Marine Spatial Plans for

the Gulf of Bothnia, the Baltic Sea and the Skagerrak/ Kattegat

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National planning in Sweden's territorial waters and exclusive economic zone

2022

Summary

Sweden produces three marine spatial plans – one for the Gulf of Bothnia, one for the Baltic Sea and one for the Skagerrak/Kattegat. A marine spatial plan provides guidance about what the best uses of the sea are. Marine spatial plans guide national authorities, municipalities and the courts in future decisions, planning, and licensing examinations. Traders can also obtain guidance from the plan.

Marine spatial plans are intended to contribute to long-term sustainable development. They are intended to reconcile business policy objectives, social objectives and environmental objectives.

Marine spatial plans contain guidance on most appropriate use. The use or uses specified for one area take precedence over other uses. In large parts of the sea, different uses can coexist if they adapt to each other. Marine spatial plans provide guidance on which use or uses take precedence and what adaptation is necessary.

Marine spatial plans specify thirteen uses:

- electricity transmission
- energy extraction
- investigation area for energy extraction
- defence
- general use
- culture
- nature
- recreation
- sand extraction
- investigation area for sand extraction
- shipping
- possible shipping
- commercial fishing.

Marine spatial plans also specify areas where particular consideration has to be paid to high nature values, high cultural landscape values, or to the interests of Sweden's total defence.

Proposals for uses are based on tradeoffs and appropriateness assessments considering location, characteristics and needs. National interests and other public interests are important when making tradeoffs.

The consequences of marine spatial plans are assessed from ecological, economic and social perspectives. Assessments of consequences are carried out in parallel with and as an integral part of planning. Consequences are additionally analysed in a separate environmental impact assessment and a separate sustainability assessment.

Marine spatial planning is based on laws, regulations, societal goals, reports of different kinds, and not least on the extensive dialogue that the Swedish Agency for Marine and Water Management has held with affected stakeholders.

Figure 1. Map overview of Sweden's three marine spatial planning areas.

How to read the plans

You can read the plans as a document – with map support online

The marine spatial plans make up Part 2–7 of this document. Part 1 is a background description of marine spatial planning from the Swedish Agency for Marine and Water Management.

The document is supplemented by online resources to aid readers explore the plans in greater detail, on the website of the Swedish Agency for Marine and Water Management. Some of the online maps are both clickable and searchable, and can be zoomed. There are also several sets of data in different maps, for comparison.

You can find the online resources as well as this document on

www.havochvatten.se.

How the document is structured

The document is divided into seven parts. Part 1 is a background description. Part 2 applies to all three marine spatial plans, as do Part 6 and Part 7.

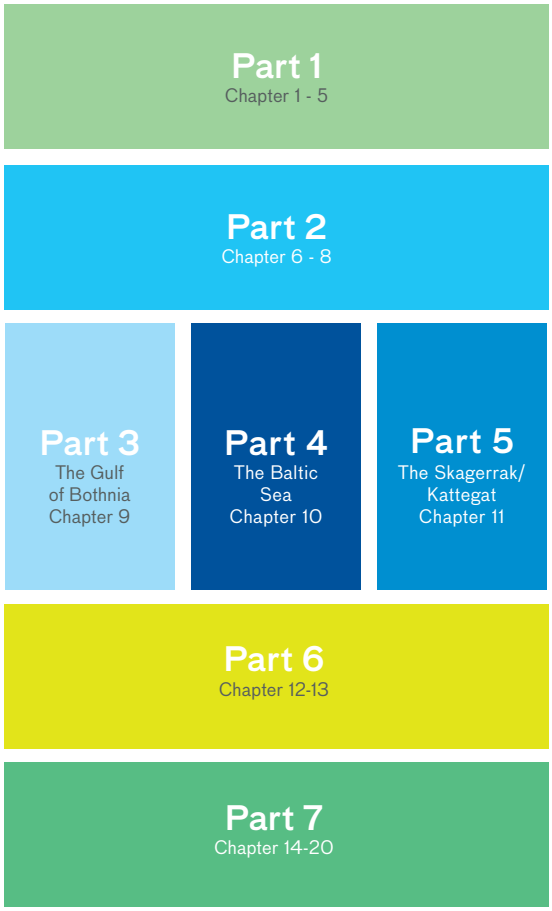


Figure 2. Structure of the document – generally and specifically applicable parts

Contents

This is marine spatial planning

Part 1

1. About marine spatial planning

The purpose of marine spatial planning is to ensure that the sea is used sustainably, now and in the future. The sea has to be shared between many interests, and marine spatial plans facilitates this by providing guidance about what the best uses of the sea are from a unified perspective.

