. In their current state, however, the marine habitats are not sufficiently accounted for in the management plans (Virtanen, Forsblom, et al. 2022). This has been at least partially because the marine environment was relatively unexplored at the time of their writing (many written pre-2010, when e.g., the Velmu inventory programme was still at its start). However, the updating of management plans is underway, and they are planned to better consider the marine habitats and environment than before.

Approximately 40% of the marine N2K sites have been implemented utilising the NCA; the remaining 60% of areas have in general been implemented by other means (i.e., the previously listed implementation methods) (Virtanen, Forsblom, et al. 2022). In the previously mentioned calculation, N2K sites with 50 ha or more marine area were included (situation March 2022); the calculation is approximate due to the lack of a clear definition of what defines a marine N2K site (e.g., a specified spatial area size, or inclusion of marine habitats etc.) and may thus vary depending on definitions. A large portion of the remaining 60% of areas have been implemented through the WA. The implementation method zoning of N2K sites dataset is out of date (CKAN 2019), but a more up-to-date version of the data exists in the ULJAS database. Although the implementation method dataset in the ULJAS database contains more up-to-date information about the implementation, it does not include the implementation method of every N2K covering marine areas. The digitised information on implementation methods of specific areas is key information with regards to the (level of) protection of areas, as it specifies the regulatory instruments of areas.

The N2K sites are often (compare to previously mentioned 40%) at least partially overlapping with nature conservation areas (sensu NCA), which could be considered to increase the protection level. Land-use plans, fishing restrictions, as well as the nature conservation programmes (NCPs, e.g., beach and esker protection programmes, see section 2.1.3.6) may support the protection of specific habitats and species with periodised or all-year prohibitions. The N2K sites may include YSA areas, as well, contributing to the protection level through, often individualised, restrictions and prohibitions.

In many N2K areas at sea, the marine parts have been implemented utilising the WA. The WA has been considered insufficient as a tool of protection by e.g., Pappila and Puharinen (2022). The WA is not an active protection measure (it does not involve a delineation procedure and may thus be considered to provide weak protection), and only protects the coastal flads habitat in natural or natural-like state, that are smaller than 10 hectares. The habitats only come into question if a planned activity jeopardises its natural status. Further, because the N2K habitats are often very extensive features, smaller-scale and impact human activities may not need a permit and may be considered to not significantly deteriorate the N2K site's conservation objectives. The WA has limited capability to address cumulative pressures from activities. Smaller-scale human activities may, however, cumulatively deteriorate the state of ecological features, such as the N2K habitats.

Currently, no clear definition, indicators, or measures of *significant deterioration* exists in Finland (Laamanen et al. 2021). However, considerable amounts of case law (the Supreme Administrative Court of Finland (KHO), Court of Justice of the European Union (CJEU)) exists, where the non-deterioration requirement has been considered and interpreted. Case law, in turn, serves as the basis for decisions and rulings (for an early example, see e.g. Kallio (2006)), and evolves over time. Additionally, the European Commission provides guidance regarding, e.g., the interpretation of concepts of Article 6 of the HD (EC 2019). See also section 2.4 on the non-deterioration requirement. Significant deterioration of nature values will most likely have to be assessed case-by-case, but a common framework, tool, or platform could make the process more standardised and transparent.

Conclusions: International protected area networks – dissemination of efficacy

- Because the NCA could be considered the strongest conservation tool in Mainland Finland, a larger portion of marine N2K sites could be implemented through said legislation, instead of the WA, in order to strengthen the N2K networks protection level.
- Due to the nature of the assessment framework of N2K non-deterioration (uniqueness and circumstances of areas, case law), it is challenging to establish what constitutes a significant deterioration of nature features, but a common framework could be developed to support, standardise, and make the process more transparent.
- Although the concept (and legislative side) of non-deterioration could work well in theory (including e.g., consideration of cumulative effects), but because the N2K habitats have relatively rigid definitions, and because the habitats tend to be of very large scale, especially smaller-scale activities tend to not be considered to significantly deteriorate the habitats, and the marine nature may not in practice benefit from the non-deterioration requirement.

2.1.2.2 HELCOM MPAs

The goal of the HELCOM MPAs is to protect valuable marine and coastal habitats in the Baltic Sea by protecting the marine nature, preserve species diversity, and reducing emissions from all sources into the Baltic Sea (Arnkil et al. 2019). The HELCOM MPAs are a result of the Helsinki

Convention on the Protection of the Marine Environment of the Baltic Sea Area (FINLEX 1992). The protection is implemented by designating areas with underwater nature values as MPAs, and through the management of human activities within those areas. According to the recommendation 35/1 of HELCOM (2014), each HELCOM MPA is to have a unique management plan in order to regulate human activities, prevent conflicts of interest, and to ensure that the protection targets are achieved. As stated previously, the needs of HELCOM MPAs to be accounted for in the management and planning (Metsähallitus 2023a).

The objective of the MPA network is to conserve areas with threatened or decreasing species, that are significant resting and feeding areas, habitats or species of importance for the ecosystem, diverse or sensitive areas, rare geomorphological features or processes, and ecologically significant areas (Arnkil et al. 2019). All HELCOM MPAs in Finland, except for one area on the Åland Islands, are overlapping with N2K areas. Currently, the HELCOM MPAs in the Finnish areas do not have separate management plans, but the plans are congruent with those of the overlapping N2K and national parks (NCA (9/2023) 63 §; Arnkil et al. 2019; Metsähallitus 2023a).

The new NCA 63 § regarding HELCOM MPAs was kept almost the same as the in the previous NCA (73 §, 1096/1996), but specified (see HE 76/2022). In the reasonings and suggestion for a new NCA (HE 76/2022), the expansion of the HELCOM MPA network, as recommended in HELCOM Recommendation 15/5, has been acknowledged. The expansion of the HELCOM MPA network comes into question, however, when preparing the expansion of the N2K network. The NCA 63 § refers to NCA 15 § regarding the establishment of new HELCOM MPAs, hence the same principles apply as to those of establishing nature conservation programmes (NCP, see section 2.1.3.6), which require the approval of the Finnish Government, making the process administratively cumbersome. NCA 16 §, in turn, stipulates the judicial implications of NCPs: that an activity which jeopardises the conservation objectives of the NCP area in question (accepted by the Finnish Government) cannot be undertaken. HE (76/2022) further states that the inclusion of an area in the HELCOM MPA network does not impose any international obligations other than that the Helsinki Commission should be given the opportunity to be heard, in the case of any significant reduction in the size of the MPA or any significant deterioration of its conservation status. The opinion of the Commission is not binding on the Member State.

The HELCOM MPA status by itself does not incur de facto restrictions on the activities in an area. The HELCOM MPAs however largely overlap with the Finnish N2K sites (as well as other area types) and are thus provided legal protection in the overlapping areas. In essence, the HELCOM MPAs gain increased protection indirectly by overlapping with other PA schemes that have, e.g., legal protection through national legislation. This does, however, imply that unless the HELCOM MPA overlaps with another PA scheme (with legal protection basis), they are more akin to symbolic areas, with recommendations of restricted activities. The Finnish HELCOM MPAs all overlap with other PA schemes, except for one area on the Åland Islands, Bogskär, in the southern part of Åland's marine area (Arnkil et al. 2019). A main difference between HELCOM MPAs and N2K areas is the fact that N2K sites may often contain both marine and terrestrial areas and aim to protect certain habitats and species at EU level, while the HELCOM MPAs are restricted to the coastal and marine areas and seek to protect all habitats and species specific to the Baltic Sea, existing in the area (HELCOM 2013a). If the protected values of a HELCOM MPA are completely deteriorated, the status may be removed. HELCOM recommendation 35/1 (HELCOM 2014) lists however, that "*o) perform identification, designation and legal protection of HELCOM MPAs according to HELCOMs criteria and guidelines and base all management plans or measures on relevant HELCOM publications such as "Planning and management of Baltic Sea Protected Areas: guidelines and tools" (BSEP 105). For EU Member States the respective EU requirements and guidelines are regarded as adequate for designating and managing HELCOM MPAs;*". If the recommendation is followed, the HELCOM MPAs could be granted stronger legal protection in the future.

Although all but one of the HELCOM MPAs have been designated overlapping with, e.g., marine parts of Finnish N2K areas, because the establishment of those N2K areas has not primarily been

the underwater nature values, and because those areas have been established prior to comprehensive knowledge about the underwater nature, and because the definitions of e.g., N2K habitats can be rigid, leaving out many nature values, it becomes questionable how well the HELCOM MPAs have been designated. Further, because the marine parts of the current N2K sites have often been implemented through, e.g., the WA or EPA (not providing active protection), the level of protection could be considered relatively low.

Conclusions: HELCOM MPAs

- The HELCOM MPAs largely overlap with the marine parts of N2K sites, where the marine features of the N2K sites have not been the primary target of protection and were established prior to more comprehensive information on underwater marine nature. It may thus be questionable, how well the HELCOM MPAs thus cover marine underwater nature, especially because the Finnish HD habitats do not appear to describe marine biodiversity well (Virtanen et al. 2018; see also section 2.1.2.1 on the N2K network).
- Further, because many of the overlapping marine parts of N2K sites have been implemented through the WA, the level of protection may be relatively low in at least parts of the HELCOM MPAs.
- To enhance the efficacy of the HELCOM MPAs, more binding or stronger regulations regarding them could be implemented, as per, e.g., HELCOM Recommendation 35/1.

2.1.2.3 Ramsar areas

The objective of Ramsar areas (of the Ramsar Convention on the protection and sustainable use of wetlands) is to establish nature conservation areas in wetland areas and promote the protection of internationally significant wetlands and waterfowl (MoE 2023c). There are 49 Ramsar sites in Finland, all of which are included in the N2K network, and of which 17 are situated on the coast and marine areas of the Finnish Baltic Sea (Arnkil et al. 2019).

Originally, the purpose of the convention was to protect wetlands used by waterfowl during migration and nesting, as well as preserve the networks of wetlands along migration routes. Later, the convention was extended to better cover the protection and sustainable use of ecosystems; in addition to the waterfowl, the vegetation, fish, mammals, and invertebrates in the Ramsar sites are evaluated. The wetlands in the Baltic Sea are classified as a distinct class. In Finland, the Ramsar sites strengthen the conservation of birds in N2K areas. Along with the wetlands, the convention includes shallow (down to 6 m depth) marine areas within the site boundaries (Arnkil et al. 2019).

The Ramsar sites themselves do not lead to direct restrictions, but because the Ramsar sites are included in the N2K network, the same restrictions of the N2K areas (and other overlapping PA types) are applied to the Ramsar sites, as well. The Ramsar Convention obligates Finland to designate nature conservation areas in wetland areas and promote the conservation of internationally significant wetlands and waterfowl (MoE 2023c; also, NCA 4 §). Planning processes as well as other activities are to consider the Ramsar sites according to the convention. For example, harmful activities to the waterfowl and their habitats are such that alter or fragment the habitats, cause noise or disturbing movements (Arnkil et al. 2019). As such, merely the presence of humans may be considered harmful (Laursen, Kahlert, and Frikke 2005; Bregnballe, Aaen, and Fox 2009).

Similar to the HELCOM MPAs, the Ramsar areas themselves have limited protection status based on legislation. The Finnish Ramsar sites, however, largely overlap with N2K sites, as well as other, e.g., national nature conservation areas, nature conservation programmes (see section 2.1.3.6), and in some cases HELCOM MPAs, too. Thus, they are at least provided some protection indirectly through the overlapping area types, and the consideration obligation during planning processes (UNESCO 1994, Art. 3).

Conclusions: Ramsar areas

- Whilst the overlap with other MPA types is beneficial, they mostly overlap with N2K sites, and especially the marine parts (down to 6 m depth), might be susceptible to human pressures, due to many of the marine N2K sites being implemented through the WA in the marine parts.
- Similar to the HELCOM MPAs, the Ramsar sites and associated ecological features could benefit from stronger legal regulations.

2.1.2.4 The UNESCO World Heritage Site in Kvarken

The United Nations Educational, Scientific and Cultural Organization (UNESCO) maintains a list of World Heritage Sites (WHS), with the goal of preserving globally valuable nature and cultural areas for posterity.

The WHS in Kvarken is the only marine WHS site in Finland, which together with the Swedish part of Kvarken is a geologically significant area and is included as a natural site. The relatively fast land-uplift (Poutanen and Steffen 2014) and the moraine environment, a left-over from the most recent ice age, give the Kvarken archipelago a globally unique character.

The protected features in the Kvarken WHS are the unique glacial deposits and landforms, which are characterised by the thousands of islands and marine area in the WHS. The land-uplift processes are active to this day and continue to affect the area's biological successional processes.

Sixty percent of the Kvarken archipelago WHS overlaps with the N2K network or other PA schemes. UNESCO is to be informed about all planned projects that might affect the area's protected features. The regional land-use plan safeguards the features of the Kvarken archipelago through its planning regulations, and the geological features in the zone between the two central areas on the Finnish side are to be considered in the regional planning processes (Arnkil et al. 2019).

The UNESCO WHS area in the Kvarken archipelago is technically not a protected area and is not considered as such in Finland. The area is not reported as part of the Nationally Designated Areas (NatDA, or Common Database on Designated Areas, CDDA database), either. UNESCO must be informed about all projects to be undertaken within the WHS that may affect the protected features of the area. The regional land use plan safeguards the general nature values of the Kvarken archipelago belonging to the WHS. The geologically significant zone in between the two central areas is to be considered in area-based planning processes (Arnkil et al. 2019). The UNESCO WHS in the Kvarken Archipelago has been evaluated to be a possible OECM area candidate in the future (BIODIVERSEA Action A.5.3).

2.1.3 National protected areas, networks, and conservation programmes

Many different types of protected area types exist in Finland; area types along with their regulatory instruments, as well as key points are compiled in Table 2. NCA 43 § lists area types that are considered nature conservation areas (national parks, nature parks (none in the sea), other state-owned nature conservation areas, and privately-owned protected areas), as well as their conditions of establishment. The conditions of establishment of nature conservation (NCA 43 §) are as follows:

1) an endangered, rare, or regressive species, community of organisms, habitat type or ecosystem lives or exists in the area;
2) there are breeding or resting places for an individual of an animal species in the area, requiring strict protection as referred to in 78 §;

3) there is a special or rare natural formation in the area;
4) the area has special scenic value;
5) preserving or achieving a favourable level of protection of the habitat or species requires it;
6) the area has special significance for habitats or species to adapt to the effects of climate change; and
7) other than as referred to in parts 1-6, the area is so representative, typical, or valuable that its protection can be considered necessary in terms of preserving natural diversity or beauty.

Table 2. Characteristics of national protected area schemes with marine relevancy.

National protected area scheme	Regulatory instruments	Additional details
National parks	• NCA (9/2023) 44 §, 49-51 §§, 57-59 §§ • Established by (new) law	• Established only on state-owned areas. • Management plan obligatory. • Minimum area of 1000 ha. • Area must be significant as a general natural attraction, in terms of increasing knowledge of nature, or general nature hobby.
Seal reserves	• The Governments decree on seal reserves (736/2001) • Decree on establishment of a seal reserve in Karlbybådarna in the municipality of Kökar, Åland Islands (ÅLR 1998)	• Main objective to protect grey seals but also other nature values within reserves. • Permanent and temporary movement restrictions. • Management plan drawn if necessary.
Other state-owned nature conservation areas	• NCA (9/2023) 46 §, 52 §, 57-59 §§, 62 § • Established through Governments or MoE's decree	• Conservation objectives decided on a case-by-case basis. • Management plan or rules of conduct drawn if needed.
Privately-owned protected areas	• NCA (9/2023) 47-48 §§, 53-54 §§, 57 §, 59 §, 61 §	• Established by regional ELY centres. • Management plan can be drawn with consent from property owner. • The ELY centre can establish a nature conservation area on private property without the consent of the property owner, provided that certain criteria are fulfilled (NCA 47 § sub-section 2).
Nature reserves (Åland Islands)	• NCAÅ 5 §, 7-13 §§, 21-23 §§ • NCDÅ (1998:113)	• Established by the Government of Åland. • Areas can be leased for conservation by the Government of Åland (minimum of 10 years) • Establishment and restrictions case-by-case.

National nature conservation programmes	• NCA (9/2023) 15-16 §§	• Not a protected area type per se but consists of areas reserved for protection. • Proposed by MoE. Accepted by the Finnish Government after a hearing. • Requires details of harmful activities. • Exemptions may be granted by ELY centres.

2.1.3.1 National parks

The Finnish national parks are located on state-owned land and marine areas and are regulated in chapter 6 of the NCA (9/2023). The areas chosen as national parks are to have a significance as a general natural attraction, and its area is to be at least 1000 ha. Furthermore, in addition to conservation, the national parks are meant to inform the general public about nature and support nature-related hobbies. National parks also serve the needs of scientific research. Other use of the areas depends on the conserved features and is stipulated in the NCA and the management plan.

National parks are established by law on state-owned areas. The NCA 57 § stipulates that national parks are to have management plans and is the responsibility of the authority managing the area. The management plans of national parks are drafted by Metsähallitus, and MoE issues a statement. The management planning is often implemented as a process considering especially the overlapping N2K areas simultaneously.

In principle, all nature values in the national parks are protected, unless the regulations for said national park state otherwise. One is in principle allowed to, e.g., forage for berries or fish according to general fishing rights (FA 7 §), in national parks, if not prohibited by stipulations of NCA 52 §, subsection 4; "*Fishing in public waters in the sea and in other state nature reserves in the Finnish Exclusive Economic Zone is regulated in section 8, subsections 1 and 3 of the FA. However, a Government Decree may provide for restrictions on fishing in public waters in the sea or in other State nature reserves in the Finnish Exclusive Economic Zone if fishing endangers the purpose for which the area was established or is detrimental to other uses of the area. Restrictions may be regional or temporal.*" It is, however, possible to restrict, e.g., movement, camping, landing, usage of boat, ship, or other vehicle, as well as damaging vegetation or animals (NCA 56 §). In nature conservation areas, it is possible to restrict the everyman's rights, in order to reach the conservation goals for the area is question. These restrictions can be found in, e.g., the establishment documents, or the rules of conduct for the area. Some characteristics of national protected area schemes (marine relevancy) are compiled in Table 2.

Conclusions: National parks

- The Gulf of Finland national park in the eastern Gulf of Finland technically does not meet the establishment conditions of a national park, namely, its area is less than 1000 ha. The national park does not include water areas, hence the small area. Metsähallitus (2014) has suggested that the marine waters surrounding the national park be included in the park, in order to meet the condition of the NCA.
- Following the update of the NCA, mineral prospecting has been completely prohibited in national parks (and nature parks), but the same restriction currently does not apply to other nature conservation area types, although it has been strengthened.

2.1.3.2 Seal reserves

The seal reserves of Finland were established in 2001 through the Governments decree on seal reserves (736/2001) (Finnish Government 2001) on state-owned areas. The seal reserves are partially also included in the N2K network. The areas have been established on islets in the outer archipelago used mainly by grey seals (*Halichoerus grypus, LC*), in order to protect the grey seals and limit disturbing activities. The reserves also contain other nature values that are conserved through the decree. The areas are governed by Metsähallitus.

The main purpose of the seal reserves is to protect the grey seals, but some of the seal reserves are also important for the Baltic ringed seal (*Pusa hispida baltica*; NT). Simultaneously, the seal reserve areas protect certain marine habitats, such as the Islands and islets in outer archipelago (HD habitat 1620) and their underwater areas.

The most significant feature of the seal reserves are the movement restrictions. Movement is prohibited year-round at half a nautical mile (926 metres) from the islets or islet groups located within the MPAs, without the permission of Metsähallitus. In the other parts of the reserves, movement outside of the official fairways is allowed only from the 16th of June to the 31st of January. Furthermore, hunting and fishing methods that are harmful for the seals are prohibited in the areas. Guided seal watching is possible with a special permit. Management plans for specific seal reserves can be produced in order to more precisely regulate the usage of the areas.

A seal reserve also exists on the Åland Islands (ÅLR 1998). Similar to Mainland Finland, human movement and activity is prohibited within the area without the permission of the Provincial Government of the Åland Islands. The prohibition further includes overflight at an altitude lower that 500 m.

Conclusions: Seal reserves

- The seal reserves are very close to strictly protected, especially in the core area, due to the movement restrictions, which indirectly also protect the underwater marine nature values within the areas.

2.1.3.3 Other state-owned nature conservation areas

The other state-owned nature conservation areas are an ensemble of PAs on state-owned areas, that are neither national parks nor seal reserves. The areas have been established as PAs by separate decrees, and the conservation targets have been defined on a case-by-case basis. The Finnish Government or the MoE prepare the decree. A portion of these areas are also former *privately-owned protected areas* (detailed in section 2.1.3.4), which have been acquired by the state post-establishment.

A large portion of the state's other PAs are part of the special protected areas of the old NCA (71/1923). In PAs covered by the subsequent NCA (1096/1996), the conservation regulations follow those of national parks and nature reserves, as applicable. Nowadays these areas implement the conservation goals of the N2K network and nature conservation programmes (section 2.1.3.6), as well as the protection of nature values outside of these. Thus, although the protected features are determined individually for each area, the features are based on those previously mentioned, albeit in some cases also other nature values not included in those.

The regulated activities in the state's other PAs are based on, when applicable, the old NCA (71/1923), the newer NCA (1096/1996; the conservation stipulations of the 17a §), as well as specific, area-wise area usage regulations. It is possible to make exceptions to the conservation decisions of the NCA when establishing the PA in question. In cases where privately-owned PAs have

been acquired by the state, and thus included in the state's other PAs, the original protection stipulations are followed.

Conclusions: Other state-owned nature conservation areas

- Considering that the conservation objectives of the areas at least in part protect N2K nature values, and N2K habitats may not describe marine biodiversity very well in a Finnish marine setting (Virtanen et al. 2018), the conservation level and values may be questionable, complicated by the fact that conservation objectives and restrictions are considered area-by-area.

2.1.3.4 Privately-owned protected areas

Privately-owned protected areas (YSA) are generally established on the initiative of the property owner or a government authority (ELY centre). The ELY centres also have the authority to protect areas belonging to nature conservation programmes without the consent of the landowner (NCA 47 §). In these cases, however, the conservation stipulations cannot restrict the land-use more than the conservation programme in question requires. YSA areas have often been established due to being part of nature conservation programmes (section 2.1.3.5) or the N2K network. YSA areas are owned by, e.g., private persons or entities (such as co-ownership by multiple persons or participant's associations, non-governmental entities), municipalities, or cities. Metsähallitus together with the landowner(s) are responsible for the management of the area(s).

The smallest of YSA areas are less than 1 ha in size. In the Finnish marine areas, however, the average size of YSA areas is approximately 280 ha (including the land area within the "marine" YSA area). The YSA areas are often also conjoined, and thus form larger ensembles. The YSA areas are the most numerous PA area type; quantitatively they are more numerous than the number of areas of other PA area types combined.

The protected nature values in the YSA areas are defined in the establishment documents case-by-case. Generally, the nature values to be protected are related to the nature conservation programmes or N2K areas, based on which the area has been established.

The regulated activities within YSA areas are based the conservation stipulations agreed upon at the time of establishment. The regulations are not consistent across all YSA areas, as the conservation goals and exemptions of the property owners are considered in the final establishment decision. The regulations and prohibitions concern, e.g., building, dredging and/or dumping, extraction of soil material (e.g., sand or gravel), damaging plants and/or animals, hunting, fishing, or movement restrictions in areas with importance for birds in the area. The restrictions may be periodised or year-round. Exceptions to what is allowed (with regards to existing restrictions) may also be added. However, the restrictions to movement are only possible if the protected features in the area require it. Due to the previous lack of comprehensive information regarding underwater nature, YSA areas may set stronger restrictions to area-use than the nature values would require. This concerns especially restrictions to movement, and (complete) fishing prohibitions; general fishing rights (FA 7 §) cannot unfoundedly be prohibited. Thus, the establishment decisions and restrictions of (marine) YSA areas are reviewed in Action A4.

Conclusions: Privately-owned protected areas

- Due to many YSA areas having been established prior to comprehensive knowledge on the marine underwater nature, it may be questionable if the restrictions, especially the stronger restrictions such as to movement in the areas, are well founded and meet the requirements of the NCA, i.e., that the nature values require such strong restrictions.
- Because restrictions are established on a case-by-case basis, and the restrictions may vary significantly between areas, assessing the level of protection becomes challenging, when considering, e.g., the sufficiency of the MPA network as a whole.
- General fishing rights (FA 7 §) cannot be restricted if not well founded.
- The above two points have prompted the review of YSA establishment decisions and their restrictions to area-use (Action A4).

2.1.3.5 Nature reserves on the Åland Islands

The nature reserves on the Åland Islands (*nature reserves* translated by author from the Swedish language *naturreservat* designation used on the Åland Islands) are nature conservation areas established by the Provincial Government of the Åland Islands, and the establishment is based on the NCAÅ and NCDÅ. Their purpose is to protect rare or important species, habitats, biotopes, and ecosystems, as well as especially representative local nature features. The marine nature reserves are largely overlapping with the N2K areas of Åland and cover a plethora of different nature features. Each nature reserve is regulated separately by a decision of the Government of Åland (ÅLR 2023a).

The protected values are determined case-by-case. A nature reserve can be established if a rare species, biotope, or ecosystem occurs in the area, if an area has special significance for the knowledge of the nature on the Åland Islands, or if a habitat is especially representative in an area (NCAÅ 5 §). The Government of Åland can then decide to protect an area based on NCAÅ 8 §. The purpose of the conservation, as well as the (proportional) necessary restrictions and the right to use the area must be stated in the decision.

For example, important areas for birds, seals and other species and cultural landscapes are protected. In some areas the nature reserves overlap with the N2K network and thus strengthen the protection of the N2K areas. The regulations of activities are determined separately in the establishment decisions of each area. The restrictions include, for example, prohibitions on modifying or damaging the environment, and restrictions to movement and landing.

In many cases, the restrictions and prohibitions enacted by the nature reserves on the Åland Islands are considerably stricter than the nature conservation areas of Mainland-Finland, especially when established on land or water areas governed by the Provincial Government.

Conclusions: Nature reserves on the Åland Islands

- The nature reserves are often stricter concerning their restrictions compared to their nature conservation area counterpart in Mainland-Finland.

2.1.3.6 Nature conservation programmes

Nationally significant nature values can be included in the nature conservation programmes (NCP), through which areas can be reserved for nature conservation purposes. The NCPs are not PAs per se, but they are reserved for conservation in the future. The NCPs are regulated by the NCA 15-16

§. The NCP must state what kind of measures are to be considered to endanger the purpose of the programme. The NCPs are prepared by the MoE, after which a hearing must be organised for those whose privileges or rights the programme affects. The NCPs can then be approved by the Finnish Government.

Although not PAs, in Government-approved NCP areas, no activities that may jeopardise the purpose of the protection are allowed. The prohibitions are in force despite possible appeals unless the appellate authority rules otherwise. An ELY centre can grant permission to deviate from the restriction if the purpose of the protection is not clearly jeopardised. When planning their measures and deciding on their implementation, the state authority and institution must consider that the measures do not complicate the implementation of the NCP.

Currently there are 9 NCPs, and perhaps the most relevant to the marine areas are (translated by author):

- Esker conservation programme (1984)
    - The programme is implemented through the permit procedures of the Land Extraction Act (555/1981), i.e., concerns land extraction activities, and are not established as nature conservation areas unless possible the areas that are procured by the state or are protected by the property owner. The sites included in the programme are marked in regional land use plans and are thus considered in the area use planning processes (Land Use and Building Act (132/1999)). There are no state obligations in the programme (Lilja-Rothsten 2011).
- Bird waters conservation programme (1982)
    - Objectives: activities that significantly degrade the natural state and conservation objectives of the areas, such as drainage, damming and other hydraulic engineering projects, should be prevented where appropriate (Lilja-Rothsten 2011).
- The Government's principal decision to protect the Mikkeli Islands group of islands (1989)
    - Objectives: improve the opportunities for commercial fishing. Further development, logging, and other measures that alter the natural environment should be refrained from (Lilja-Rothsten 2011).
- Development programme of national and nature parks (1978)
    - Part of the process of establishing national and nature parks. The Principal Decision on the development programme of national and nature parks took into consideration the Report of the National Parks Committee 1976:88 and made an establishment decision on 17 national parks and 7 nature parks, as well as expansions to 6 national parks and 4 nature parks (Lilja-Rothsten 2011).
- Beach conservation programme (1990)
    - Sites of the programme are primarily implemented through the voluntary conservation procedure of the NCA. Action will only be taken on the initiative of the landowner or if construction or other activities risk the deterioration of the conservation objectives (Lilja-Rothsten 2011).

Action will only be taken if the landowner on the initiative of the landowner or if building projects or other conservation measures are undertaken on the site. activities that are damaging to the conservation area. The above listed programmes are the most relevant for the marine areas, as they border or cover marine or coastal areas, although other types are situated close to or border the marine areas, as well (CKAN 2021). Further, the voluntary nature conservation programmes of measures (described in section 1.3) could be considered a nature conservation programme. Additionally, although not an NCP, nationally valuable landscape areas based on the Land Use and Building Act (132/1999), and may have positive underwater biodiversity effects, as they are accounted for in land use planning processes (LUBA 24 §). The Åland Islands does not have NCPs.

Lilja-Rothsten (2011) reviewed, among others, the background, obligations, and implementation of NCPs in Finland, in 2011. In many cases, the programmes had progressed, but e.g., concerning

the Bird waters conservation programme, by 2011, a third of the restoration activities had yet to be implemented due to resource constraints. No clear funding mechanism had been dedicated to the programme, and funding had been project-based. Programmes are also not actively enforced, but come into question through e.g., specific permitting procedures or on the initiative of the land-owner.

Conclusions: Nature conservation programmes

- The nature conservation programmes (considered here) are not actively enforced (by e.g., administrative authorities), lack funding, and are considered during permitting processes.

2.1.4 Dissemination of the protection provided by national conservation measures

2.1.4.1 National conservation schemes

The NCA and NCAÅ could be considered the strongest conservation instruments in Finland, and the nature conservation areas and reserves could be considered the strongest protected area types, when compared to the international conservation instruments (section 2.1.2) (Pappila and Puharinen 2022; Virtanen, Forsblom, et al. 2022). The areas have increased judicial power, in addition to more specified and individualised legal precedence and establishment decisions regulating the restricted activities. In contrast, e.g., the N2K network, based on the protection of species and habitats, has been considered to insufficiently describe marine underwater biodiversity (Virtanen, Forsblom, et al. 2022; Virtanen et al. 2018); overall, the habitats are considered poor surrogates or proxies for marine biodiversity (Virtanen et al. 2018). Focusing conservation efforts on threatened species and habitats (i.e., rarer features) may in fact prove detrimental for overall conservation. Authors (e.g. Virtanen and Moilanen 2023; Kuismanen et al. 2022; Jantunen et al. 2020) have proposed moving toward the inclusion of biological and ecological features as a whole in conservation, by accounting for, e.g., ecological networks, functions and interactions.

The NCA specifies certain “baseline” regulations in PAs (NCA 49-51 §§), which can be further specified in the establishment documents. This implies that, e.g., YSA areas may widely vary in their regulations, ranging from only the baseline regulations (with possible exemptions) to even stricter protection, through e.g., movement restrictions or material extraction bans. Seal reserves and national parks are restrictive in their regulations, although the national parks less so, and the restrictions may vary temporally and spatially. The national PA types could be argued to have more concrete restrictions and prohibitions, when compared to e.g., the N2K sites, which to a large degree are based on the non-deterioration requirement and have to a large degree been implemented utilising the WA in marine areas, and concerning only the protected natural values due to which an area has been included in the N2K network.

Finland does not yet have marine nature parks or areas that could be considered wilderness areas according to the IUCN protected area categorisation (Ib). Nature parks could be considered among the strictest PA types nationally, as they are for the most part closed off for the public. A written permission from Metsähallitus is required to roam the areas unless there are defined paths from which one cannot stray (NCA 56 §). Permissions are only granted for scientific reasons. Nature parks could be considered in a marine setting, if an area meets the establishment criteria (defined in NCA 45 §):

- The area is at least 1000 ha of size,
- The area is owned by the state,
- The area must be of importance for
    - securing the natural development of the area,

- scientific research, or
- education.

Marine nature and its features have previously been explicitly missing from the national legislation (included only in, e.g., the WA: small flads in natural state), and only recently were two marine habitats included in the NCA: eelgrass (*Zostera marina*) bottoms and sheltered charophyte bottoms. This implies that in the future, the characteristics of such habitats cannot be jeopardised or destroyed, provided that an ELY centre has specified and delineated the area in question and informed the property owner of the delineation decision (NCA 64 §). The habitats are thus not by default protected (like the flad habitat of WA 2:11 §), or similar to the protection of particularly important habitats in 10 § of the Forest Act (1093/1996) (Jantunen et al. 2020), despite many habitats remaining Red Listed (Kontula and Raunio 2018, Kotilainen et al. 2019).

Despite the addition of the two marine habitats to the NCA, the realisation of protection of these habitats may prove challenging. For the habitats to gain legal protection, they:

(1) need to be delineated, requiring a spatial indication of occurrence, requiring information (or additional information),
(2) NCA 64 § requires the habitats to be in natural or natural-like state, and
(3) to be of importance for the conservation of the habitats type, for the habitats to qualify for delineation.

The areas (habitats sites) may also lose their protected status, if degraded. Additionally, as stated in HE (76/2022), the addition of the two marine habitats also requires new skills from the authorities, further requiring new or increased resources and financing. The delineation process has previously (i.e., before the addition of the marine habitats) also been relatively under-utilised, though it has been considered functional by property owners (HE 76/2022). As noted, the delineation requires spatial information on the occurrences of the species, and the species need to have sufficient coverage and be the dominant vegetation type in the area. The Velmu programme has mapped underwater nature since 2004, produced and published, e.g., species and habitat distribution models, which may aid authorities with the delineation process as well as the targeting of future inventories. Despite the efforts of the Velmu programme and the inventories having concentrated in coastal areas, a large portion of the data are from already protected areas. Areas remain unexplored, and there is no monitoring of, e.g., older observations. Monitoring is however developed in the BIODIVERSEA LIFE-IP project actions A6 (Developing a network for monitoring programme) and A10 (Improving the monitoring of marine bird distribution and abundance in Finnish sea area). The sheltered charophyte habitat may be easier to identify because they occur in, e.g., coastal flads, which are also easier to delineate, due to the geographically distinct nature of flads or more sheltered bays.

The naturalness requirement may however provide challenging, especially concerning the sheltered charophyte bottom habitat, because the Finnish coast is to a large degree populated close to the coast, including second homes, where human activities, such as dredging operations take place (Virtanen et al. 2023). The areas may thus not be considered to be in natural state.

Further, only two marine habitats out of the numerous threatened marine habitats (Kotilainen et al. 2019) were included in the NCA. This implies that the other threatened habitat types do not have similar levels of protection (i.e., delineation, but not necessarily required to establish an MPA), although MPAs can still be established (see list of establishment requirements in section 2.1.3) based on other ecological features.

Although there seems to be a focus on threatened or endangered species and habitats, parts 6 and 7 of NCA 43 § enable the protection of non-threatened and non-endangered features. Jantunen et al. (2020) suggested that the goal should be to achieve ecologically functional ensembles, that could follow e.g., the terrain, not only smaller components of functional ensembles. The functional ensembles should further also include non-threatened species, as they are also part of and

support the functioning of ecosystems, and e.g., the HD habitats might not function well as proxies for biodiversity (Virtanen and Moilanen 2023; Virtanen et al. 2018). Jantunen et al. (2020) also suggests it be specified in the NCA that the characteristics of the habitats in 64 § cannot be deteriorated by activities outside of the delineations, either. HE (76/2022) and Kuismanen et al. (2022) also suggested that threatened habitat types be included in the NCA and its Decree similarly to threatened species. This would promote the investigation of their occurrences in land use planning as well as impact assessments of projects and would increase their importance in the consideration and implementation of project permits.

However, Virtanen and Moilanen (2023) showed that focussing only on the conservation of endangered species and habitats might not even safeguard the endangered species themselves, and that more common (non-threatened) but habitat-forming species should be protected as well, in order to better preserve the functionality of ecosystems. The threatened species may have more limited ecological niches compared to more tolerant and adaptive species, and the former may be reliant on the functioning of the latter (Virtanen and Moilanen 2023). Further, Virtanen and Moilanen (2023) also suggest that conservation should focus more on protecting more complete ecological ensembles, in order to ensure the protection of whole systems and not only parts of them.

Conclusions: National conservation schemes

- Some of the national conservation measures (e.g., nature conservation areas) may have quite strong regulations, providing higher levels of protection than, e.g., international area types.
- Defining strict protection and utilising no-use/no-take in marine areas, such as those of the terrestrial nature parks. The definition of strict protection may be open to certain interpretation (EC 2022a). Ideally, strict protection would be harmonised among countries. The BSAP (HELCOM 2021a) also includes objectives regarding strict protection and conservation in general (objectives B1-B7).
- N2K habitats have been considered to not describe marine biodiversity very well, and the focus of conservation efforts has been suggested to consider ecosystem ensembles, instead of focusing on specific threatened species and/or habitats.
- There are currently no nature parks in a marine setting, thus marine parks could be considered in the development of the MPA network. Further, IUCN protected area category Ib wilderness areas could also be considered.
- Only two marine habitats were added to the updated NCA (9/2023), while there are still numerous other threatened marine habitats. The addition of the habitats is a step in the right direction, but some challenges may exist due to the nature of the protection measures.
    - The process requires information, the natural or natural-like state of the habitats, importance for the conservation of the habitat type, as well as monitoring.
- The national conservation measures have a focus on threatened species and habitats and is has been suggested that conservation should consider more “common” (not necessarily threatened) nature as well, which support both the threatened species as well as the broader ecological communities, i.e., conservation could be made less reactive, and instead more proactive and balanced between threatened and common ecological features.
    - The problem with including only smaller-scale ecological or biological features, such as threatened species or habitats, is that they do not describe the marine system sufficiently or holistically (see e.g. Virtanen and Moilanen 2023) and compare to the preliminary investigation of Soininen and Pappila (2023).
- Review how well international commitments, agreements, directives, and such have been implemented in Finland, and if the implementation is sufficient regarding, e.g., conservation, level of obligation, strength of regulation or implementation nationally. Topics to review could be or include:
    - HELCOM (HOLAS assessments, BSAP, recommendations and projects)
    - Ramsar
    - EU Directives such as the HD, BD, MSFD, MSPD, or WFD
    - Agreements such as the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), Agreement on the Conservation of Populations of European Bats (EUROBATS), or Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
    - Conventions such as Convention on the Conservation of Migratory Species of Wild Animals (CMS, also known as the Bonn Convention), or Convention on Biological Diversity (CBD, e.g., GBF).

2.1.4.2 Land use planning at different spatial scales

Land use planning is a spatial land-/water-use process directing the human use of areas and constructions. In Finland, the land use planning process is divided into three layers: the regional land use plan, the (local) master plan, and a detailed local plan. Finland and the Åland Islands have

also adopted maritime spatial plans (MSPs), as stipulated by the MSPD and LUBA and WAÅ. MSP is discussed more in section 2.2. One of the objectives of land use planning and the LUBA (5 §) is to preserve biological diversity. The LUBA is also cited as an implementation method of some N2K sites, but more often concerns land areas, implying that the conservation targets of the N2K site in question are to be preserved by means of land use planning.

The most general and upper-most level of planning process is the regional land use plan, which directs the local master plan, which in turn directs the local detailed plan. The land use planning processes are directed by the LUBA. A decree on the symbology used in the land use planning processes under the LUBA was given by the MoE (2000). The symbology includes, inter alia, markings related to ecological and diversity features, and through the zoning processes areas where, e.g., deteriorating activities are restricted can be delineated.

The regional land use plans are prepared by the regional councils and are approved by the MoE (LUBA, chapter 4). The regional land use plans coordinate the regional and local objectives with the national objectives.

The purpose of the local master plan is the governance of land-use and the community structure in a municipality or part of one. A local master plan is prepared as the basis for a municipality's detailed statutory land-use planning and for land use and construction, and the preparation of amendments to local detailed plans or detailed shore plans is subject to the provisions of the local master plan (LUBA, chapter 5). A local master plan is approved by the local council. If municipalities prepare a joint local master plan, it shall be subject to the approval of a joint decision-making body of the municipalities and ratification by the MoE (LUBA, chapter 6).

The purpose of the local detailed plan is to guide the construction processes of the municipality or part of it, and the organisation and development of area use (LUBA, chapter 7). The local detailed plan is approved by the local/municipal council. The local detailed plan shows areas designated for different purposes (e.g., residential, industry, recreation, transport) and lays down guidelines concerning construction (e.g., location and size of buildings) and land use.

Conclusions: Land use planning at different spatial scales

- Development and implementation of a common holistic planning platform where all aspects of the marine environment are included, bringing together all actors in the marine realm to a common planning tool (suggested in Soininen and Pappila 2023). In a sense, it would be similar to the MSP, but would include activities on land, as they may either indirectly or directly affect the marine environment.
- Identification of the most vulnerable marine areas, in order to steer deteriorating activities elsewhere.

2.1.4.3 Regulation of the Water Act

The WA is relevant because it is an implementation method often used in the marine parts of N2K sites, and because human activities, that, broadly stated, physically affect the marine environment to a large degree, require a "water" permit. The WA 2:11 § also stipulates that the naturalness of a maximally 10 ha sized flad (along other more terrestrial features) in natural state cannot be jeopardized. The 2:11 § of the WA applies to all habitats that match the description, and not only those that appear within PAs or have no pre-existing delineation. The WA has no definition regarding the maximum size of a flad, and the 2:11 § of the WA only implies that flads larger than 10 ha are not automatically protected, and that the need of conservation is to be resolved on a case-by-case basis (KHO 784/2018).

The permitting authority may in exceptional cases, where the conservation objective(s) can be considered to not significantly deteriorate, grant permission for activities in natural flads. Currently, no common definition of what characteristics define a flad in natural state exists in Finland, although some general guidelines exist (Tolonen et al. 2019), and such features have been identified according to one methodology and set of criteria in the Archipelago and Bothnian Sea areas (Sydänoja 2008), complicating the features' conservation. The Velmu programme has attempted to amend this data gap by recently performing a field campaign focusing on coastal flads, to clarify factors constituting, among others, the naturalness state of flads.

Similar to the determination of significant deterioration (NCA), the naturalness of aforementioned flads have also been processed in case law. According to a spatial analysis by Haapamäki (2021), the 1st stage in the flad successional development is currently the least protected and concludes that due to the natural succession of the habitat, we might with time have diminishing numbers of lagoon habitats in natural state. An argument could also be made, that due to the eutrophication of the Baltic Sea, very few flads in natural state exist (e.g. Haapamäki 2021). However, after the natural state of flads has been defined, and the locations of the features identified, there are several possibilities to regulate the (deteriorating or jeopardising) activities within those features, through different instruments as well as legally. Due to the flads occurring coastally, many of these areas are however likely privately-owned, which might complicate their protection.