This is marine spatial planning

The sea, and the use of the sea's resources, provide many benefits to our society. Examples include areas for recreation, the production of foods and renewable energy, and space for transportation. In and around the sea are animal and plant life that make up important parts of the ecosystem and are the basis for a rich biological diversity that provides resilience against climate change. New, innovative uses of the sea's resources are constantly being found, but at the same time the pressures on the ecosystems are considerable. The sea also has a largely unexplored cultural landscape. Major demands are being made for sustainable use of the sea's resources, but there are also major challenges such as a changing climate, increasing populations, urbanisation, and a globalised world.

A marine spatial plan provides guidance for the areas encompassed by it to be used for the end or ends that they are best suited, given their characteristics and locations as well as society's needs. Marine spatial planning makes tradeoffs between different interests. This guidance is intended to be used by government agencies, municipalities and regions in planning and in examining claims for use within the marine spatial planning area.

The aim of marine spatial plans is to contribute to long-term sustainable development. The plans reconcile business policy objectives, social objectives and environmental objectives. Marine spatial plans must contribute to:

- the achievement and maintenance of a good environmental status of the sea environment
- the sustainable use of the sea's resources, so that maritime industries can develop
- the promotion of coexistence between different activities and areas of use.

Sweden produces three marine spatial plans – one for the Gulf of Bothnia, one for the Baltic Sea and one for the Skagerrak/Kattegat. The marine spatial plans encompass Sweden's exclusive economic zone and those parts not in private ownership of Swedish territorial waters within one nautical mile of the baseline referred to in the Act on Sweden's Marine Territory and Maritime Zones (2017:1272). An ecosystem approach is applied when drawing up marine spatial plans, as stipulated in the Marine spatial Planning Ordinance.

Sweden has incorporated the EU's framework directive for marine spatial planning (2014/89/EU) into Swedish legislation through the Environmental Code (1998:808) and the Marine spatial Planning Ordinance (2015:400).

Marine spatial plans are adopted by the government. The government may also issue regulations regarding bans or restrictions on activities and measures in an area subject to marine spatial planning, if they are needed to achieve the plan's aim. The Swedish Agency for Marine and Water Management draws up proposals for marine spatial plans in collaboration with several other government agencies and stakeholders.

This is the first time that Sweden is drawing up national marine spatial plans. In addition to the plans themselves, the process of drawing up marine spatial plans also generates new knowledge about the sea and its uses.

Presentation of marine spatial plans

Marine spatial plans consist of a map and a description of the plan, as specified in Section 3 of the Marine spatial Planning Ordinance.

The map must show:

- the basic characteristics of the use of the marine area
- those areas that are of national interest as specified in Chapter 3 of the Environmental Code
- other public interests of substantial significance.

The description of the plan must:

- state the focus of the use of the marine area
- indicate and describe those areas that are of national interest as specified in Chapter 3 of the Environmental Code
- describe other public interests of substantial significance, current use and other planning assumptions
- present the considerations that underlie the plan
- state how issues of incompatible purposes should be resolved
- present the implications and consequences of use as laid out in the plan.

2. Marine spatial planning in context

Marine spatial planning honours Sweden's commitments under the UN Convention on the Law of the Sea (SÖ 2000:1) and other international law, and conforms to legislation and policy at the EU level. Collaboration plays an important role in planning. Sweden collaborates with its neighbouring countries in EU projects and on drawing up regional marine environment conventions. Within Sweden, planning responsibilities for territorial waters overlap between municipalities and the national government in 65 municipalities. Marine spatial planning is one of several processes in overall marine and water management.