Certain activities, such as small-scale dredging (less than 500 m^3), fall under the notification obligation, where the local ELY centre must be informed about a planned dredging operation (up to 500 m^3) in advance. The ELY centres are then to evaluate the need for a permit, if e.g., the dredging operation poses a risk to nature or fish stocks, or the previously mentioned WA 2:11 § habitats. Individual dredging operations may not significantly affect the marine environment (if planned appropriately, e.g., during winter months), but the cumulative effects of many operations in a spatially confined area might, as a dredging operation completely removes the immediate vegetation where it takes place (e.g. Virtanen et al. 2023). When comparing the known (reported) vs. the dredging operations interpreted from aerial and satellite photographs, a large disparity between the two can be observed, implying that dredging operations are not always reported (Sahla et al. 2020; Kuismanen and Husa 2020; CKAN 2020). The assessment of cumulative effects of human activities is not explicitly regulated in the WA, unlike in permitting processes under the EPA, in the cases of N2K sites, or during environmental impact assessments (EIAs, Act on the Environmental Impact Assessment Procedure (252/2017)), hence, evaluation of cumulative effects of activities appears to be performed seldom (Kuismanen et al. 2022). Assessing cumulative effects of activities is increasingly important as more activities are planned in the marine areas, as seemingly small-scale activities may in time cumulatively cause large deteriorating effects, if, e.g., essential habitats are lost over time.

Only the most significant point-based human activities deteriorating or disturbing the marine biodiversity are considered in the WA permit process, during which a comparison of interests takes place, in which aspects of marine nature can be widely taken into account as part of the loss of public interest caused by the project (Pappila and Puharinen 2022). The activities may however be granted permits, if the benefits from the activity exceed the harms to a sufficient degree (no objective or exact measure of what is *sufficient* exists, and is based on case law), even if it is at the cost of the marine nature (Pappila and Puharinen 2022).

The river basin management plans and the marine strategies must be considered in the WA permitting process, indirectly providing some protection for the marine nature. The objectives of the river basin management partially include the seabed integrity criterion. Even though the environmental objectives of river basin management are not directly connected to the conditions of granting WA permits, case law of the Finnish Supreme Administrative Court (KHO) has confirmed that the Weser judgement of the EU court applies to the goals of the permit consideration (Pappila and Puharinen 2022). Consequently, a permit cannot be granted for activities that destroy or disturb the seabed of coastal waters, and in a deteriorating way affect the environmental objectives, unless

granted an exemption according to VMJL 23 §. Currently, the legal situation regarding the granting of an exemption and the relationship to the permit consideration is unclear (Pappila and Puharinen 2022).

The objectives of the marine strategy process describe marine nature more broadly than the water management objectives and are applied further out in the sea area in addition to the coastal waters within the scope of river basin management. However, the goals of the marine strategy are very weakly connected to the WA permitting consideration through the obligation to consider the marine strategy. The consideration obligation does not distinguish whether the effects of the project must be reflected in, e.g., definitions of Good Environmental Status (GEnS) covering wider geographical areas, environmental objectives of the marine strategy, or measures included in the marine strategy action program. The consideration obligation is also weak in terms of legal obligation, which is why it is unclear whether aspects of marine management could have a significant impact on the WA's permit consideration. In the absence of Court of Justice of the EU rulings and national case law, aspects of the marine strategy currently do not have increased weight in WA permitting consideration (Pappila and Puharinen 2022; Puharinen, Hakkarainen, and Belinskij 2021). Another aspect to consider could be how straightforwardly the commitment adopted on the river basin management side could be applied to the marine strategy side in general. It would be good to consider the differences between the two different planning systems in terms of, e.g., the geographical and natural science boundaries they use. The geographical delineations (or limitations) can be thought to have a significant effect, e.g., in a situation where the effectiveness of, say, a singly project and the related burden of proof on the scale of the marine strategy (the entire Finnish sea area) would have to be evaluated, compared to the relatively smaller water body used in river basin management. It would likely be easier to show the impact of a single project on a smaller scale compared to the state of the entire sea area. It might also be easier to show the impact, e.g., in a more coastal setting compared to the open sea.

In a report by Puharinen, Hakkarainen, and Belinskij (2021) on the legal effects of the marine strategy's objectives, the consideration of marine strategy aspects in WA permitting consideration was discussed, and concluded that it should be strengthened, especially by linking the environmental objectives of the marine strategy to the permitting conditions. The environmental objectives are a better measure for evaluating projects under WA, than objectives of a good state for the entire sea area; for example, the integrity of the seabed is assessed, and a target of good status is set on the scale of the entire sea area. However, this also requires that the environmental targets of the marine strategy are set in a way that is appropriate in terms of directing the permit consideration. This could be considered in particular when, e.g., defining limit values for the total amount of lost and disturbed seabed for different areas in environmental goals, or even defining the most suitable placement sites for different types of projects (Pappila and Puharinen 2022).

The WA as a regulatory instrument is quite ineffective in controlling activities that fall outside the threshold or list of activities requiring a permit. The notification procedure of the WA is mainly intended as a communication channel, and in addition, an apparent problem appears to be the neglect of notifications (see previous dredging notification example). The N2K regulation of the NCA also applies to projects processed in the notification procedure, and the authorities have an obligation to prohibit a project that significantly deteriorates nature values in a N2K site. However, in the case of projects that are often processed in the notification procedure, it is rather a matter of mutual effects and cumulative effects rather than the fact that a small-scale project alone would cause effects prohibited in the Natura regulation (Pappila and Puharinen 2022). Currently, the WA does not regulate the cumulative effects of activities, except if a project is either listed as EIA-requiring in the EIA legislation (Annex 1 of EIA 252/2017) or is considered to exceed an impact threshold, thus requiring an EIA despite the project type not being listed in the aforementioned annex.

Conclusions: Regulation of the Water Act

- Due to their coastal nature, a large portion of the protected features of the WA 2:11 §, flads, likely occur in areas owned by private property owners, which may complicate their conservation, i.e., by designating a protected site, and may have implications of human pressures.
- Investigating how to define and what constitutes natural coastal lagoon features (WA 2:11 §).
- The notification obligation regarding, e.g., small-scale dredging operations, may not function as a communication channel between the authority and operator, as indicated by a comparison of reported and observed dredging operations.
- For example, dredging operations only require a permit once the volume of dredged material reaches over 500 m^3. The notification procedure regarding dredging operations smaller than 500 m^3 should be developed to better consider marine biodiversity and nature. Dredging operations completely remove existing vegetation from the dredged area and may temporarily obscure the sunlight from reaching deeper into the water column. See e.g. Virtanen et al. (2023) on the biodiversity effects of recreational land-use, such as dredging, in coastal Finland.
- The WA has limited capability to regulate the cumulative effects of activities. Assessing the cumulative activities is increasingly important the more activities that take place in the marine area, and depends on, among others, the spatial scale of the assessment.
- Developing a system or method for the assessment of cumulative impacts of human activities, to holistically be able to assess effects of human activities on nature.
- Develop the permitting processes (not necessarily only regarding the WA) by adding a requirement for new projects or activities to consider the cumulative effects of the project.
- Components related to, and the role of the objectives of river basin management and the marine strategy in their current form remain unclear as per their role in permit processes. The linking between the WA and e.g., marine strategy has previously been suggested to be strengthened and clarified, i.e., the marine strategy would have increased weight in permit processes.
- Alternatively, investigate how straightforwardly the commitment adopted in the river basin management side could be applied to the marine strategy side in general. In the review, it would be good to, e.g., account for the differences between the two planning systems regarding, e.g., the geographical and natural boundaries they use, as the spatial scale may have a significantly effect on outcomes of e.g., permit applications.

2.1.4.4 MPA management and zoning

The Finnish MPAs may also include zoning within the MPAs' management plans and rules of conduct, which may include, e.g., bans or restrictions regarding certain more destructive activities, such as anchoring, movement, fishing, material extractions etc. locally within an area. The smaller zones within MPAs may thus have an increased level of protection compared to other parts of the same area. The purpose of zoning in MPAs can be, e.g., to conserve certain features, and the restrictions reflect said feature, and to not unnecessarily restrict e.g., movement in areas where said restriction may be unfounded. The principles regarding the management of PAs in Finland is described in Metsähallitus (2023).

Further, NCA 57 § stipulates that a management plan must be drawn up to organise the management of the national park, setting out the measures to be taken to achieve the objectives for establishing the national park. A management plan may also be prepared for a nature park or other na-

ture conservation areas of the state. The management plans are prepared by Metsähallitus. Management plans may also be prepared for privately-owned protected areas, and those are approved by the ELY centres, if the plan has the consent of the property owner.

NCA 58 § stipulates that Metsähallitus must draw up the rules of conduct for national parks, guiding its users. The rules of conduct are to contain the necessary restrictions regarding the use of the area, based on section 56, subsection 2 (restrictions to movement) of the NCA. If necessary, Metsähallitus may also draw up rules of conduct for a nature park and other state nature conservation areas.

A similar problem regarding data exists here as with the N2K sites' implementation method not being digitised – the digitised information is not complete. Information on zoned areas may exist in either paper format or on electronical documents, but not all exist in spatial data format in the ULJAS database. The information is more complete on state-owned protected areas, and can be found on, e.g., the Retkikartta service (Metsähallitus 2023b). Further, the fishing restrictions exists on a separate web-based spatial service (MMM 2023c), and areas restricting water traffic exist on the Finnish Transport Infrastructure Agency's web-based spatial service (Väylä 2022). A problem is that all restrictions do not exist in the same service. A user may only use one service regarding one type of restriction and may not be informed about other restrictions in place. The digitising of the regulatory zones within the various types of MPAs in Finland, as well as other restricted areas (e.g., fishing or water traffic restrictions), and listing the regulations within each of the zones, could be utilised to create a spatial layer or analysis, informing about the "cumulative regulations" within overlapping areas (Figure 1). This would be important in evaluating the theoretical level of protection in the marine areas (theoretical because it would not include compliance of restrictions), would aid in, e.g., identifying areas which could be considered to fall under the strict protection objective of the EUBDS (if so called cumulative regulations from overlapping restriction schemes can be considered as such), investigating how well ecological features are protected (and if sufficiently; if linked with biological and/or pressure data), and inform the public about restrictions when, e.g., boating, if developed into a live web-service or published alongside sea charts. A large digitising effort regarding the privately-owned PAs is currently ongoing in the A4 action of the BIODIVERSEA LIFE-IP project.

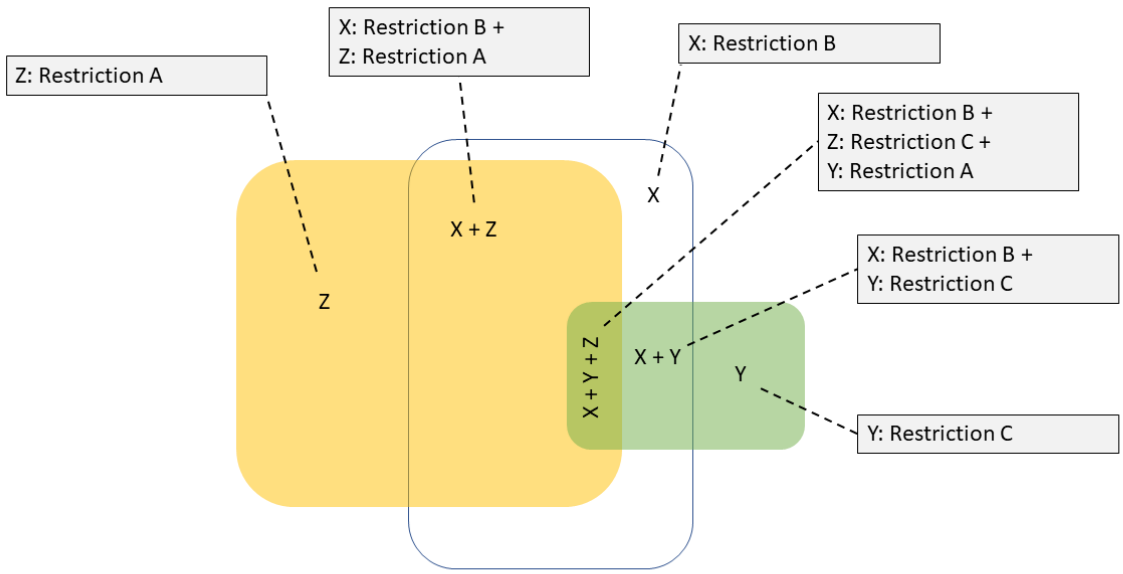

Figure 2. Simplified demonstration of cumulative regulations framework and spatial analysis. Blue outlined area imposes X restrictions within its area. Yellow area imposes Z restrictions in its area, but with overlap from blue area, restrictions

are now from the both of them (X+Z) within the overlapping area. Similarly, overlap from one or both of the blue or yellow areas with the green area imposes certain restrictions (e.g. X+Y, or X+Y+Z), while Green by itself restricts Y. Sizes and overlaps of shapes do not reflect any real spatial area coverages of regulations.

Conclusions: MPA management and zoning

- Different types of restrictions regarding different types of human activities exist in separate databases. Further, not all areas, e.g., zones within MPAs, have been digitized. To be able to evaluate levels of protection, it would be important to combine and produce a data layer or product describing the overlapping, or "cumulative" regulations of areas.
    - The data layer could further be utilised to analyse the de facto (theoretical, excluding the compliance aspect) level of protection, if combined with other, e.g., biological and human pressure data or it could also be utilised and published as a standalone data product or map service, for the use of anyone roaming the sea (e.g., recreational boaters), to inform on the restrictions of zones and areas.

2.1.4.5 Ownership status of ecologically valuable marine areas

The ownership of marine areas further complicates the increase of protection in marine areas and may prove to be a bottleneck if the goal is to protect the de facto most valuable nature areas (cf. 30% and 10% strict conservation objectives). Metsähallitus governs the state-owned marine areas, but a large portion of the shallow, innermost coastal areas, which are currently outside of the MPA network, are owned by private entities, such as municipalities, NGOs, private citizens or participant's associations. Even features which are otherwise easily delineated, such as flads (Annex I HD habitat Coastal lagoons, 1150; VU (Kotilainen et al. 2019)), are often on private properties (Virtanen, Forsblom, et al. 2022).

There is also an important difference to note when negotiating with participant's associations regarding private protection, when compared to negotiating with individual or only a few owners. Participant's associations make decisions collectively or they have a delegate body which is chosen by the shareholders to make the decisions. The shareholders that own more shares have more votes and therefore more power to affect outcomes.

Property owners may not be willing to protect their own areas, due to, e.g., fear of possible restrictions. Municipalities may be more open to conservation, and the city of Helsinki, for example, plans to increase the PA coverage in its areas in the coming years (City of Helsinki 2021; City Council of Helsinki 2019).

Conclusions: Ownership status of ecologically valuable marine areas

- A large portion of the shallow, innermost coastal areas not included in the MPA network are owned by private entities, complicating the conservation of such areas. The process of possible conservation of such areas could be aided through, e.g., education regarding the benefits of protection, as well as the process and regulations that may follow. A financial incentive could also be of benefit.

2.1.4.6 Fishing and fishing restrictions

Most protection of fish species is regulated in the Fishing Act and Decree. Some non-commercial fish species were previously included under the purview of the NCA (1096/1996), and its NCD

(160/1997; Annex I), but were excluded from the current NCA (9/2023) and NCD (1066/2023). The species in question (several occurring in the sea) were according to HE (76/2022) expected to have sufficient legal protection under the FA and FD. Marine protected areas (NCA) can also stipulate restrictions, as well as exemptions, to fishing. The NCA (50.5 §), however, exempts general fishing rights from the provisions on the protection of national parks and nature parks according to the FA 7 § if the conservation objectives of the area are not jeopardised. Other types of fishing in national parks are regulated by permitting (NCA 51 §). Overall, the restrictions to fishing within protected areas of the NCA, as well as areas of restrictions to some general fishing rights of the FA (54 §; established by the ELY centre), are very varied. Some areas prohibit fishing completely, year-round, and others prohibit fishing temporally, e.g., period(s) of time. Restrictions may also apply to gear types.

General fishing rights (FA 7 §)

1. *Everyone has the right to fish for herring free of charge using a single rod with vertically movable hooks attached to the line.*
2. *Any person who has paid the fisheries management fee and any person younger or older than the age limits laid down in Article 79, subsection 1, shall be entitled to engage in bait fishing. The fisheries management fee and its payment are regulated in Chapter 9.*
3. *The rights referred to in paragraphs 1 and 2 shall not apply to rapids and watercourses of migratory fish stocks, nor to waters where fishing is prohibited under any other provision. Fishing competitions for angling, spearfishing, lure fishing and other similar organised events shall be subject to authorisation by the holder of the fishing rights.*
4. *The provisions of paragraphs 1 to 3 shall also apply in State-owned waters.*

According to the FA (8 §), fishing is allowed in other state-owned PAs (NCA 52 §), covering commercial fishing as well. Metsähallitus decides on fishing permits and the rights to fish in public water areas, accounting for the national fish resources management. If necessary, fishing can be restricted in these areas by ELY centres. In private PAs (NCA 53 §), necessary regulations need to be in place to fulfil the conservation objectives, including restrictions to movement (NCA 56 §).

The N2K sites have all-encompassing measures in place regarding fishing (e.g., regulations on commercial fisheries or minimum landing size), as well as site-specific regulations (e.g., Seal Protection Areas). These, however, need to be compared to the new NCA. All Finnish N2K sites have site-specific conservation objectives (SSCOs), but with some uncertainty if all measures are in place. Nationally designated areas also have SSCOs. In some MPAs, movement restrictions have been stipulated (NCA 56 §), either seasonal or year-round, which de facto restrict fishing (when restrictions are in force); these, however, also need to be compared to the new NCA. The movement restrictions have not been stipulated because of fishing, but for, e.g., the purposes of protecting breeding birds from disturbances.

Finland also has an exemption for designating N2K sites for the following HD Annex II species: European bullhead (*Cottus gobio*), salmon (*Salmo salar*), European river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*), spined loach (*Cobitis taenia*), and asp (*Leuciscus aspius*). Thus, the linkage between fishing and SSCOs in MPAs cannot be based on the aforementioned species. Of the species listed, only the salmon faces some fishing pressure, from both commercial and recreational fishing. Fishing of salmon is also regulated both internationally as well as nationally. Fishing of lampreys is also strictly regulated (e.g., prohibition of fishing between the 1st of April and 15th of August), and catch numbers are small.

So called no-take areas do not exist in Finland. Despite the many types of MPAs in Finland, such as national parks, HELCOM MPAs, temporary fishing restriction areas, and nature conservation areas (which varyingly may restrict fishing), none of them necessarily restrict all fishing. In Sweden, a report

reviewing the effect of some Swedish no-take zones was recently published (Bergström, Berkström, et al. 2022), and showed that there have been positive effects to the targeted fish stocks. Assessments on the effects of no-take areas, as well as clarification regarding the establishment of such areas in Finland would not be unfounded, especially with certain fish stocks diminishing. Popular predatory fish stocks under heavy recreational fishing pressure, such as pike and pikeperch, could benefit from a sanctuary from fishing pressure.

One of the most important factors affecting the state of the Baltic Sea is eutrophication along with synergistic effects of climate change (e.g. HELCOM 2023b; Viitasalo and Bonsdorff 2022; Andersen et al. 2017), to which area-based conservation measures are not the answer. The aforementioned factors (among others) in turn affect the water quality (e.g., temperature, salinity, pH) in an unfavourable way for many fish species, which may, e.g., reduce their chance of successful reproduction. Hence area-based protection, restoration, or legal regulation of fisheries is not the answer to all problems fish stocks are encountering and requires actions on larger scales, such as mitigating effects of climate change or improving the environmental state of the Baltic Sea.

Conclusions: Fishing and fishing restrictions

- Fisheries regulation appears to function relatively well, due to the strong regulations, but there are many data gaps and problems affecting fish stocks that cannot be solved with area-based conservation.
- Improvements in the monitoring methods of migratory fish. Outside of known migration routes, fishing data reporting, or tracking individual fish, it is challenging to say how the fish distribute in the sea. Conservation measures are therefore focused on areas important for their reproduction and by, e.g., setting minimum catch-sizes.
- Human constructions such as hydropower and damming prevent migratory fish from reproducing. The significance of hydropower in Finland's energy production has diminished (Soininen et al. 2018) and could be expected to further decline in the future, as we are transitioning toward more renewable energy production. Further, WFD obligations might lead to changes in legislation (Soininen et al. 2018). Hence, change of relevant legislation, e.g., permanency of water permits.
- Assessment and clarification on the efficacy and establishment of no-take zones in Finland. It could involve a project to, e.g., review evidence from outside of Finland (or if de facto no-take zones exist in Finland due to regulations), designating a no-take zone (temporary, time-scale of years) in Finland in order to monitor and review the results, review and assess the feasibility of no-take zones in Finland, and in which case, how to judicially implement them.
- Legally protect important breeding and juvenile areas of fish from deterioration (e.g., similar instrument as the NCA's or WA's habitat conservation). The fishing restriction designations of the FA (53-54 §§) only concern fishing, and not, e.g., the deterioration of the designated area. If the habitat is no longer appropriate for the fish species, the fish may migrate elsewhere despite the effect of the fishing restriction.
    - The EUBDS states that strict protection may concern important ecosystem services.
- The state of the Baltic Sea requires efforts other than conservation, in order to ensure the vitality of fish stocks, such as mitigating climate change or the root-causes of eutrophication.

2.1.4.7 Spatial coverage of the MPA network

A significant challenge of reaching the 30% spatial conservation objective (and the 10% strict protection objective) remains. Because a large portion of what could be considered the most important or significant marine areas ecologically are situated in privately-owned areas, the question becomes how to incentivise these landowners to contribute toward the increase of the network of protected areas. Authorities have the option to expropriate private properties under certain conditions, but this should be avoided if possible. Simultaneously, establishing privately-owned PAs also risks protecting very little, if the landowner wishes to retain most of the rights to exercise activities; essentially, the conservation benefit may not be large. The establishment conditions of nature conservation areas are listed in NCA 43 §, and the restrictions should reflect the requirements of the protected features. Thus, the procurement of areas for the state could be considered, but not forced, and could include certain incentives for the property owner. Another option would be to establish a voluntary conservation programme like the METSO and HELMI programmes, as is mentioned in the current Governments programme (Finnish Government 2023b), for the protection of marine nature. It would also be beneficial to inform the public about the importance and benefits of conservation and biodiversity. Another important factor to consider regarding the 30% conservation objective is that it does and should not imply that the remaining 70% is open to human exploitation, especially because the effects of activities are not necessarily restricted to outside the MPA delineations. A balance should be achieved, with an open dialogue with all actors to reach a common understanding regarding the use of marine areas. It would be important to fit together all interests regarding the marine environment, thus requiring a more holistic planning approach. The purpose of the Meriverkko network established as part of Action A5.2 in the BIODIVERSEA LIFE-IP project is to bring together and connect different sectors and actors and would function as a platform for dialogue. Involving the public and stakeholders in the conservation and decision-making processes could make the processes increasingly transparent and also increase their acceptability.

An approach to take regarding the conservation of ecological features would be to first evaluate what activities are harmful for the ecological feature, and based on that, restrict activities accordingly in an area. Further, it might not be fruitful to conserve areas that otherwise would qualify for conservation schemes but are under no (human) pressures.

An idea to investigate the efficacy of the MPA network, as well as identifying gaps in protection:

1. First, the compilation of cumulative regulations (cf. Figure 1). This would not only include regulations from PAs, but also other areas restricting human activities and providing de facto biodiversity and ecosystem benefits, such as fishing restriction areas and water traffic restriction areas (potential OECM areas), as well as potential stricter protection regulations in smaller zones of existing PAs (e.g., anchoring or movement restrictions). The compilation would probably require certain standardisation or categorisation of restrictions.
    a. This by itself, could function as a map service for, e.g., recreational users of the sea, especially if restrictions are updated in real-time, i.e., fishing restrictions would be seen when they are active (as they are not necessarily active year-round), especially if developed as a multi-platform application, that could for example, ping a user's phone when approaching a restricted area. The idea is similar to the ProtectedSeas Navigator service (see e.g. Driedger et al. (2023) and Sletten et al. (2021) for applications).
2. The cumulative regulations analysis could then further be compared to
    a. Known ecosystem/ecological features in the MPAs, and even further,
    b. The pressures in said area, in order to evaluate the current MPA network (efficacy) and if restrictions correspond to the needs of the protected features, identify weaknesses in the network, as well as the development of the network.

An exercise like this could, for example, identify deficiencies in the current network, and if the restrictions to activities are based on what negatively affects the ecosystem features, the restriction would not be excessive, unless it is called for (such as a completely pristine environment in natural

state), as it would likely not be desirable to restrict all activities in every area. It should be noted that unless an area is effectively managed, and restrictions are not followed or enforced, the designated areas could be considered so-called paper parks, that essentially do not provide any biodiversity benefits (see e.g., Bustamante et al. 2014; Pieraccini, Coppa, and De Lucia 2017).

Conclusions: Spatial coverage of the MPA network

- Public and stakeholder participation in conservation decision-making processes, as well as education, could both inform the parties involved and educate them regarding the benefits of a rich biodiversity. It could also make the decision-making processes more transparent and acceptable. The Meriverkko network could function as a common platform.
- The efficacy regulation-wise of the Finnish MPA network could be investigated by (I) assessing the cumulative regulations regarding human activities in the sea, and by further including (II) ecological features, and (III) pressures in the areas.

2.1.4.8 Other aspects – data gaps, carbon-rich marine areas, follow-up ideas

Certain data from the marine environment are still lacking, both regarding the state of populations and distribution of species, and distribution and occurrence of habitats. For example, despite the efforts of the Velmu programme, there are still areas unexplored in the Finnish marine environment. For example, little information has been collected from very deep or offshore areas, the latter where shallower bottoms also exist, and where offshore wind parks may be and are planned. Further, slightly more than half of the Velmu surveys have been done within MPAs, i.e. just above half of the inventories have been done in approximately 11% of the marine area of Finland (Virtanen, Forsblom, et al. 2022). Temporally, the surveys are also singular points in time; information on the current state of a species or its distribution, especially concerning older data points, may not exist. Monitoring and the development of a monitoring programme is, however, planned as part of the BIODIVERSEA LIFE-IP project.

The EUBDS highlights the need to protect carbon-rich ecosystems. In the Baltic Sea, a large part of carbon is bound to sedimentation bottoms, which are otherwise not very significant in terms of nature values. Hence, activities modifying the bottoms should be limited, such as dredging operations (Moksnes et al. 2021). Many of these sedimentation bottoms are also situated on private properties or built as marinas. There is also a data gap, both in terms of location and carbon binding capacity. Some scientific studies have shown that certain macrophyte species and bivalves are significant carbon binders (e.g. Attard et al. 2019), but data is not available for all species. Eelgrass, for example, is an important carbon binder, but occurs scattered in the northern Baltic Sea, and thus binds what is a fraction of what e.g., reed (*Phragmites australis*) and other macrophytes can bind (Frigstad et al. 2021; Koponen et al. 2022), due to their wide distribution. The conservation of reeds may, however, prove challenging, as even though they are an important component in the ecosystem for many species groups, they are commonly seen as a nuisance, e.g., around second homes or cottages, and are often removed (Sahla et al. 2020; Kuismanen and Husa 2020; Virtanen et al. 2023).

Area-based conservation is not always a significant instrument, either, as many pressures that cannot be tackled with MPAs exist. MPAs have, for example, little effect in curbing climate change, although certain factors might contribute to the mitigation, but only under stricter protection schemes (Jacquemont et al. 2022; Sala et al. 2021). Additionally, as climate change is bound to change ecological components in the Baltic Sea (see e.g. review by Viitasalo and Bonsdorff 2022), it would be important to consider what will happen to current protected areas and their conserva-

tion objectives, if the conservation objectives, for example, gradually disappear or redistribute. Existing nature conservation areas could be considered quite permanent, and the adaptation to a changing environment may currently be quite laborious with the current regulative instruments. Similarly, future MPAs should include the consideration of climate change in the planning process, depending on the conservation objectives of the area. Eutrophication is another pressure against which MPAs have limited mitigative effects and would require actions or change in the terrestrial realm as well as regulation. Hence, a suggestion by Pappila and Puharinen (2022), for example, is that objectives of the VMJL and marine strategy should further be tied to relevant terrestrial legislation, such as LUBA and thus land-use planning processes.

In addition to PAs, other area types with restrictions, such as fishing or water traffic restrictions, or military areas, may positively affect the biodiversity of areas. The previously mentioned area types are, e.g., currently considered as potential OECM areas (Biodiversea Action A.5.3).

Conclusions: Other aspects – data gaps, carbon-rich marine areas, follow-up ideas

- More data and research regarding the marine environment are required regarding, e.g., deeper or offshore marine areas, where offshore wind power is planned.
- Carbon-rich ecosystems may be challenging to protect, because reed belts, for example, can bind large amounts of carbon, but may not be considered conservation-worthy.
- The climate change factor should be incorporated in the MPA designation process, especially if futureproofing is desired, and because the designation process could be considered rigid.
- MPAs have limited effects on, e.g., curbing the eutrophication problem of the Baltic Sea, and would, for example, entail changes to legislation focused in the terrestrial. An example would be to strengthen the objectives of the VMJL and marine strategy in land use planning processes.
- Development of clear indicators for marine biodiversity**,** descriptions of what marine biodiversity is and implies, and based on that assess limits for the amount or nature of human activities allowed. Further, develop indicators to gage the total biodiversity loss. The process of deterioration accumulates gradually (e.g. small dredging by small dredging), and at some point the carrying capacity of the system may reach a point-of-no-return, after which a new “normal” is reached. Indicators are also useful for authorities assessing environmental or nature effects of human activities and could harmonise the processes.
- Improvement of the efficacy of existing protection measures. Many smaller-scale pressures are left unidentified and unregulated. For example, the runoff from land to sea through rivers includes diffuse pollution/pollutants, from e.g., agriculture, traffic, or rural housing (Airaksinen et al. 2020).
- An example of an important feature to find more information about are the ferromanganese concretions, as interest in the economic exploitation of these and other minerals have increased in the recent years (e.g. Kaikkonen and Virtanen 2022; Kaikkonen et al. 2021), and they are still relatively unknown ecologically (Kotilainen et al. 2020).
- Not much ecological data from areas greatly affected by humans exists. There is especially a lack of before-after data regarding areas impacted by human activities, leading to challenges in the evaluation of environmental impacts (Virtanen, Forsblom, et al. 2022).

2.2 Are there contradictory obligations in different marine related sectoral legislation, which deteriorate conservation of the marine biodiversity?

One of the main challenges will be to find a balance for all the actors and sectors at sea, between economic exploitation of marine areas, social and cultural values, and the conservation of valuable nature. Does the 30% conservation target imply that the remaining 70% of the sea is free-for-all? The 30% protection goal may indirectly be even larger, due to e.g., the non-deterioration requirements of nature values, which is to be assessed outside of the PAs, as well, or the evaluation of cumulative effects of activities. Many larger-scale and impacting activities can likely not border PAs, as they may be considered to harm the protected values. A large portion of the most valuable nature features appear by or close to the coastline based on current knowledge (e.g. Virtanen, Forsblom, et al. 2022; Lappalainen, Kurvinen, and Kuismanen 2020; Lappalainen et al. 2019), where many economic interests also lie. Further, the innermost coastal areas are often privately owned, which complicates e.g., conservation efforts.

2.2.1 Blue growth

There is currently a growing need to transition toward renewable energy sources**,** due to, among others, climate change, environmental degradation, and politics (see e.g., the EU REPowerEU Plan (EC 2022b), which sets goals towards saving energy, producing clean energy, and diversifying our energy supplies, as a response to the complications in the energy market caused by Russia's invasions of Ukraine, and phasing out the Russian fossil fuel imports). The growing demand for offshore wind farms (OWF), for example, requires large areas set aside for the turbines, also limiting other human activities within the areas, and essentially completely changing the sea bottom environment and a certain route to the coast due to the power cables. Certain strategies, such as Blue Growth, which in a sense is incorporated into maritime spatial planning (MSP), promotes a sustainable development and growth of the maritime economy, while not jeopardising the achievement of the GEnS (MSFD), nor the resilience of the marine ecosystem, i.e., the marine ecosystem's capacity to adapt to human activities.

There is no guidance in the MSPD as to how Blue Growth is to be implemented. It is therefore up for interpretation in each MS, or ideally, achieve a common understanding. This may or may not pose a risk to the marine environment and the achievement of GEnS or GEcS (WFD), depending on the approach. For example, one conflict of interests was raised by van Hees (2017); the increase of renewable energy under the Renewable Energy Directive (RED; Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources), which might conflict with, e.g., nature protection law and water law, such as the WFD, if planned close enough to the coast, or MSFD further out at sea. The objective to halt the deterioration of water quality of the WFD may in some cases conflict with the efforts to promote increased renewable energy production.

2.2.1.1 Data gaps regarding offshore areas

The fact that the most valuable nature values currently known are situated in the shallower, photic coastal areas does not necessarily imply that the deeper parts of the sea are available for the economic exploitation activities, as they may contain other habitats or ecosystems that are less known, such as ferromanganese concretions/nodules (Kotilainen et al. 2020), Benthic habitats characterised by *Monoporeia affinis* and/or *Pontoporeia femorata* requiring good oxygen conditions, occurring in deep marine areas (Kotilainen et al. 2019), or have other, e.g., geological values. There is relatively little data available on, e.g., the spatial distribution or migration routes of marine mammals or migrating fish, groups of animals that traverse and exist in spatially large areas. Little research has also been done regarding the effects of OWF on ecological components in the northern Baltic Sea, although some work has been done regarding the effects of OWF on aforementioned animal groups (as well as other environmental impacts) in a Swedish context (Bergström, Öhman,

et al. 2022), and the effects of OWF and other renewable energy sectors' on the marine environment more in general (e.g. Galparsoro, Menchaca, Seeger, et al. 2022; Galparsoro, Menchaca, Garmendia, et al. 2022). In addition to more stationary underwater values and, e.g., fish, the migratory routes of birds or bats are also something to consider regarding OWF, as the wind turbines, among other impacts, run the risk of displacing the birds' routes, especially with an increasing amount of OWF (Virtanen, Lappalainen, et al. 2022). Because of the data gaps in the deeper parts of the northern Baltic Sea, ecologically valuable nature features run the risk of deterioration due to, e.g., OWF, which are constructed further out from the coast. The OWF actors may not be willing to share their collected data from their planned for OWF either and they have no obligation to, e.g., share their survey data with the environmental administration. An important development would be for the data from areas to be shared prior to being guaranteed exclusive rights to an area, at least with the environmental administration of Finland. It could be implemented, for example, as a precondition in the permitting process, or the sharing could be associated with an incentive.

A review of the different actors in the marine realm has been prepared concurrently to this report in the A5.2 action of the BIODIVERSEA LIFE IP project. See also chapter 2.4 for discussion on the non-deterioration requirement.

Conclusions: Data gaps regarding offshore areas

- There is little research on the (cumulative) effects of OWF and other larger-scale activities in the northern Baltic Sea. Amending this data gap is urgent as the OWF projects are progressing faster than the data gaps are filled.
- It would be important for larger projects, like OWF, to share survey data with the environmental administration, especially from data deficient areas. Additionally, if a project is rejected or otherwise not implemented, the data may in this case also remain with the actor and not be shared. The sharing of data could be included, e.g., in the permit conditions, or an incentive to share data could be implemented.

2.2.2 Maritime spatial planning – economy or nature first?

The purpose of MSP is to promote the sustainable development and growth of the different uses of maritime space, sustainable use of natural resources, and achievement of a good status for the marine environment (often abbreviated as GES (GEnS here to separate it from Good Ecological Status (GEcS) of the WFD), in EU directives). The Finnish MSP, however, is not binding, and is instead considered a strategic development document, contrary to, e.g., Sweden, Denmark, or Germany, where the MSP is binding. This might also be a reason as to why many different activities in the plan are overlapping, as they threshold to identify areas suitable for certain activities may be lower; although many activities can exist in conjunction with one another, others may even be conflicting (overlap of e.g., ecological factors and maritime economic activities). Further, currently, in Finland, the MSP and conservation processes are two distinct processes; the end-product of conservation planning is binding, while MSP is not, and is more of a strategic document for use of the marine areas.

The planning solution on the Åland Islands was to not include privately owned marine areas into the planning process (ÅLR 2023b; MSPD Art. 2.1), although they were included earlier in the planning process. The private properties make up a notable part of the marine area on the Åland Islands, and thus the plan leaves only the northern, western, and southern outermost regions of the area "open" for the MSP. This also implicates that the excluded marine areas that fall under the municipal land-use planning processes may not be considered in the more holistic planning approach of MSP. The plan has also combined the markings of valuable nature, culture and environment, which may make the plan too simplistic, with the risk of overlooking specific areas' individualistic values; overall, the plan is relatively simplistic when compared to the plan in Mainland-Finland.

Further, the majority of coastal human activity (dredging, wave brakers, piers, among others) are observable in aerial and satellite imagery namely in the privately-owned marine areas (Kuismanen and Husa 2020).

The fact that the Finnish MSPs are not binding has both benefits and drawbacks. Haapasaari and van Tatenhove (2022) speculate that the expert-driven, legally non-binding framework of the Finnish MSP process may support the implementation of EBA in MSP, although the non-binding nature may prove to be unpredictable in nature. For example, according to Haapasaari and van Tatenhove (2022), "*the Finnish municipalities expressed that MSP should neither hamper the planning of municipalities nor restrict the economic activities in the sea areas or the access rights of the in habitants.*", and that the implementation process would become too complex and judicially impossible for the Regional Councils to implement a legally binding MSP (in Mainland-Finland). The planning markings in the MSPs of both the Finnish and the Åland Islands' plans do not imply that the areas are reserved for specific purposes. This so-called soft law may have its benefits though, especially in complex systems (Weeks and Pearson 2017). Benefits of the non-binding approach include, among others, the possibility of adapting the plans for future needs or goals (Weeks and Pearson 2017; Haapasaari and van Tatenhove 2022), but on the other hand, a certain commitment from all actors is required for a non-binding framework to function desirably. The MSP in Finland is only one level of planning; there are regional and local land use plans, which are smaller scale than the MSP, and which are legally binding (see section 2.1.4.2).

The incorporation of the conservation aspect into MSPs, or the MSP-MPA interaction has been discussed to some extent (e.g. Haapasaari and van Tatenhove 2022; Trouillet and Jay 2021) as a counterpart to the increasing maritime activities. An ideal synergy could be, e.g., the recognition of the conservation aspect in a MSP and directing possibly harmful activities away from valuable nature features, depending on the features in a specific area, although this could be a cumbersome process. This would imply that economic growth would happen within the constraints of the carrying capacity of nature. Depending on political priorities, the balance of economic growth and conservation may tip toward one side of the metaphorical scale, i.e., MSP is approached from the EBA side, or alternatively the maritime economy side (Trouillet and Jay 2021). Another consideration are the multiple-use MPAs or other spatially defined areas (e.g. Ban et al. 2012), in which certain economical activities may be allowed, depending on the protected nature values, or other effective area-based conservation measures, OECMs (IUCN-WCPA 2019), although these have yet to be implemented in Finland (see BIODIVERSEA LIFE-IP action A5.3). In Finland, at least, there is a conflict between the increased use of marine areas, and achieving GEnS, through e.g., reduced emissions and halting deterioration of the marine environment and nature. As noted by Haapasaari and van Tatenhove (2022), many of the Baltic Sea's problems regarding GEnS come from the terrestrial realm, which the national MSP has very limited capacity to affect (cf. recommendation of a holistic, common planning platform described by Soininen & Pappila (2023)). The Finnish MSP was considered by Haapasaari and van Tatenhove (2022) to have a weak connection to both MSFD and its GEnS objective.

The Regional Councils in Finland have recently started the process of updating the current MSP, for it to better consider the increasing development of, e.g., OWF. The project Developing offshore wind power in Finland's marine areas (MeriTV) led by the Finnish Environment Institute in 2023 also produced data on important ecosystem service areas in the marine area of Finland (Paulus et al. 2024, manuscript submitted). Within the same project, the analysis of Virtanen, Lappalainen, et al. (2022) was updated with newer data. Both analyses support the (ongoing) MSP process of Finland.

Depending on the direction that is taken in an MSP, be it either a maritime economy or an ecosystem focussed approach, the effects may reflect the direction. The effects on the maritime economy and biodiversity of the non-binding nature of the Finnish MSP remains to be seen, alongside the plans of other Baltic Sea countries.

Some EU MS have practised MSP even longer. Analyses of the earlier MSPs around Europe have shown that the EBA has not been utilised in the planning to a large extent, and that the blue economy has been the priority, over the GES targets (Domínguez-Tejo et al. 2016; Jones, Lieberknecht, and Qiu 2016). Airaksinen et al. (2020) gauged in their impact assessment of the Finnish MSP, that if various sectors fail to transition to a sustainable way of doing business, the cumulative effects of maritime activities may become net-negative (for the marine environment and nature). The Programme of Measures of Finland's Marine Strategy 2022-2027 (Laamanen et al. 2021) has two actions regarding MSP: they cover, among others, the information and data needs of the MSP process for the next planning round, and an efficacy evaluation and monitoring programme, through which the good environmental status of the marine environment, sustainable blue growth and sustainable use of natural resources are ensured.

Conclusions: Maritime spatial planning – economy or nature first?

- The MSP and conservation processes are currently two distinct processes. For the nature conservation aspect, it would be important for it to be considered in planning to a higher degree, or in some cases, to even exclude certain ("planned") activities if justified because of certain nature values.
- Although MSP according to the MSPD should support MSs achieve GES (MSFD). However, the Finnish MSP had been considered to have a weak connection to the GES objective of the MSFD.

2.2.3 Exploitation of marine mineral resources

The rising demand of minerals and metals has led to seabed mining and mineral extraction to become commercially interesting for mining companies and has been considered a risk to the marine environment and sustainability goals, especially in shallow areas (e.g. Kaikkonen and Virtanen 2022; Kaikkonen et al. 2021; Miller et al. 2018). Seabed mining is still rare in the Baltic Sea, and its environmental effects remain obscure, but recent developments (e.g., EC (2023f) proposal of ensuring supply of critical raw materials) have prompted the research regarding the effects on ecosystem components of seabed mining (e.g. Helmons et al. 2022; Orcutt et al. 2020; Drazen et al. 2020; Christiansen, Denda, and Christiansen 2020; Williams et al. 2022). Some potential effects have been assessed some 20 years ago in the Baltic Sea, by HELCOM (HELCOM 1999). Monitoring in the sea area of Kotka, eastern Gulf of Finland, indicated that although the total number of macrobenthos taxa returned to pre-dredging level in one year, but the abundance and biomass remained low, suggesting that complete recovery would need a longer period of time (HELCOM 1999).

One of the objectives of the MSFD is to reduce impacts on the seabed, and the Baltic Sea Action Plan (HELCOM 2021a) also states that extraction of minerals (excluding sand and gravel) should not be undertaken before the environmental effects of seabed mining are better known.

In Finland, marine mineral extraction has thus far mostly been limited to the extraction of marine sand and gravel resources. Most of the marine sand and other mineral resources have been identified on the Finnish coast, but little surveying has been done in the EEZ (Kostamo 2021). In the recent years, marine sand has mostly been utilised as filling mass in coastal large-scale construction projects, due to the extraction of marine material sometimes being a logistically cheaper option compared to the extraction from a land-based source (Kostamo 2021). The most notable other marine mineral deposits are the ferromanganese concretions, although the possibility of extraction of phosphorous from seabed sediments has also been investigated to some degree (Kostamo 2021).

Kostamo (2021) speculated that the extraction of marine sand and gravel will increase in the future.

Because of the relatively recently piqued interest in the extraction marine mineral resources, both globally, and especially in the Baltic Sea, where it is a relatively new activity, the larger-scale or cumulative effects have likely not been considered in many areas, and prompts a screening of the relevant regulations (Kaikkonen and Virtanen 2022), especially because the extraction of mineral materials may have a deteriorating and harming effect on the marine environment and biodiversity. Depending on the extraction method, for example, heavy metals and environmental pollutants may be released and suspended in the water column, becoming harmful for fish and other organisms (Kostamo 2021). Furthermore, in cases where the regulations and potential effects are not clear, the precautionary principle should be exercised.

The national legislation with regards to seabed mining is also seemingly unclear (Vihervuori 2019), and seabed mining differs significantly from terrestrial mining, and increased interest toward mineral extraction would incentivise the review and clarification of mining and mineral extraction legislation and practises (e.g., is extraction under the purview of mining or land extraction; mining applies to bedrock, mineral sediments (i.e., not bedrock) may be dredged). Currently, regarding marine sand extraction, the Land Extraction Act (555/1981) does not apply in water areas for which the extraction requires a water permit (WA) from the Regional State Administrative Agency (Vihervuori 2019). Under the WA, the requirement of a permit is assessed case-by-case based on the detrimental consequences of the individual project, and whether it exceeds the permit threshold of the WA. In other cases, the activity requires a permit from the municipal authorities (Land Extraction Act 7 §). The updated NCA prohibits mineral prospecting in national parks and strengthens the regulation of prospecting in other state-owned PAs.

Vihervuori (2019) argues however, that additional regulation through the Mining Act may be excessive, as the WA offers "*full control on impacts of waters.*" The regulation is further complicated by the relationship between different Acts, and the ownership status of the areas. The same factors are highlighted in the respondents' feedback to the report (Vihervuori 2019). The marine areas can be roughly divided into (I) the innermost marine areas that are often owned privately, by, e.g., cities, municipalities, participants' associations, or individual people; (II) the public, state-owned waters, that generally fall between the innermost marine areas, and the EEZ; and (III) Finland's EEZ, outside of the territorial waters, in international waters.

The NCA in Finland could support the minimising of unknown effects of marine mineral exploitation with the addition of NCA 7 § on the precautionary principle, stating that in decision-making according to this [NCA] law (or a decree pursuant to it), special consideration is given to the threat of a significant reduction or loss of biodiversity, even if there is no confirmed scientific information about it**.** This could, for example, be the case with the Benthic habitat with ferromanganese concretions (DD), of which little is known, and the extraction activity is listed as a threat (Kontula and Raunio 2019). A possible caveat with the NCA 7 § is, however, the fact that if the decision-making process in question does not fall under the purview of the NCA, the precautionary principle is not automatically applied, unless it is explicitly stated in the relevant law or is part of existing legislation. In order to apply section 7 of the NCA, it should be included within the scope of other laws and the associated decision-making-process. The precautionary principle, e.g., is not included in the EIA process or specified in the EIA law, and it's likely not included in other permitting procedures (except in the EPA 15 and 20 §§, and the NCA). However, the principle is included in Article 191 of the Treaty on the Functioning of the European Union, making it a binding principle for MS and a general guideline. For example, if mineral extraction were to take place in Finland's territorial waters or on the continental shelf, the precautionary principle would not automatically apply if the situation does not fall under the scope of the NCA, i.e., it does not involve a protected area or a protected species or exceptional consideration for their protection.

In the rationale for the NCA 9/2023 (HE 76/2022), it is stated that: "*In practice, the precautionary principle is already part of existing law and affects decisions made by authorities and legal practice based on existing law. The purpose of the proposal regarding the precautionary principle is to make this established legal status visible, and it would not, as such, have immediate effects on landowners. However, in some situations, landowners might experience indirect effects of applying the principle when authorities try to anticipate risks to protected natural values during permit assessments. It should be noted that the precautionary principle only applies to significant adverse effects.*" It is then further stated that: "*The precautionary principle alone does not provide a basis for restrictions in situations that do not involve discretion under the Nature Conservation Act. Therefore, the precautionary principle is not an additional requirement for the authority decisions specified in this law. Its purpose is to guide the application of the Nature Conservation Act, especially the assessment of significant effects on protected natural values. Thus, the precautionary principle would not increase obligations for, for example, landowners or operators.*"

To summarise, the precautionary principle of NCA 7 § is tied to the NCA, and to be invoked, it requires a significant deterioration or disappearance, implying that the threshold is set high. But as also implied, the principle is a general international principle on the EU level as well, so it may contribute to decision-making more generally. More on the legislation related to material extraction in section 2.5.2.

The extraction of minerals may conflict with the objectives of PAs, and may thus be prohibited within the PAs, or even in the vicinity, if the extracting activity has the potential to deteriorate certain habitats or jeopardise the conservation objectives. The seabed extraction activity may also be hindered by the environmental objectives of the MSFD as well as during the assessments of ecological status (WFD) due to possibly physical changes to the environment, or the possible release of contaminants. The updated NCA completely bans mineral prospecting in national parks (and nature parks on land), and the requirements for prospecting are tightened in the state's other PAs.

Conclusions: Exploitation of marine mineral resources

- Because mineral exploitation is (other than e.g., sand or gravel extraction) is a relatively new activity, it prompts the screening of the steering regulations as well as its effects on marine nature.
- Some recommendation regarding the extraction of marine sand and mineral deposits have been presented by Kostamo (2021):
    - Extraction of material from below the photic zone, and far away enough from the coastline, so that erosion risk is minimised to proximal beaches.
    - Review, clarification, harmonisation, and development of related legislation to ensure sustainable practises.
    - Improved information on mineral and rock material in a marine setting.
    - Impact assessments on extractions of seabed material. The investigation of the ecological effects of seabed mining in Finland's context, as well as its cumulative effects.
    - The clarification of the regulation of seabed mining and mineral extraction (mining implies bedrock, while other extraction could imply, e.g., suction dredging of seabed surface mineral deposits on softer sediments), and what legislation is relevant when.
- The NCA 7 § on the precautionary principle may to certain extent function as a safety net for marine nature, when applied, but concerns decision-making under the purview of the NCA, which may limit its effect. Even if applied, the threshold for application may be high. This could be amended by including it under the purview of other legislation associated with, e.g., permitting processes.
    - The precautionary principle is, however, a general international principle in the EU, and may thus contribute to decision-making in cases when technically not required.

2.3 What are the benefits and differences for achieving a good environmental status according the MSFD, good ecological status according to the WFD and favourable conservation status according to the HD? What should be prioritized and when?

The Marine Strategy Framework Directive (MSFD), the Water Framework Directive (WFD), and the Habitats Directive (HD) all have a similar goal, to preserve and protect the marine environment (for general introductions to the Directives, see sections 1.2.1-1.2.3.). It should be noted that the WFD and HD (and BD) are not restricted to the marine environment, while the MSFD concerns namely the marine environment. The WFD concerns the coastal area in a broader sense: it covers both coastal marine waters as well as the river basins and waters on land, all of which affect the marine environment. The HD and BD concerns certain habitats and species listed in the directives, which are distributed both on land and in the sea (see sections 1.2.3 and 2.1 on the HD and N2K sites).

The directives share similar objectives, and partly overlapping measures, but perhaps most notably, the spatial scales of the directives' outcomes differ (Table 4, Figure 3). The descriptors of the WFD, HD, and BD, for example, feed into the descriptors of the MSFD (Figure 4). A complicating factor in the Baltic Sea is the prevailing eutrophication, and the internal nutrient loading, due to which even if steps are taken towards the improvement of the environmental conditions in the sea, the improvement schemes must be consistent for a long time, and the effects may be slowly observed in the future.

Table 3. Collation of the objectives, methods, assessment, and classification of the MSFD, WFD, and HD. Adapted from Kostamo, Viitasalo, et al. (2020).

	MSFD	WFD	HD
Objectives	Good environmental status of the marine environment	The prevention of the deterioration of water bodies' states, and to reach good ecological status	Achieving a favourable level of protection of species and habitats, and stopping their quantitative and distributional decline
Methods	Programme of measures	Measures of the Water strategy programme of measures	Natura 2000 network, other conservation and restoration measures
Assessment	Qualitative descriptors and their criteria and methodological standards (Commission decision 2017/848), indicators, environmental objectives (see Korpinen et al. 2018)	Quality factors (biological, hydro-morphological, and water quality)	Elements of a favourable level of conservation
Classification	Good / not achieved	High / good / moderate / poor / bad	Good / poor / bad / unknown

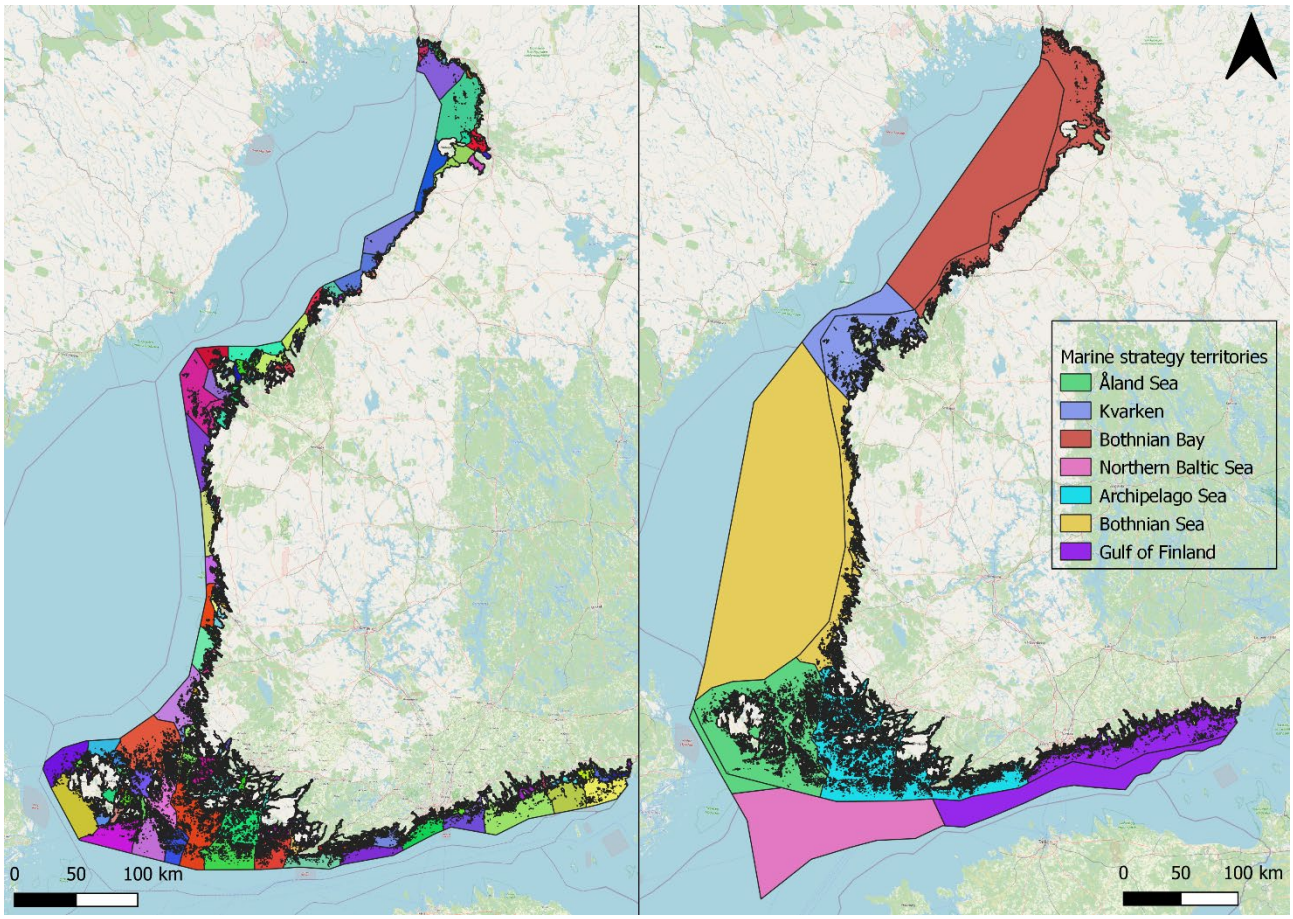

Figure 3. Comparison of WFD (left side) and MSFD (right side) AUs. The coastal areas of the MSFD AUs follow those of the WFD water bodies.

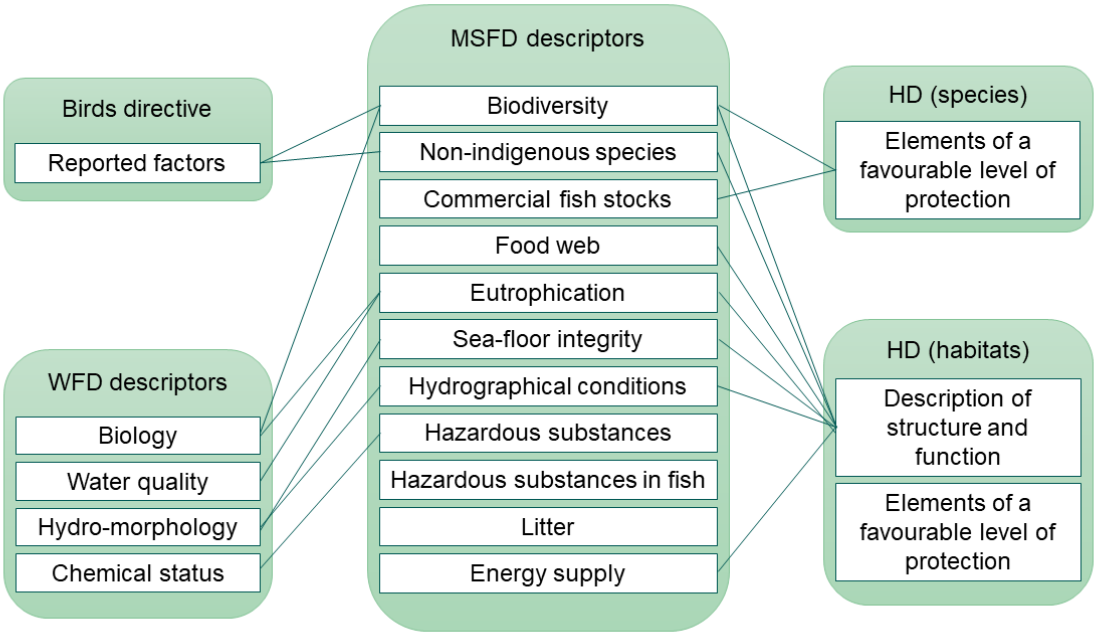

Figure 4. How the different descriptors of WFD, HD (species and habitats), and BD feed into the MSFD descriptors. Adapted from (Kostamo, Viitasalo, et al. 2020).

2.3.1 Similarities between the HD, WFD, and MSFD and what to prioritise and when?

The directives considered here all set objectives related to the marine environment and its good status, although the MSFD is the most comprehensive. The MSFD extends from established EU laws and addresses in particular aspects of the marine environment that are not dealt with in other regulations, including the WFD, HD, BD, and CFP, with one of its legal aims being to help attain GEnS under the MSFD (EUR-Lex 2021). The WFD and MSFD apply a more comprehensive ecosystem-based approach, whilst the HD (and BD) focus on more localised conservation schemes to protect and achieve a favourable conservation status for the species and habitats listed in their respective annexes. The WFD AUs are utilised in the assessment of good status in the coastal areas in MSFD assessments so long as they overlap. The WFD descriptors are all either descriptors or indicators of the MSFD (Figure 3). The conservations status evaluated in the HD (and BD) have some overlaps with the MSFD descriptors, and some components of the HD and the state of certain directive species populations are directly used as MSFD indicators (Kostamo, Viitasalo, et al. 2020; EC 2012).

In terms of what to prioritize and when, the three Directives considered here are somewhat interlinked, covering similar and sometimes overlapping aspects related to the marine environment (Pappila and Puharinen 2022). It could be generally stated or assumed, that achieving GEnS (MSFD) would at the very least contribute toward GEcS (WFD) and vice versa, which in turn would contribute to FCS (HD), as the species and habitats in the Baltic Sea would likely benefit from the improved ecological and environmental statuses, as the Baltic Sea suffers from many pressures, e.g., eutrophication or human activities, such as construction of marine, coastal or offshore structures, extraction of minerals (including sand and gravel), input of nutrients, spread of non-indigenous species, fishing, bycatch, underwater noise, many of which may be further exacerbated by climate change (e.g. HELCOM 2021a). It could also be noted, that HELCOM prepares overviews of the ecosystem health (holistic assessments) on the regional sea scale, i.e., the Baltic Sea scale, which also supports the Baltic Sea countries in their MSFD assessments and reporting (HELCOM 2023b).

This is not always the case, however, as certain HD habitats or species may require better conditions than those that are required for good status according to the WFD or MSFD. EC (2011), for example, highlight estuaries (habitat code 1130) and the freshwater pearl mussel (*Margaritifera margaritifera*) as features that require better conditions than those of GEcS; the estuary habitat may require better hydromorphological conditions, and the freshwater pearl mussel may need lower nutrient conditions than those stipulated by the WFD. The reason for not reaching the FCS for a species could also be due to certain human activities, and it is therefore important to consider what the cause for the status is (EC 2011). It is also noted in EC (2011) that the FCS does not apply to the status of a species or habitat in an individual site, but to the status in the natural range in the entire national part of a biogeographical region, implicating variation dependent on the water body, as well. The FCS is not confined to withing N2K sites, either.

The FCS of HD habitats has been equated to good status in the MSFD, and the descriptions of habitats' functions and structure are connected to many of the MSFD descriptors. The definitions are, however, not quantitative, and the state of habitats is not monitored in the same way as the indicator development of WFD or MSFD (Kostamo, Viitasalo, et al. 2020). There are also important distinctions between them. The GEnS objective of the MSFD includes all marine biodiversity, while the HD and BD specify certain species and habitats; the MSFD is more all-encompassing (EC 2012). The timetable also differs; FCS has no formal deadline, such as those of the MSFD or WFD.

Thus, achieving the objectives of all three directives would require an integrated and coordinated approach. For example, the current MPA and N2K network has been considered unsatisfactory (Virtanen, Forsblom, et al. 2022; Virtanen et al. 2018; Laamanen et al. 2021). Area-based conser-

vation methods are, however, not likely to significantly contribute towards the eutrophication problem, which in turn requires long-term measures from other sectors, such as those involved in the input of nutrients, underwater noise, or activities that cause release of nutrients and other harmful substances from the seabed.

Regulation of underwater noise

What is considered underwater noise (pollution)? Underwater noise is produced by humans and is at a level considered to have adverse effects on the environment (Laamanen et al. 2021). Human-caused underwater noise can be continuous or impulsive. The continuous noise is caused mainly by shipping, and impulsive noise by construction underwater, and may include, e.g., the construction of OWF or material extraction processes (Laamanen et al. 2021). El-Dairi, Outinen, and Kankaanpää (2024) recently reviewed the effects of underwater noise on a molecular and physiological level in marine biota, and e.g., Bergström et al. (2023) have reviewed the effects of OWF on marine biota, including underwater noise, in a Swedish context. In its thematic assessment including underwater noise, HELCOM (2023c) reviewed the Baltic Sea scale of noise levels and impacts. Overall, underwater noise can be very harmful for many species groups. In order to minimise the harm of underwater noise, stipulations to MPAs regarding noise levels could be introduced, or area types such “silent” areas or areas corresponding to IUCN protected area category Ib (wilderness area) could be designated.

In Finland, underwater noise is regulated in:

- The Governments Decree on the Organisation of the Marine Strategy (980/2011), where underwater noise is listed in two annexes. Annex 2 is an indicative list used when assessing activities affecting the marine environment, and notes that underwater noise from e.g., shipping and underwater acoustic equipment. Annex 3 lists the qualitative descriptors used for assessing the state of the sea. It states that underwater noise cannot be on such a level, that adversely would affect the marine environment.
- In environmental impact assessment related Acts and Decrees (see Table 1), where it is stated that the impacts of underwater noise are to be assessed.
- The EPA and EPAÅ, where the definition of environmental pollution includes (underwater) noise.
- Soft law instruments such as the HELCOM BSAP.

However, depending on the specific environmental challenges and priorities in a given region or ecosystem, one of the Directives, i.e., the targets or objectives of one of the Directives, may need to be prioritised over the others (e.g., in terms of the primary pressures, or the timetable; cf. WFD, MSFD, with scheduled cycles, and Nature Directives with no formal timetable). For example, if an area is significantly deteriorated by pollution and/or the degradation or ecosystems, achieving GEnS (MSFD) may be considered prioritised, and simultaneously, it would likely improve the environmental state for species to some extent. Similarly, on the other hand, if an area hosts threatened, endangered, or vulnerable species and habitats, achieving FCS (Nature Directives) could be prioritised, especially if the species or habitat is a priority species or habitat, and the MS has a particular responsibility in view of the proportion of its natural range, and the environmental and/or ecological state of the area is for the moment considered “sufficient” or if improving the state happens over a longer time period (e.g., curbing eutrophication in the Baltic Sea). Further, through the national biodiversity strategy proposal (MoE 2022), and the proposed Finnish nature restoration regulation both strive toward implementing and progressing the HD and BD targets. The EU directives have been implemented into the national legislation, providing the tools to achieve the objectives set by the directives. The legislation includes, e.g., the NCA, NCDÅ, VMJL, WA, WAÅ, EPA, EIA, and LUBA. Ultimately, the priority should be to ensure the long-term sustainability of the environment and its resources, and to balance the needs of humans with the protection of nature.

2.4 How has the non-deterioration requirement of marine areas in Finland and elsewhere in Europe been implemented in practice (literature review)?

In this chapter, the non-deterioration requirement will be discussed. In the first part, the non-deterioration will be discussed regarding the WFD and its national implementation, along with examples from other EU Member States. The second part will focus on the non-deterioration requirement of the Finnish NCA.

EU directives are to be implemented in the MS legislation, not only entailing legal transposition, but also the application and enforcement of it. The legal frameworks regarding, among other topics, conservation, the non-deterioration requirement and (ecological) compensation in Finland, have been explored previously (e.g., Jantunen et al. 2020; Kostamo, Kymenvaara, et al. 2020).

As a part of the EUBDS (EC 2020a), in 2022 the EU proposed a Regulation on nature restoration (Proposal for a Regulation of the European Parliament and of the Council on nature restoration; EC 2022c). The European Parliament recently adopted a law on nature restoration (European Parliament 2024) (at the time of writing, the European Council also has to adopt the law, before proceeding to publishing it in the EU Official Journal and then entering into force 20 days later).

For the marine environment, the Articles regarding restoration targets for coastal ecosystems (Article 4) and restoration of marine ecosystems (Article 5) could be considered the most relevant, along with their relevant Annexes. The purpose of the restoration regulation is to improve the state of nature in different environments, both inside as well as outside PAs, and reverse the trend of biodiversity loss. For example, Article 5.1 in European Parliament (2024) states that:

1. *Member States shall put in place the restoration measures that are necessary to improve to good condition areas of habitat types listed in Annex II which are not in good condition. Such restoration measures shall be put in place:*
   - *(a) by 2030, on at least 30 % of the total area of groups 1 to 6 of the habitat types listed in Annex II that is not in good condition, as quantified in the national restoration plan referred to in Article 15;*
   - *(b) by 2040, on at least 60 % and, by 2050, on at least 90 % of the area of each of the groups 1 to 6 of the habitat types listed in Annex II that is not in good condition, as quantified in the national restoration plan referred to in Article 15;*
   - *(c) by 2040, on at least two thirds of the percentage referred to in point (d) of this paragraph of the area of group 7 of the habitat types listed in Annex II that is not in good condition, as quantified in the national restoration plan referred to in Article 15; and*
   - *(d) by 2050, on a percentage, identified in accordance with Article 14(3), of the area of group 7 of the habitat types listed in Annex II that is not in good condition, as quantified in the national restoration plan referred to in Article 15.*

   The percentage referred to in the first subparagraph, point (d), of this Article shall be set so as not to prevent good environmental status, as determined pursuant to Article 9(1) of Directive 2008/56/EC, from being achieved or maintained.

Once the Regulation is implemented, the EU MS are to prepare national restoration plans within two years of the restoration Regulation entering into force. The national restoration plans are to, e.g., define the means to achieve the objectives of the Regulation. The Restoration regulation is likely to have implications for non-deterioration of nature values.

In marine Finland, perhaps the most prevalent implementation of the non-deterioration requirement is through the WFD, although the NCA also stipulates the non-deterioration requirement of the HD, where the state of the protected features part of N2K sites cannot be deteriorated. As described previously, the objective of the WFD is to reach GEcS of water bodies in the EU. In addition to the

GEcS objective, the MS are obligated to implement measures to prevent the (further) deterioration of the status of the water bodies.

2.4.1 The water framework directive and realisations of non-deterioration

A key legal praxis regarding non-deterioration was derived from the Weser judgement concerning the dredging of the German river Weser (2015, European Court of Justice, C-461/13), which stipulated that the MS are, unless a derogation is granted, required to refuse the permit of an activity if it risks a deterioration of the status of a surface water body, or jeopardises the attainment of good status. From this it can be concluded that the environment objectives of the WFD are both legally binding, and the non-deterioration requirement is granted a significant legal status (Kostamo, Kymenvaara, et al. 2020). The deterioration of the status occurs as soon as the status of at least one of the quality elements of the WFD declines by one class, even if the decline does not result in the change in the classification of the surface water body (KHO 2019:166).

A clarification of when an activity is of such an overriding public interest to grant derogation from the objectives (WFD Art. 4(7)), was judged in the Schwarze Sulm case of the European Court of Justice (C-346/14), when a new hydropower plant was granted a permit (Kostamo, Kymenvaara, et al. 2020; Starke and Van Rijswick 2021).

2.4.1.1 Finnish national legislation, Åland Islands legislation (WFD focus)

The legislation in Finland (VMJL, Government Decree on Water Resources Management (1040/2006), Government Decree on Water Resources Management Regions (1303/2004)) currently focuses mainly on the procedural aspects of river basin and marine strategy planning, and less so on the environmental objectives, their legal effects and enforcement. The quality elements of ecological status are not established by legislation, but at described in a ministerial guidance document (Kostamo, Kymenvaara, et al. 2020).

The VMJL is currently undergoing an update process (Report of the working group 2023; Finnish Government 2023a). The purpose of the update process is to prepare proposals for legislation regarding the environmental goals of water management, including the deviations from those. The environmental goals would be made binding to correspond to EU regulation (WFD), and it would be made possible to deviate from the environmental goals of water management also during other times than in connection with the approval of the water management plans. The changes made to VMJL would also be reflected as updates in the WA as well as EPA.

In Finland, two types of permits are related to the non-deterioration requirement in the marine areas. These are the *environmental* and *water* permits. The environmental permit in general is required if an activity causes a risk of environmental pollution in an area (EPA 27 §). The water permit is applied for if an activity structurally or physically changes the waters or water area (WA 3:2 §), either in or close to a water body (Kostamo, Kymenvaara, et al. 2020).

The EPA requires the actor to organise the activity in a way where pollution is completely prevented, or minimised, if not possible to completely prevent. Assessment of cumulative effects is included in the EPA permitting process (15 and 20 §§). The WA requires that activities use water resources so that public and private interests are not violated in a way that may be avoided if the purpose of the project can be achieved without unreasonable cost increase in relation to the total costs and the damage caused (WA 2:7 §).

The binding character of the environmental objectives of the WFD are not yet reflected in the Finnish legislation (Kostamo, Kymenvaara, et al. 2020; Belinskij et al. 2018; VMJL pending update). The VMJL as well as the EPA and WA only stipulate that the river basin management plans must be “taken into account” in decision-making, including permitting. Pappila and Puharinen (2022) suggested that instead of only being “taken into account”, the plans would be binding and included in permitting processes.

In general, if an activity does not cause a health hazard or significant pollution of the environment, an environmental permit may be granted (EPA 49 §), and a water permit may be granted if benefits of public and private interests are greater than the harm caused. An authority must deny a permit if an activity may cause deterioration or jeopardise the WFD objectives. The permits may also include certain conditions, which must be followed, or the permit may be revoked.

The assessment of cumulative effects from activities is lacking in the national legislation and is required in the cases of N2K sites (see chapter 2.4.2), when performing an EIA (practically concerns larger-scale projects) and included in the EPA permitting process. A flaw in the existing permitting system is evident in the failure to account for cumulative impacts when multiple permitting processes occur concurrently in the same area, even when the permitting authorities are the same. Further, depending on the scale of the activity applied for, and the "scale" of, for example, the ecological features, it could simply be assessed, that because e.g., the scale of the activity is smaller in relation to the scale of, say, a N2K habitat, the activity would not be considered to deteriorate the state of the habitat (e.g. fish farm case study in Kuismanen et al. 2022). Even if smaller scale activities may be unlikely to deteriorate the marine environment to a great degree, the cumulative sum of many smaller-scale activities might.

The Weser judgement has thus far not led to changes in the Finnish legislation, although amendments have been suggested by e.g. Belinskij et al. (2018). The suggestions included, e.g., binding environmental goals in the permit laws, or strengthening the consideration of environmental objectives. Despite not explicitly implemented into national legislation, the environmental objectives have become an important part of the national environmental and water permitting; a significant role has been given to the environmental objectives of the WFD by the Finnish Supreme Administrative Court in the national permitting processes (reviewed by Kostamo, Kymenvaara, et al. 2020). The role of the Weser judgement has also been confirmed during the permitting process of a large biomass plant, due to there being a risk of deteriorating one of the quality elements (phytoplankton) in the water body (KHO, 2019:166). The judgement followed that of the Weser judgement and was based on the EPA. Thus, although the environmental objectives of the WFD are not included in the legislation, they could be considered obligating (Kostamo, Kymenvaara, et al. 2020). In view of this, compensation measures have been considered in relation to the environmental objectives and permitting processes, in order to offset, e.g., nutrient emissions, and gain derogation (Kostamo, Kymenvaara, et al. 2020; Kostamo et al. 2018). Compensation measures have thus far been utilised in a marine setting relatively seldom (Kuismanen et al. 2022). As a new chapter, the updated NCA (chapter 11) added stipulations about the voluntary ecological compensation).

Regarding the non-deterioration requirement and jeopardising the attainment of WFD objectives on the Åland Islands, a permit application must be denied, if it risks deteriorating the marine environment. According to the WAÅ (5:9 §), a new activity may be granted a permit, and the denial of permit circumvented, if it is demonstrated that an activity does not contribute to increased eutrophication, or if a so-called *improvement surplus* is utilised (Kostamo, Kymenvaara, et al. 2020). Operators may because of this expand and initiate new activities in these situations (WAÅ 5:12 §). The improvement surplus means that an extra improvement of water quality has been attained, which is of higher standard than the WAÅ requires. In 2020 (Kostamo, Kymenvaara, et al. 2020), no application for the utilisation of the improvement surplus had been approved.

2.4.2 Non-deterioration of the WFD elsewhere in the EU

In this section examples of how non-deterioration of the WFD has been implemented in the EU. Some studies on the implementation of the WFD non-deterioration have been reviewed for the Netherlands, Germany, Belgium, Denmark, Ireland (Liefferink et al. 2021; Starke and Van Rijswick 2021). Liefferink et al. (2021) reviewed the implementation of the WFD in six case studies and compared the approaches. Authorities are involved in the regulation, albeit some at more of a distance compared to others that are more closely involved. Authorities were considered to be more

closely involved in instances where the WFD targets were also closer, and less so in cases where the targets are further away from reaching the WFD targets.

2.4.2.1 Denmark – nitrogen on farms, constructed wetlands
In Denmark, case studies regarding the non-deterioration requirement have been done on the spatially targeted regulation of nitrogen on farms and constructed wetlands (Liefferink et al. 2021). The targeted regulation focused on reduction of the nitrogen discharge from agricultural sources to coastal areas. Agricultural actors in catchments draining to vulnerable coastal waters (~70% of Danish farmland) are required to put additional effort into reducing nitrogen leaching. The main measures that farmers use is catch crops, but can also utilize "set-aside", burning of the fibre fraction of animal manure, and/or voluntary nitrogen norm reduction. Farmers are compensated for these measures. The regulation is a mix of voluntary and mandatory elements: the farmers can choose the measures individually, but the end goal, the required nitrogen reduction is mandatory at the collective and catchment level. Stricter regulation would follow if the desired results were not attained.

The construction of wetlands is another measure and serves to act as nitrogen sinks. The construction of wetlands is also voluntary, but here too, more mandatory regulation will follow if desired results are not reached. Landowners may apply for the wetlands programme with no obligation to do so. Here too, financial compensation acts as incentive.

2.4.2.2 Germany, Lower Saxony – focus water bodies, nitrate-sensitive areas
In Germany in general, non-deterioration is interpreted as a specific justification for large-scale infrastructure projects (greater good vs. deterioration) since the Weser ruling. The non-deterioration requirement is a strict permit requirement for large-scale projects, and the ban and its derogation play a major role in permitting processes (Starke and Van Rijswick 2021).

Liefferink et al. (2021) looked at focus water bodies (water bodies with promising potential for improvement) and nitrate-sensitive areas (poor groundwater quality in areas). Focus water bodies had been chosen based on the following, as well as how close they were to the target status:

- The water bodies were assessed to have moderate status or potential and are only 1° away from good status or potential, and
- The water bodies show promising biological repopulation potential according to a biological assessment.

"Water alliances" are formed to develop and implement targeted measures. Most of the implemented projects had a focus on the improvement of hydromorphology.

The nitrate-sensitive areas are "far-from-target", where the status of groundwater is bad due to nitrate pollution. The areas are identified and delineated, and in 2019 restrictions on farming activities in the designated nitrate-sensitive areas were imposed by the *Länder* ministry. The restrictions are comprised of process standards: mandatory analysis of farm fertiliser to calculate the exact nutrient concentration and to improve the precision of fertiliser usage, processing of fertiliser into the soil within 1 h and increasing fertiliser storage to seven months. It is still unclear if the measures are sufficient.

2.4.2.3 Belgium – nitrate concentration, groundwater, farms
In Flanders, Belgium, stricter rules have been implemented in focus areas (Liefferink et al. 2021). The focus areas are surface water bodies where nitrate concentrations exceed a norm, or where nitrate concentration evolution in the groundwater shows insufficient progress. This is re-evaluated yearly.

For farms in the focus areas, lower nitrate residue values, stricter rules for manure application, and obligatory use of catch crops apply without any financial compensation; the farms are also subject to more scrutiny and enforcement procedures. The farms can be exempted from the measures if they can, at their own cost, prove that their activities do not contribute to the nitrate pollution of

ground and surface water. Thus far the focus area approach has failed to sufficiently reduce the "distance-to-target", and the approach will require revision.

2.4.2.4 The Netherlands – greenhouse horticulture

In the Netherlands, non-deterioration is a requirement for management authorities; it has the role of a planning level management objective (Starke and Van Rijswick 2021).

Liefferink et al. (2021) looked at the area-specific approach to greenhouse horticulture in the Netherlands. The water quality targets for both pesticides and nutrients in the greenhouse regions of the Netherlands were not yet met at the time of the review. The regional water boards also have limited competencies for preparing differentiated regulatory standards, but they can provide subsidies, enforcement, physical infrastructure, and communication. Because of this, the area-specific approach does not specify stricter standards but intensifies monitoring instead. The areas are mapped, and the enforcement agencies cooperate. Results are shared with all actors in the same areas, and individual greenhouses are granted one year to address leakages of illegal emissions. The approach is costly (costs the water authority an additional 900.000 € annually for monitoring and personnel), but evaluations of the approach underscore its effectiveness for diminishing both nutrient and pesticide concentrations.

There are two main reasons why the greenhouse sector supports the approach:

- The sector has a high stake in ensuring that an effective package of pesticides remains on the market. Farmers are aware that the national regulators may ban certain substances if problems with the water quality remain unaddressed.
- The sector supports intensive monitoring because it standardises the rules for all involved greenhouses. Those that follow the rules should not be at a competitive disadvantage to those possibly cutting corners.

2.4.2.5 Ireland – high status water bodies

Compared to most MS in the EU, Ireland has a high number of surface water bodies with high ecological status, and aims to preserve that status, as the areas provide, e.g., ecosystem services, while simultaneously being vulnerable (Liefferink et al. 2021). The oligotrophic waters have low assimilation capacity for nutrients, and many are close to or have already exceeded their capacity for catchment intensification of land use. The preservation of high-status waters entails the avoidance of source pollution, accidental emissions of pollutants, monitoring, and even the control of low and medium-intensity activities, such as one-off housing, forestry, or wind farm development. Water protection is to be well integrated with land-use planning and mapping systems at different administrative levels. An appointed programme coordinator manages activities, develops communications and engagement plans, and gives recommendations for the management and integrated planning of high-status areas. Stakeholders cooperate with a Local Authorities Water Programme in order to identify risks to water quality. In addition to the aforementioned focal points, early corrective action is given a great emphasis.

2.4.2.6 To conclude regarding the WFD

Authors (e.g. Voulvoulis, Arpon, and Giakoumis (2017); Carvalho et al. (2019)) have called for the review and revision of the current implementation efforts, as the objective of GEcS has yet to be attained in the European water bodies. Harmonisation of information, standards, targets regarding the state of ecosystems among the MS, e.g., bordering a sea basin, could be beneficial, especially in a semi-enclosed basin, such as the Baltic Sea. This could be performed through, e.g., so-called intercalibration exercises (Birk et al. 2013). Climate change knows no borders, and is therefore an important consideration, as it may have long-lasting or permanent effects on the marine ecosystems (e.g. Viitasalo and Bonsdorff 2022; Ottersen et al. 2023), and may require us to rethink the concepts, thresholds, or baselines for status classifications of Directives (Puharinen 2021; Nõges et al. 2007). This goes not only for water quality, but also for, e.g., species that are affected by changing conditions.

Some key questions to address are at what point are MS ineffectively or insufficiently financing the water management system, and when does it constitute a breach of the WFD requirements. At what point are the targets insufficiently implemented into, e.g., legislation or guidelines, and thus, addressed? In Finland, a process to update the legislation (VMJL) regarding the implementation of WFD is currently underway. Recently, on the Åland Islands, an update process regarding the WAÅ was completed, with drafted changes regarding the implementation of the WFD, but no notable changes were ultimately made. The implementation could be highly dependent of the MS's interpretations and application, which could question the political willpower (Starke and Van Rijswick 2021; Boeuf, Fritsch, and Martin-Ortega 2016). Boeuf, Fritsch, and Martin-Ortega (2016) argue that the exemptions of goal achievement obligation may hinder the full potential of the WFD objectives, as it lowers the ambitions of the directive, if or when overused. The authors argue that the exemptions have been poorly justified by the MSs. On the other hand, the exemptions also make the goal achievement obligation more manageable and more directly applicable (Starke and Van Rijswick 2021). For example, in the Baltic Sea, the problem of eutrophication will take a long time to curb and requires amendments in the terrestrial realm.

2.4.3 Non-deterioration of the Nature Conservation Act in Finland

In this section, the non-deterioration of the NCA (9/2023) is discussed. Comparisons have been made to the now outdated NCA (1096/1996), but unless stated otherwise, the cited sections and references to the NCA concern the NCA currently in force. The contents of the new NCA regarding N2K stayed almost unchanged (HE 76/2022).

The now outdated Finnish NCA (1096/1996) has been evaluated previously by Jantunen et al. (2020), and by Similä et al. (2010) before that, including numerous improvement suggestions. The updated Finnish NCA entered force in June 2023, and has thus not yet been evaluated in similar manner, as it has at the time of writing been in force for less than a year. The non-deterioration regarding N2K sites of the old NCA (1096/1996) as well as related case law was reviewed in a master's thesis by Jaaksola (2016), but is given less weight here, due to being a thesis. The proposed update of the NCA in 2022 (HE 76/2022) includes, e.g., descriptions of the process, and explanations and justifications for proposed changes.

The NCA non-deterioration requirement (34 § in NCA 9/2023, 64 a § in NCA 1096/1996) is a "general non-deterioration requirement", which affects all activities, regardless of if the activity requires a permit or not. Additionally, an authority cannot approve an activity or the plan of an activity, if it causes or risks significant harm to an area's conservation objectives (unless other regulation is in place, other nature features than the conservation objectives of a N2K site fall outside the non-deterioration requirement); this, in theory, functions as a sort of double confirmation preventing harm to the environment. Another aspect is how authorities interpret said clause. Non-deterioration concerns species, as well, in the form of significant disturbances (HE 77/2014). According to the EU Commission's guidelines (EC 2018), disturbances and deterioration are different, and they have different legal effects due to the phrasing "*in so far as such disturbance could be significant in relation to the objectives of this Directive*" of Art. 6(2) in the HD applying only to disturbance, although nationally they have not been treated as such (Kallio 2001; deterioration: habitats, disturbances: species).

According to the Commission, deterioration implies that a habitat physically deteriorates; disturbances do not directly affect physical circumstances, but if the disturbances are significant, the disturbances can affect the physical indicators in such a way that corresponds to deterioration (EC 2018). The Commissions guidelines also note that the deterioration of habitats also concern the habitats of the species listed in the HD Annexes. According to the Commission's guidelines (EC 2018), only the disturbances must be significant, and there is no such leeway concerning deterioration. Article 6(2) of the HD stipulates that MS (emphasising underlining by author) "[…] *shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been*

designated, in so far as such disturbance could be significant in relation to the objectives of this Directive." The HD does not state that deterioration should be significant; the significant clause has been added in the national legislation (NCA 34 §). The Commission (EC 2018) further states that Art. 6(2) "*[…] should be interpreted as requiring as requiring Member States to take all the appropriate actions to ensure that no deterioration or significant disturbance occurs. It requires both human-caused and any predictable natural deterioration of natural habitats and the habitats of species to be avoided*", implying that the NCA allows for deterioration of nature values, unless effects of activities are deemed significant, despite the HD not allowing for any deterioration.

The 78 § of the NCA stipulates special regulations concerning species in the HD Annex IV (animal and plant species of community interest in need of strict protection). It concerns singular species' reproduction or resting areas, which cannot be disposed of or deteriorated, and may coincide with N2K sites and associated habitats. The non-deterioration requirement of the 78 § does not require the area to be under a conservation scheme, but concerns species of Annex IV overall, wherever they occur.

Because the non-deterioration requirement also concerns activities that do not require a permit nor the permission of authorities, the functionality of compliance monitoring or enforcement may come into question. The authorities do not necessarily have the means of ensuring that non-permit requiring activities will not deteriorate N2K conservation objectives. The application of the non-deterioration requirement then falls on the person or entity exercising said non-permit requiring activity, and it may not be in said entity's "best interest". Deterioration may thus not easily become noticed unless it is reported.

The *significant deterioration* term leaves room for interpretation. The evaluation of *significance* is central to the application of the non-deterioration requirement because nationally, a Natura assessment has to be performed when an activity likely significantly deteriorates the conserved features of a N2K site. A permitting case regarding the expansion of an OWF in the immediate vicinity of a N2K site led to the need of the project owner to update their Natura assessment (Suomen Hyötytuuli Oy and AFRY 2021), for example, because of the uncertainty regarding significant deterioration of the N2K site's conservation objectives. A Natura assessment can be performed despite a project not requiring an EIA (ELY centre 2018), but a Natura assessment is not required if a project undergoes an environmental impact assessment (EIA) procedure (NCA 35.4 §). The wording of the NCA implies that a N2K site's conservation objectives cannot be deteriorated as a consequence of human activities, while the HD does not specify that the deterioration concerns only human activities; it states, overall, that the conservation objectives cannot be deteriorated, possibly including climate change, as well (Kallio 2001; Borgström 2012). This, in turn, implies that the HD requires active conservation measures of the MS, in addition to the more indirect measures, i.e., denial of permit of potentially deteriorating activities.

The NCA 35 § stipulates, that if a project or plan either by itself or assessed together with other projects or plans is likely to significantly deteriorate the natural values of an area proposed by the Finnish Government or is already included in the N2K network, for the protection of which the area has been included or is intended to be included in the N2K network, the implementer of the project or the drafter of the plan must assess these effects in an appropriate manner. The section also concerns activities outside of N2K areas, as well as cumulative effects of activities. The NCA 35 § considers only activities that may deteriorate natural values due to which the N2K site has been implemented should be evaluated in a N2K assessment, while the HD (Art. 6(3)) considers all activities, that may affect the area significantly, either by itself or in combination with other plans or projects, "*[…] shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*." The HD does not explicitly mention only the natural values, due to which the area has been implemented, but concerns all activities, and stipulates the assessment of how the activities may affect the conservation objectives of an area. In this regard, Kallio (2001)

discusses that the HD has not been sufficiently implemented into the NCA. Based on this, the obligation to assess effects to N2K sites stem from the location of the effects of activities, not the location of the activity itself.

HE (79/1996) states that the *plans* or *projects* mentioned in the NCA and HD regarding the assessment of cumulative effects concerns activities/projects/plans that are under discussion, pending, or currently known. This way, the assessment threshold is not limited only to ongoing or finished projects or plans.

In the end, the definition of significant deterioration is defined on a case-by-case basis, based on an area's individual features. Hence, it would be challenging to create an indicator that would be applied more generally to questions regarding effects causing *significant* deterioration. Significant deterioration is to a large degree based on previous case law and is also affected by the guidance documents of the European Commission (e.g., EC 2018). This is because the assessment of significance must consider the distinct features of the N2K site in question and its conservation objectives, i.e., the assessment is individualised to a large degree, and might not be directly transferable to other areas. The effects on the environment of a specific activity may or may not cause varying degrees of deterioration to the conservation objectives of a N2K site. The activity does not need to be wide-ranging nor quantitative, either; it is enough that the deterioration is significant. Further, the temporal length and intensity of the deteriorating effect should be assessed. For example, in a terrestrial setting, the construction of a building implies permanent damage to an environment, while a thinning felling of trees in a forest is temporary, despite the effects being long-lasting.

A derogation from the non-deterioration requirement can be granted if the Finnish Government in its general session decides that the project or plan must be implemented due to a compelling reason that is of high importance in terms of public interest and there is no alternative solution (NCA 39.2 §). Thus, only the Finnish Government has the authority to diverge from the non-deterioration requirement. The non-deterioration requirement derogation means exactly what it says: a derogation from the non-deterioration requirement. Previously (NCA 1096/1996), the derogation technically did not mean that the project or plan is granted permission to proceed with the activity in question, and that the permits would still have to be approved. The order of procedures changed with the current NCA (9/2023); now the required permits are settled before the derogation of the Government (HE 76/2022).

Related to the derogation from non-deterioration, the European Commission has recently made proposals for legislation regarding projects that could be considered highly important in terms of public interest. They are the European Critical Raw Materials Act (EC 2023f, 2023a) and the Net Zero Industry Act (EC 2023g, 2023b). The proposed legislations may be possible to implement in N2K sites, as well. The Annexes I and II (EC 2023a) of the European Critical Raw Materials Act lists raw materials considered strategic, as well as critical, respectively, and Annex I (EC 2023b) of the Net Zero Industry Act lists eight strategic net-zero technologies, including onshore wind and offshore renewable technologies. The Net Zero Industry Act is in line with the programme of Prime Minister Petteri Orpo's Government (Finnish Government 2023b) to increase the production of clean energy and promote the growth of the mineral industry. These objectives may however conflict with other (global) problems, such as biodiversity loss, or the EUBDS.

In addition to the no-alternative and overriding public interest requirements, there is a third precondition to the derogation. The precondition is that the nature values are compensated. In the case that the Finnish Government grants a derogation from the non-deterioration requirement, it must according to the NCA 39.4 § also decide on the measures necessary to compensate for the damage caused to the unity or natural values of the N2K network. The HD does not specify what the compensated actions are, but according to the Commissions guidelines (EC 2018), they can be, e.g., mitigating actions that minimise or remove the negative effects directed at the protected area, or compensatory measures that are "*independent of the project (including any associated mitigation measures). They are intended to offset the residual negative effects of the plan or project so*

that the overall ecological coherence of the Natura 2000 network is maintained. They can also be considered in the context of Article 6(4)." Mitigating measures can be, e.g., noise barriers, and compensatory measures are to be in addition to the "regular" HD measures (e.g., management plans are part of the regular measures). The compensatory measure does not have to be targeted toward the same area as the deteriorating activity and might not even be possible, as the deteriorating activity may completely eradicate the nature values from the area. The compensation obligation becomes applicable in Finland only when the deterioration of conservation objective(s) (i.e., nature values of a N2K site) is significant.

Conclusions: Non-deterioration of the Nature Conservation Act in Finland

- The HD could be considered to not have been implemented sufficiently into the national legislation. The HD formulations regarding non-deterioration imply that no deterioration should take place, human activity or not, while the Finnish legislation requires not *significant* deterioration to take place.
- Authorities do not necessarily have the resources to monitor activities not requiring permits regarding non-deterioration.
- Some proposals for EU legislation as well as the Finnish Government programme may conflict with, e.g., non-deterioration requirements, biodiversity loss reversal, the restoration legislation in preparation, or the EUBDS.

2.4.4 Changes in the new NCA regarding the non-deterioration requirement

The updated NCA (9/2023) entered force on June 1st, 2023, and has been described in HE (76/2022), where the updating process has been described in more detail, along with, e.g., evaluation of the 1996 iteration of the NCA.

Here, some changes of the NCA, with a focus on the sections affecting the non-deterioration requirement (chapter 2.5 concerns the development of legislation broader), are listed.

- Section 3 concerns definitions used in the NCA.
    - The 3.3 § definition of a habitat was expanded and specified some, in order for it to better correspond to the HDs definition.
    - The 3.4 § definition of a species was not changed, and in its current form does not correspond to the HDs definition. It has been suggested by Jantunen et al. (2020) to be expanded to consider also the distribution area and the sufficiency of habitats, in addition to the state of the population and the species' vitality.
- Section 7 on the precautionary principle is a new section, which stipulates that in decision-making in accordance with this law or the decree pursuant to it, attention is paid to the threat of a significant reduction or loss of biodiversity, even if there is no confirmed scientific evidence about it.
    - The section concerns "this law [NCA] or the decree pursuant to it", implicating that it might not always be applicable, the precautionary principle is, however, a general international principle, so it may guide decision-making more generally. See section 2.2.3 for more regarding the precautionary principle.
- Chapter 5 (concerning the N2K network) of the updated NCA mostly encompasses small changes to the wording of the sections and subsections, but the content has remained similar to previously.
    - E.g., section 34, on the non-deterioration requirement: no changes.

    - See the contents of chapter 2.4 for information on the implementation of the N2K in the NCA.
- Mineral prospecting has been prohibited in national (and nature) parks (49 §), and the regulation of mineral prospecting has become stricter in the state's other protected areas.
- Chapter 11 of the NCA describes voluntary ecological compensation, which is a new addition to the NCA. Ecological compensation is intended as a last resort in permitting processes when the effects of activities cannot be prevented or minimised and is supposed to support the stopping of biodiversity loss by 2030.
    - The starting point of ecological compensation is that the cause of the deterioration, i.e., the actor who deteriorates natural values through one's activities, can compensate for the deterioration caused by the activities to the habitat type or habitat of a species. The compensation is performed either by producing natural values or by means of conservation. The production of natural values can involve, e.g., improving the natura state of a deteriorated habitat type by restoring it, or protecting an area with valuable natural values.
    - The Decree of the Ministry of the Environment on voluntary ecological compensation (933/2023) entered force on the 15th of September 2023, specifying, e.g., natural value equivalence, evaluation of the change in the natural state of the deteriorated and the compensated area. The decree also includes two annexes, concerning (I) the characteristics of habitat type groups (including the Baltic Sea), and (II) habitat type groups, where an endangered habitat type can be compensated with an equally endangered or more endangered habitat type of the same habitat type group.

2.5 How should the legislation be developed in order to better serve the marine biodiversity and GES targets of different directives and international agreements?

The legislation concerning the marine nature has been considered unsatisfactory (Pappila and Puharinen 2022; Kuismanen et al. 2022; Laamanen et al. 2021). There are, for example, few marine biological or ecological features that have been considered in the current legislation, and the legislation in Finland has been mainly based on conservation in the terrestrial realm (Pappila and Puharinen 2022). This is coupled with the fact that many species and habitats are still endangered or data deficient (Kotilainen et al. 2020; Hyvärinen et al. 2019). Most of these features are not included in any legislation (two marine habitats were added to the NCA, protected after delineation), at least directly, thus leaving decision-making open to interpretation.

Because of this, permitting processes are an important consideration regarding the protection of the ecological features. A somewhat common theme in the permitting processes has been noted to be the consideration of variables related to the WFD (Kuismanen et al. 2022), which are some physical-chemical properties of the water, chemical quality, and biological qualities such as fish, benthic invertebrates, and aquatic flora. Depending on the type and location of an activity, certain variables are more relevant to assess than others (cf. also section 2.4.3 and the uniqueness of habitats and their environments). The consideration of marine features holistically is growing increasingly important, as increasing amounts of human activities are directed towards the marine areas (e.g., OWF following the green transition, or the European Commission's proposals for the Net Zero Industry Act and securing a supply of critical raw materials (EC 2023g, 2023f)), thus increasing the human footprint in marine areas.

The ongoing global biodiversity loss (IPBES 2019), sometimes called the Anthropocene defaunation (e.g. Finn, Grattarola, and Pincheira-Donoso 2023), has prompted that more "common" nature should be conserved as it is an integral part of the ecosystem. Despite the NCA's recent update, it has still been considered to not contain enough changes with regards to the ongoing biodi-

versity loss (Soininen and Pappila 2023), despite, e.g., new objectives from the 15th CBD Conference of the Parties in Kunming-Montreal and the resulting Global Biodiversity Framework. Further, the current national legislation regarding biodiversity has been, according to Soininen and Pappila (2023), considered to:

1. Be diffuse and punctuate; nature-related law is diffuse, and with certain emphases, which is apparent in the regulation of nature-related legislation (NCA, WA, Forest Act, LUBA etc.). For example, no single law steers biodiversity loss holistically, and the NCA protects only certain species and habitats, and not ecosystems holistically.
2. Lack ambition; the legally binding tools to combat biodiversity loss of nature values falling outside of the NCA are limited. Legislation protects weakened species and habitats but has no way to prevent biodiversity loss as a whole.
3. Have gaps in regulation; gaps are related to especially restoration. There are currently no obligations in the national legislation.
    a. It should be noted that the EU wide restoration regulation is currently being negotiated.
4. Be rigid; the current legislation provides strong protection for previously permitted projects, which prevents or slows down the improvement of restoration efforts. For example, permits granted through the WA are cumbersome to either change or retract (Belinskij et al. 2019).

Due to this, the authors (Soininen and Pappila 2023) suggest the implementation of a new framework-like Nature Act, which could be similar to the existing Climate Change Act (423/2022). Along with the proposed Nature Act, the investigation further suggests the revision of other national legislation, such as the WA, EPA, and LUBA. The changes should stipulate that plans or decisions under the purview of each law cannot be accepted, if it would negatively affect nature, or if harm is not compensated. The investigation assumed that the NCA (9/2023) would preserve the most valuable nature features in terms of biodiversity, and that the NCA functions as the last resort and provides the strongest legal protection. The investigation also assumes that the NCA already contains sufficient means to achieve the 10% strict protection goals of the EUBDS and the draft restoration regulation.

2.5.1 Biodiversity loss and current legislation

Biodiversity loss has not been halted despite efforts at different spatial scales (IPBES 2019), and ultimately, the ongoing biodiversity crisis could be attributed to the human activities. As we have not yet been able to stop biodiversity loss, one conclusion that could be drawn, is that regulation has not been sufficient, or that it has been too lenient with derogations. As discussed previously, e.g., the WFD has been criticised (e.g. Carvalho et al. 2019; Voulvoulis, Arpon, and Giakoumis 2017).

Many authors have listed recommendations for the improvement of nature conservation (Pappila and Puharinen 2022; Kotiaho et al. 2021; Kuismanen et al. 2022; Virtanen, Forsblom, et al. 2022; Kostamo 2021; Jantunen et al. 2020; Soininen and Pappila 2023), and time will tell how the updated NCA (9/2023) will affect conservation on a national level. For example, improvements to voluntary conservation methods have been added to the updated NCA (e.g., ecological compensation, monetary incentives). In order to develop the legislation toward improved consideration for biodiversity and GES targets, other legislation beyond the NCA, such as the WA, which is a key piece of legislation in the marine environment, or the EPA, Mining Act, Land Extraction Act, and others, could be updated to better consider ecological components. A simplified idea to follow, could be that the more sensitive or the lower the status or state of an ecological feature (e.g., species, habitat, ecosystem), the stricter or stronger the related regulations should be. The designation of an MPA in itself does not guarantee that the conservation objectives are fulfilled; the areas require effective management, as well, otherwise the areas are so-called paper parks (e.g. Bustamante et al. 2014; Pieraccini, Coppa, and De Lucia 2017).

This would require coordinated efforts across different sectors and stakeholders, and a long-term commitment to sustainable (land and water use and management) practices. An existing key instrument for this could be the MSP process, but it could be modified to, e.g., include conservation planning, in addition to the previously suggested strengthened ties to, e.g., the MSFD. Soininen and Pappila (2023) suggested the creation of a more all-encompassing planning platform, which would include both the marine and terrestrial realm; functionally it could, e.g., be a merge of existing planning instruments with strengthened connections among themselves.

Many activities that potentially could deteriorate important ecosystem features, are still not effectively regulated or monitored. For example, dredging operations only require a permit once the volume of dredged material reaches over 500 m^3. Smaller-scale dredging operations (<500 m^3) require a notification to the ELY centres, at least 30 days prior to the planned operation, who can review the operation/notification. A large discrepancy, however, appears between reported dredging operations, and those observed from aerial photographs along the Finnish coast (Sahla et al. 2020; Kuismanen and Husa 2020; CKAN 2020). Dredging operations essentially completely remove existing ecological components from the dredged area and may temporarily obscure the sunlight from penetrating deeper into the water column. The dredged material also needs to be dumped appropriately, i.e., not further deteriorate other ecological features. See e.g. Virtanen et al. (2023) on the biodiversity effects of recreational land-use, such as dredging, in coastal Finland.

Conclusions: Biodiversity loss and current legislation

The legal protection of biodiversity, especially regarding the marine realm, could be improved by:

- No single law steers biodiversity holistically, and e.g., the NCA only protects certain ecological features.
- Strengthening relevant legislation such that plans or decisions under the purview of the laws cannot be accepted if it deteriorates nature values or if harm is not compensated. Legislation should also be developed to better consider ecosystem components, in order to be better connected to GES objectives and biodiversity.
- Including more species and habitats in legislation, either directly or indirectly. Direct examples include the inclusion of more species and habitats, and the assessment of cumulative effects, considering smaller-scale projects or develop tools for such evaluations, while indirect means could be to increase control of pesticides or other pollutants (in the marine or terrestrial realm). The species and habitats could be implemented into the NCA, as it already includes species and habitat conservation, and regulated following previously presented logic: the more sensitive or lower the state, the stricter the regulations. Runoff from land to sea, e.g., agriculture, rural housing and traffic, is largely unregulated, and could be implemented into e.g., the EPA, or by drawing inspiration from systems elsewhere in Europe (see section 2.4.2), or utilising economic incentives.
- As for marine habitats, the N2K habitats are quite broad, geologically defined features, and thus run the risk of not really being considered in permitting processes, especially small-scale projects. Nationally Red Listed habitats and species (Kotilainen et al. 2020, 2019; Hyvärinen et al. 2019) could be included in legislation, to, for example, aid in evaluating effects on smaller-scale features, as well as to have a more concrete feature to base decisions on.
- Because of the ongoing biodiversity crisis, it would not be unfounded to include non-threatened species or habitats either (Virtanen and Moilanen 2023; Soininen and Pappila 2023), especially if they provide or contribute toward, e.g., important ecosystem services, or are characterised by high biodiversity, in order to preserve complete ecosystem ensembles and support connectivity aspects of conservation.
- The legislation in general regarding ecological components appears reactionary as opposed to pre-emptive, i.e., changes are made (e.g., the inclusion of two marine habitats in the NCA) after the damage to an ecological component has already been done (e.g., a species or habitat has become endangered). Legislation could be developed to the more future-focused.
- The efficacy of enforcement of existing regulations could be improved through, e.g.,
    - more funding: unregulated, often small-scale, activities lack monitoring, or
    - greater penalties for non-compliance (see examples from how the non-deterioration requirement has been implemented elsewhere, section 2.4.2).
- Actors/operators should have access to up-to-date information regarding marine biodiversity, and the effects of activities on the marine biodiversity. This in turn, implies that underwater inventories are required, along with a monitoring system.

2.6 Analyse the habitats directive definitions to find out important nature values that fall outside of the definitions and are therefore not protected by the legislation

Mudflats and sandflats not covered by seawater at low tide (HD habitat 1140) can be found on coasts and are defined by the fluctuations of tidal waters. The habitat can also be found in association with the Sandbanks which are slightly covered by sea water all the time (1110) and Reefs (1170) habitats (EC 2013). The Baltic Sea is a "microtidal" sea (Snoeijs-Leijonmalm, Schubert, and Radziejewska 2017), with the tides range varying a few cm over most of the Baltic Sea. The tide is more prominent closer to the entrance to the Baltic Sea, e.g., on the west coast of Sweden, but is virtually undetectable and meteorologically forced in the northern Baltic Sea. The habitat is currently not recognised according to Finnish interpretation Sweden and Estonia however recognise the habitat, and it occurs in the western part of Estonia, and scarcely along the whole Swedish coast. Potential recognition of the habitat on the Finnish coast in the Bothnian Bay was described in the SEAmBOTH project (Bergdahl et al. 2020). The Finnish part of the Bothnian Bay has some variations in sea level, the effect of which is exacerbated by the very low incline of the coast, resulting in temporal water level variations covering and uncovering large areas. The effect of tides could in the Bothnian Bay thus be considered ecologically similar.

Submarine structures made by leaking gases (1180) are described as "*Submarine structures consist of sandstone slabs, pavements, and pillars up to 4 m high, formed by aggregation of carbonate cement resulting from microbial oxidation of gas emissions, mainly methane. The formations are interspersed with gas vents that intermittently release gas. The methane most likely originates from the microbial decomposition of fossil plant materials" (EC 2013)*. The habitat can be categorised into two distinct types: the bubbling reef variant, and the pockmark variant (EC 2013). The habitat has been found in e,g., Denmark and the west coast of Sweden. Perhaps the most resemblant phenomena to habitat 1180 occurring in Finland, are the gas domes studied by Nyman et al. (2020) in Lumparn Bay, Åland Islands, from where approx. 1800 domes were observed on the seabed. The heights of the domes were generally around 1 m, with a diameter of 20-30 cm, up to 60 cm. The gas domes generally contained high concentrations of sulphur. Nyman et al. (2020) concluded however, that the gas domes do not fulfil the description of the submarine structure habitat, because there were no carbonate structures associated with the domes, and because no pockmarks were observed in the area.

Marine mineral aggregates and/or **Biogenic environments (substrates, bottoms, reefs)** are mentioned in the context of the reefs habitat (1170) of the habitat interpretation manual (EC 2013). The reefs habitat can be classified as either biogenic concretions or or geogenic origin (EC 2013). The biogenic concretions have been defined as "*concretions, encrustations, corallogenic concretions and bivalve mussel beds originating from dead or living animals, i.e. biogenic hard bottoms which supply habitats for epibiotic species*", and geogenic origin as "*reefs formed by non biogenic substrata*." The reefs are also topographically distinct from the surrounding seafloor.

The Finnish N2K habitat guide (Airaksinen and Karttunen 2001) mentions that the reefs habitat can occur as biogenic concretions, but that actual biogenic reefs do not exist in Finland. The inventory guide for N2K habitats (Syke and Metsähallitus 2020) does not mention biogenic reefs in context of the reefs habitat (1170). Marine mineral concretions or aggregates and biogenic reefs, despite possibly of smaller scale than geonic reefs, can form complex three-dimensional environments for marine organisms, and ferromanganese concretions are, for example, often associated with rich benthic diversity (Kotilainen et al. 2020; Kaikkonen et al. 2019). The biogenic or mineral concretions may however be considered too small or not distinct enough on the seafloor to be considered the HD reef habitat. Due to, for example, ferromanganese concretions being formed part abiotically, part biotically (Tebo et al. 2004), it is also unclear if they could be classified as biogenic environments (Kaikkonen et al. 2019).

Overall, in the final report of the Towards a coherent protected area network – Priorities of protecting biodiversity in Finland (KOKASU) project coordinated by Syke, one of the most notable gaps in conservation identified for the Baltic Sea was the lack of habitat classifications (Virtanen, Forsblom, et al. 2022). Issues identified by Virtanen, Forsblom, et al. (2022) included:

- Many criteria are based on the abiotic environment (N2K habitats) or the dominance of one species (national Red List of habitats, HELCOM HUB (HELCOM 2013b)), implying that many species communities are left outside the habitat classifications due to the lack of one dominating (e.g. coverage or biomass) species, even though mixed communities can host very diverse species assemblages. The mixed species communities can still be diverse and functionally valuable, despite the lack of a dominating species.
- Some species-based habitats are strictly based on the coverage or biomass of said species, and thus a large-sized benthic species may dominate benthic samples due to its size, even though other smaller-sized species may be present in the sample.
    - Development of the benthic animal habitats classifications could improve the coverage estimations of such habitats.
- Some habitats are based on the dominant bottom (substrate) type (e.g. hard bottom, soft bottom), but similarly to the dominating species communities, mixed bottoms fall outside the habitat definitions, despite hosting diverse communities (due to e.g. varying substrate) and being dominant in many areas.
- The (strict) interpretation of some habitat types causes difficulties in the national applications of the interpretation criteria. The habitats listed in the HD Annex I have been identified as requiring species conservation measures in the EU context and may thus not include habitats that may be “significant” in a smaller, e.g., national scale. For example, the underwater parts of sandy beaches or rock or boulder formation commencing from the continent of an island do not belong to any habitat type.
    - The HD habitats also do not describe biodiversity patterns in Finland very well (Virtanen et al. 2018). Species, however, act as good surrogates for marine habitats.
    - Due to the interpretation system, certain HD habitats have not been recognised in Finland (see e.g., Mudflats and sandflats not covered by seawater at low tide habitat example below).
- No conservation criteria for biological or functional diversity exist in Finland, and thus those are not judicially protected.

In order to efficiently protect the most important ecological features, definitions and classifications of marine habitats should be developed. This includes addressing deficiencies listed above, such as the benthic animal habitats, the mixed substrate and species community habitats, as well as identifying valuable functional ensembles (as has been noted in previous sections). Due to data gaps still existing in the marine area of Finland, the habitat classifications could be to some degree adaptable for when new information is acquired. The HD habitats may not function well as proxies for biodiversity (Virtanen et al. 2018), and for example Fraschetti, Terlizzi, and Boero (2008) noted that while a plethora of terrestrial habitats are described, marine habitats have been described more scarcely, likely stemming from, at least, the operational challenges to research marine areas, causing differences in the conservation and management of habitats (i.e., the marine habitat classifications have been less effective than terrestrial ones (Dauvin, Bellan, and Bellan-Santini 2007)). On the one hand, the HD habitats are a common classification of habitats in the EU, but on the other hand, they may not, at least in a Finnish context, function well as proxies for biodiversity. The areas currently protecting HD habitats in Finland were also shown to not cover a large part of rocky and sandy shores hosting functionally important species compositions (Virtanen et al. 2018). Thus, Virtanen et al. (2018) suggest the broadening of the interpretation of marine habitats, in order to capture important ecological features in the habitat definitions.

Conclusions: Nature values outside of classification systems

- The definitions of habitats could be broadened, in order to capture important ecological features relevant to marine conservation in Finland. Research on the biological characteristics of some HD habitats could be considered.
- Habitats with no clearly dominant substrate or species fall outside the scope of currently recognised habitat classifications. Such habitats would require their own classifications.
- There are no conservation criteria for biological or functional diversity in Finland. Such criteria should be developed.

3 Summary of recommendations and gaps

In this chapter, recommendations, gaps, and follow-up investigations from sections 2.1-2.6 have been compiled regarding the current schemes of protection in Finland. The previous sections have somewhat overlapping recommendations and identified gaps, and are thus compiled and grouped together here.

Recommendations

- The legal protection of biodiversity, especially regarding the marine realm, could be improved by:
    - No single law steers biodiversity holistically, and e.g., the NCA only protects certain ecological features. Soininen and Pappila (2023) suggests the implementation of a new framework-like Nature Act. Along with the proposed Nature Act, the investigation further suggests the revision of other national legislation, such as the WA, EPA, and LUBA; the changes should stipulate that plans or decisions under the purview of each law cannot be accepted, if it would negatively affect nature, or if caused harm is not compensated.
    - Strengthening relevant legislation such that plans or decisions under the purview of the laws cannot be accepted if it deteriorates nature values or if harm is not compensated. Legislation should also be developed to better consider ecosystem components, in order to be better connected to GES objectives and biodiversity.
    - The legislation in general regarding ecological components appears reactionary as opposed to pre-emptive, i.e., changes are made (e.g., the inclusion of two marine habitats in the NCA) after the damage to an ecological component has already been done (e.g., a species or habitat has become endangered). Legislation could be developed to the more future-focused.
    - Actors/operators should have access to up-to-date information regarding marine biodiversity, and the effects of activities on the marine biodiversity. This in turn, implies that underwater inventories are required, along with a monitoring system.
- Develop clear indicators for marine biodiversity, descriptions of what marine biodiversity is and implies, and based on that assess limits for the amount or nature of human activities allowed. Further, develop indicators to gage the total biodiversity loss. The process of deterioration accumulates gradually (e.g. small dredging by small dredging), and at some point the carrying capacity of the system may reach a point-of-no-return, after which a new “normal” is reached. Indicators are also useful for authorities assessing environmental or nature effects of human activities and could harmonise the processes.
    - There are no criteria for biological or functional diversity, thus those are not judicially protected. Such criteria should be developed.
- Many activities that potentially could deteriorate important ecosystem features, are still not well regulated or monitored.
    - For example, dredging operations only require a permit once the volume of dredged material reaches over 500 m^3. The notification procedure regarding dredging operations smaller than 500 m^3 should be developed to better consider marine biodiversity and nature. Dredging operations completely remove existing vegetation from the dredged area and may temporarily obscure the sunlight from reaching deeper into the water column. See e.g. Virtanen et al. (2023) on the biodiversity effects of recreational land-use, such as dredging, in coastal Finland.
    - The notification obligation regarding, e.g., small-scale dredging operations, may not function well as a communication channel between the authority and operator, as indicated by a comparison of reported and observed dredging operations.
    - Runoff from land to sea through rivers includes diffuse pollution/pollutants, from e.g., agriculture, traffic, or rural housing, which is not sufficiently regulated (Airaksinen et al. 2020).

    - Authorities do not necessarily have the resources to monitor activities not requiring permits regarding non-deterioration.
- Developing a system or method for the assessment of cumulative impacts of human activities, to holistically assess effects on nature.
    - An example of a problem with the current permitting scheme is that cumulative impacts are not considered during simultaneously ongoing permitting processes, where the actors would be acting in the same area, and the permitting authorities might be the same.
- Due to the nature of the assessment framework of N2K non-deterioration (uniqueness and circumstances of areas, case law), it is challenging to establish what constitutes a significant deterioration of nature features, but a common framework could be developed to support, standardise, and make the process more transparent.
    - Although the concept (and legislative side) of non-deterioration could work well in theory (including e.g., consideration of cumulative effects), but because the habitats tend to be of very large scale, especially smaller-scale activities tend to not be considered to significantly deteriorate the habitats, and the marine nature may not in practice benefit from the non-deterioration requirement.
- The definitions of habitats (HD habitats, Red List of Ecosystems habitats) could be broadened or more flexible, in order to capture important ecological features relevant to marine conservation in Finland.
    - Habitats with no clearly dominant species or substrate fall outside the scope of currently recognised habitat classifications. Such habitats would require their own classifications.
    - Research on the biological characteristics of some HD habitats (section 2.6) could be considered.
- Because of the ongoing biodiversity crisis, it would not be unfounded to protect non-threatened species or habitats (Virtanen and Moilanen 2023; Soininen and Pappila 2023), especially if they provide or contribute toward, e.g., important ecosystem services, or are characterised by high biodiversity, in order to preserve complete ecosystem ensembles and support connectivity aspects of conservation. This could be possible based on the stipulations regarding establishment conditions of NCA 43 §.
- The efficacy of enforcement of existing regulations could be improved through, e.g.,
    - more funding: unregulated, often small-scale, activities lack monitoring, or
    - greater penalties for non-compliance (see examples from how the non-deterioration requirement has been implemented elsewhere, section 2.4.2).
- The state of the Baltic Sea requires efforts other than conservation, in order to ensure the vitality of fish stocks and nature overall, such as mitigating climate change or the root-causes of eutrophication.
- A large portion of the shallow, innermost coastal areas not included in the MPA network are owned by private entities, complicating the conservation of such areas. The process of possible conservation of such areas could be aided through, e.g., education regarding the benefits of protection, as well as the process and regulations that may follow. A financial incentive could also be of benefit.
- MPAs have limited effects on, e.g., curbing the eutrophication problem of the Baltic Sea, and would, for example, entail changes to terrestrial legislation. An example would be to strengthen the objectives of the VMJL and marine strategy in land use planning processes.

Development and gaps of the MPA network

- The HELCOM MPAs largely overlap with the marine parts of N2K sites, where the marine features of the N2K sites have not been the primary target of protection and were established prior to more comprehensive information on underwater marine nature. It may thus

be questionable how well the HELCOM MPAs thus cover marine underwater nature, especially because the Finnish HD habitats do not appear to describe marine biodiversity well (Virtanen et al. 2018; see also section 2.1.2.1 on the N2K network).
    - Further, because many of the overlapping marine parts of N2K sites have been implemented through the WA, the level of protection may be relatively low in at least parts of the HELCOM MPAs.
    - To enhance the efficacy of the HELCOM MPAs, more binding or stronger regulations regarding them could be implemented, as per, e.g., HELCOM Recommendation 35/1.
- Ramsar areas: Whilst the overlap with other MPA types is beneficial, they mostly overlap with N2K sites, and especially the marine parts (down to 6 m depth) may be protected insufficiently, due to many of the marine N2K sites being implemented through the WA in the marine parts.
    - Similar to the HELCOM MPAs, the Ramsar sites and associated ecological features could benefit from stronger legal regulations.
- The Gulf of Finland national park in the eastern Gulf of Finland technically does not meet the establishment conditions of a national park, namely, its area is less than 1000 ha. The national park does not include water areas, hence the small area. Metsähallitus (2014) has suggested that the marine waters surrounding the national park be included in the park, in order to meet the condition of the NCA.
- Considering that the conservation objectives of the other state-owned conservation areas at least in part protect N2K nature values, and N2K habitats may not describe marine biodiversity patterns very well in a Finnish marine setting (Virtanen et al. 2018), the conservation level and values may be questionable, complicated by the fact that conservation objectives and restrictions are considered area-by-area.
- The nature conservation programmes (considered here) are not actively enforced (by e.g., administrative authorities), lack funding, and are considered during permitting processes. The programme areas are according to the NCA 15 § reserved for conservation purposes and could be considered to be designated as PAs.
- Following the update of the NCA, mineral prospecting has been completely prohibited in national parks (and nature parks), but the same restriction currently does not apply to other nature conservation area types, although it has been strengthened. This could have implications on the state of protected features because the EU has proposed regulations regarding, e.g., important mineral materials.
- Carbon-rich ecosystems may be challenging to protect, because reed belts, for example, can bind large amounts of carbon, but may not be considered conservation-worthy. NCA 43 § however lists preconditions of designating PAs, including that an area should be *valuable*, and the conservation of the area could be seen as necessary for biodiversity.
- The climate change factor should be incorporated in the MPA designation process, especially if futureproofing is desired, and because the designation process could be considered rigid.

Legislation and guidance related recommendations

- Improve the permitting process to be more favourable to the marine environment and nature by adding a requirement for new projects or activities to ensure that the new activity does not further deteriorate nature, together with existing activities. This would apply both on land and sea.
    - Components related to, and the role of the objectives of river basin management and the marine strategy in their current form remain unclear as per their role in permit processes, although they are affected by the consideration obligation (VMJL 28 §). The role of the obligation, however, appears vague, and could be developed by

clarifying the role, as well as increasing its weight in permitting processes, in order to improve the consideration of nature values and promote the ecosystem-based approach. The linking between the WA and e.g., marine strategy has previously been suggested to be strengthened (even binding) and clarified (Pappila and Puharinen, 2022, Puharinen et al., 2021), i.e., the marine strategy would have increased weight in permit processes.

- Development and implementation of a common holistic planning platform where all aspects of the marine environment are included, bringing together all actors in the marine realm to a common planning tool (suggested in Soininen and Pappila 2023). In a sense, it would be similar to the MSP, but would include activities on land, as they may either indirectly or directly affect the marine environment.
- Because the NCA could be considered the strongest conservation tool in Mainland Finland, a larger portion of marine N2K sites could be implemented through said legislation, instead of the WA, in order to strengthen the N2K networks protection level.
- Defining strict protection and utilising no-use/no-take in marine areas, such as those of the terrestrial nature parks. The definition of strict protection may be open to certain interpretation (EC 2022a). Ideally, strict protection would be harmonised among countries. The BSAP (HELCOM 2021a) also includes objectives regarding strict protection and conservation in general (objectives B1-B7).
    - Investigation regarding the feasibility of marine nature parks (NCA 45 §), silent areas (with regards to underwater noise), or marine wilderness areas (IUCN protected area category Ib).
- Legally protect important breeding and juvenile areas of fish from deterioration (e.g., similar instrument as the NCA's or WA's habitat conservation). The fishing restriction designations of the FA (53-54 §§) only concern fishing, and not, e.g., the deterioration of the designated area. If the habitat is no longer appropriate for the fish species, the fish may migrate elsewhere despite the effect of the fishing restriction.
    - The EUBDS states that strict protection may concern important ecosystem services.
- Only two marine habitats were added to the updated NCA (9/2023), while there are still numerous other threatened marine habitats. The addition of the habitats is a step in the right direction, but some challenges exist due to the conservation process.
    - The process requires information, the natural or natural-like state of the habitats, importance for the conservation of the habitat type, as well as monitoring.
- Including more species and habitats in legislation, either directly or indirectly. Direct examples include the inclusion of more species and habitats in legislation, strengthening their consideration obligation in permit processes, and smaller-scale projects. Indirect means could be to increase control of pesticides or other pollutants (in the marine or terrestrial realm; inspiration could be drawn from practises elsewhere in Europe, see section 2.4.2). The species and habitats should be implemented into the NCA, as it already includes species and habitat conservation, and regulated following previously presented logic: the more sensitive or lower the state, the stricter the regulations.
    - Only including smaller-scale features, such as threatened species or habitats, might not be desirable, and more common nature features should be included (Virtanen and Moilanen 2023; Soininen and Pappila 2023).
    - As for marine habitats, the N2K habitats are quite broad, geologically defined features, and thus run the risk of not really being considered in permitting processes, especially small-scale projects. Nationally Red Listed habitats and species (Kotilainen et al. 2020, 2019; Hyvärinen et al. 2019) could be included in legislation, to, for example, aid in evaluating effects on smaller-scale features, as well as to have a more concrete feature to base decisions on.
    - N2K habitats have been considered to not describe marine biodiversity very well, and the focus of conservation efforts has been suggested to consider ecosystem ensembles, instead of focusing on specific threatened species and/or habitats.

    - The national conservation measures have a focus on threatened species and habitats and is has been suggested that conservation should consider more "common" (not necessarily threatened) nature as well, which support both the threatened species as well as the broader ecological communities, i.e., conservation could be made less reactive, and instead more proactive and balanced between threatened and common ecological features.
- Some recommendations regarding mineral or substrate extraction include:
    - Extraction of material from below the photic zone, and far away enough from the coastline, so that erosion risk is minimised to proximal beaches.
    - Review, clarification, harmonisation, and development of related legislation to ensure sustainable practises.
    - The clarification of the regulation of seabed mining and mineral/substrate extraction (mining implies bedrock, while other extraction could imply, e.g., suction dredging of seabed surface mineral deposits on softer sediments), and what legislation is relevant when.
- Human constructions such as hydropower and damming prevent migratory fish from reproducing. Existing water permits are cumbersome to change or retract. The significance of hydropower in Finland's energy production has diminished (Soininen et al. 2018) and could be expected to further decline in the future, as we are transitioning toward more renewable energy production. Further, WFD obligations might lead to changes in legislation (Soininen et al. 2018). Hence, change of relevant legislation, e.g., permanency of water permits.
- The MSP and conservation processes are currently two distinct processes. For the nature conservation aspect, it would be important for it to be considered in planning to a higher degree, or in some cases, to even exclude certain ("planned") activities if justified.
- Although MSP according to the MSPD should support MSs achieve GES (MSFD), the Finnish MSP had been considered to have a weak connection to the GES objective, prompting the strengthening of said connection.
- The WA has limited capability to regulate the cumulative effects of activities. Assessing the cumulative activities is increasingly important the more activities that take place in the marine area, and depends on, among others, the spatial scale of the assessment. As such, ecological features should rather be protected by, e.g., the NCA, to ensure their protection.
    - Develop the permitting processes (not necessarily only regarding the WA) by adding a requirement for new projects or activities to consider the cumulative effects of the project.
- The NCA 7 § on the precautionary principle may to certain extent function as a safety net for marine nature, but concerns decision-making under the purview of the NCA (including other legislation referring to the NCA), which may limit its effect. Even if applied, the threshold for application may be high. This could be amended by including it under the purview of other legislation associated with, e.g., permitting processes.
    - The precautionary principle is, however, a general international principle in the EU, and may thus contribute to decision-making in cases when technically not required.
- The HD could be considered to not have been implemented sufficiently into the national legislation. The HD formulations regarding non-deterioration imply that no deterioration should take place, human activity or not, while the Finnish legislation requires *significant* deterioration not to take place.
- Some proposals for EU legislation as well as the Finnish Government programme may conflict with, e.g., non-deterioration requirements, biodiversity loss reversal, the restoration legislation in preparation, or the EUBDS.

Communication

- Public and stakeholder participation in conservation decision-making processes, as well as education, could both inform the parties involved and educate them regarding the benefits of e.g., biodiversity. It could also make the decision-making processes more transparent and acceptable. The Meriverkko network could function as a common platform.

Gaps in knowledge, data deficiencies, and information needs

- Identification of the most vulnerable marine areas, in order to steer deteriorating activities elsewhere.
- An example of an important feature to find more information about are the ferromanganese concretions, as interest in the economic exploitation of these and other minerals have increased in the recent years (e.g. Kaikkonen and Virtanen 2022; Kaikkonen et al. 2021), and they are still relatively unknown ecologically (Kotilainen et al. 2020).
- Not much ecological data from areas greatly affected by humans exists. There is especially a lack of before-after data regarding areas impacted by human activities, leading to challenges in the evaluation of environmental impacts (Virtanen, Forsblom, et al. 2022).
- Little observational data exists from offshore areas. It would be important for larger projects, e.g. OWF, to share survey data with (at least) the environmental administration, especially from data deficient areas. There are currently no obligations to share data with, e.g., the environmental administration. The OWF actors may be willing to share the data once permits to proceed have been granted, at which point intervention could be too late.
    - Alternatively, the sharing of data could be implemented as a precondition in the permitting process.
    - Additionally, if a project is rejected or otherwise not implemented, the data may in this case also remain with the actor and not be shared.
- Improved information on mineral and rock material in a marine setting, especially concerning sought-after and commercially interesting mineral materials. Although the mapping of such areas could increase the exploitation of such materials, the proposed EU Regulations regarding important minerals could promote the exploitation either way, and with this information plans to mitigate extraction operations could be prepared, and the information could be used in other planning processes as well, to consider the possibly inevitable.
- Because such material extraction has yet to take place in Finland, possible effects of such operations should be thoroughly assessed, including their possible cumulative impacts.
- Improvements in the monitoring methods of migratory fish. Outside of known migration routes, fishing data reporting, or tracking individual fish, it is challenging to say how the fish distribute in the sea. Conservation measures are therefore focused on areas important for their reproduction and by, e.g., setting minimum catch-sizes.
- Developing improved monitoring measures regarding by-catch, including that of birds. The information is required for the implementation of possible amendments.
- Due to many YSA areas having been established prior to comprehensive knowledge on the marine underwater nature, it may be questionable if the restrictions, especially the stronger restrictions such as movement restrictions in the areas, are well founded and meet the requirements of the NCA, i.e., that the nature values require such strong restrictions. General fishing rights (FA 7 §), for example, cannot be restricted unless well founded.
    - Because restrictions are established on a case-by-case basis, and the restrictions may vary significantly between areas, assessing the level of protection becomes challenging, when considering, e.g., the sufficiency of the MPA network as a whole.

Follow-up investigations

- Different types of restrictions regarding different types of human activities exist in separate databases. Further, not all areas, e.g., zones within MPAs, have been digitized. To be able

to evaluate the levels of area-based protection, it would be important to combine and produce a data layer or product describing the overlapping, or “cumulative” regulations of areas.
    - The data layer could further be utilised to analyse the de facto (theoretical, excluding the compliance aspect) level of protection, if combined with other, e.g., biological and human pressure data. It could also be published as a standalone data product or map service (e.g., phone application), for the use of anyone roaming the sea (e.g., recreational boaters), to inform on the restrictions of zones and areas.
- Investigating what defines and constitutes a natural coastal lagoon according to the WA (2:11 §), in terms of, among others, state and level of human activities (affected by terrestrial activities, as well).
    - Due to their coastal nature, a large portion of the protected features of the WA 2:11 §, flads, occur in areas owned by private property owners, which may complicate their conservation, i.e., by designating a protected site, and may have implications regarding human pressures.
- Review how well international commitments, agreements, directives, and such have been implemented in Finland, and if the implementation is sufficient regarding, e.g., conservation, level of obligation, strength of regulation or implementation nationally. Topics to review could be or include:
    - HELCOM (HOLAS assessments, BSAP, recommendations and projects)
    - Ramsar
    - EU Directives such as the HD, BD, MSFD, MSPD, or WFD
    - Agreements such as the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), Agreement on the Conservation of Populations of European Bats (EUROBATS), or Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
    - Conventions such as Convention on the Conservation of Migratory Species of Wild Animals (CMS, also known as the Bonn Convention), or Convention on Biological Diversity (CBD; e.g., GBF).
- Investigate how straightforwardly the commitment adopted in the river basin management side could be applied to the marine strategy side in general. In the review, it would be good to, e.g., account for the differences between the two planning systems regarding, e.g., the geographical and natural boundaries they use, as the spatial scale may have a significantly effect on outcomes of e.g., permit applications.
- Assessment and clarification on the efficacy and establishment of no-take zones in Finland. It could involve a project to, e.g., review evidence from outside of Finland (or if de facto no-take zones exist in Finland due to regulations), designating a no-take zone (temporary, time-scale of years) in Finland in order to monitor and review the results, review and assess the feasibility of no-take zones in Finland, and in which case, how to judicially implement them.

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