Read more about the context in Marine Spatial Planning – Current Status 2014 and Färdplan havsplanering (Roadmap for Marine Spatial Planning).

Boundaries in the sea and Sweden's rights

The UN Convention on the Law of the Sea provides an almost all-encompassing regulatory framework for the peaceful use of the world's seas, which includes all marine areas. The convention establishes a careful balance between the interests of coastal states on the one hand, who want to control activities

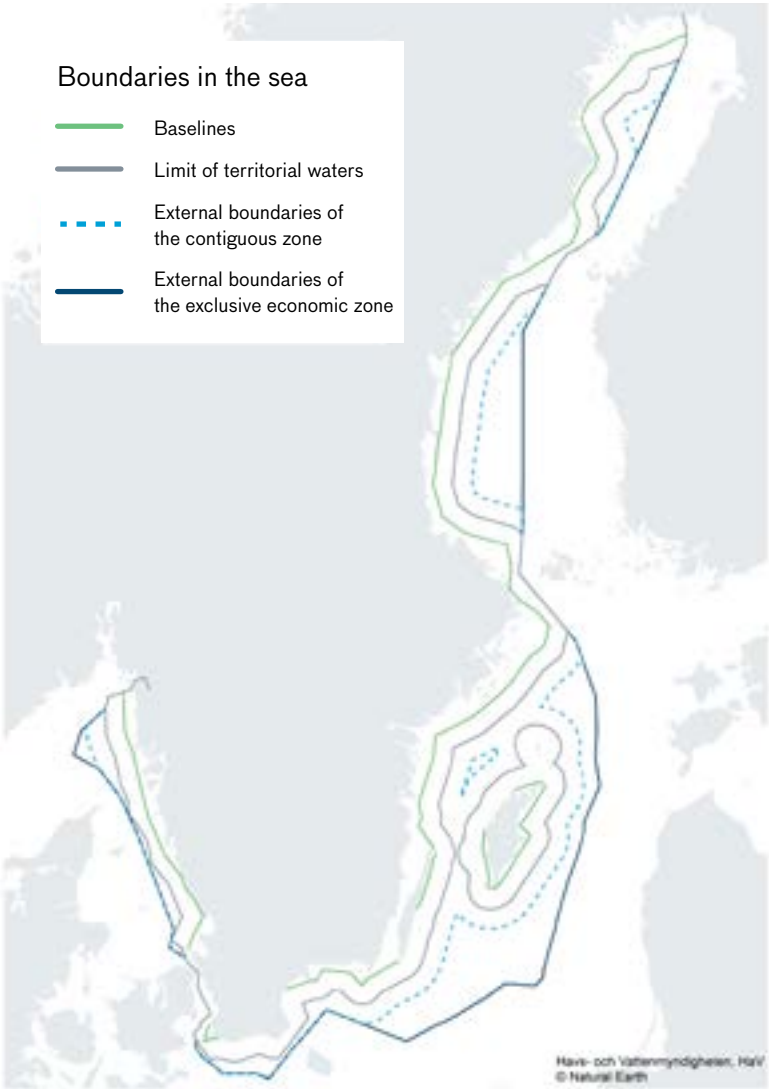


Figure 3. Boundaries in the sea

A coastal state's baseline consists either of normal baselines, made up of the low-water line along the coast, of straight baselines which may in some circumstances be drawn between appropriate points on the outermost of the state's island, of points on low rocky islets (low-water skerries) outside the baselines, or of a combination of normal and straight baselines. The baseline along Sweden's coasts consists of both normal and straight baselines.

A coastal state's territorial waters may extend to a maximum of 12 nautical miles from the baselines. The coastal state's internal waters and its territorial waters together make up a part of that state's sovereign marine territory. Marine areas outside of such sovereign marine territory have the status of international water in the law of the sea.

A coastal state's contiguous zone may be extended to a maximum of 24 nautical miles, its exclusive economic zone to a maximum of 200 nautical miles, and its continental shelf to a maximum of 200 nautical miles from the baselines. The continental shelf may in some circumstances extend even farther.

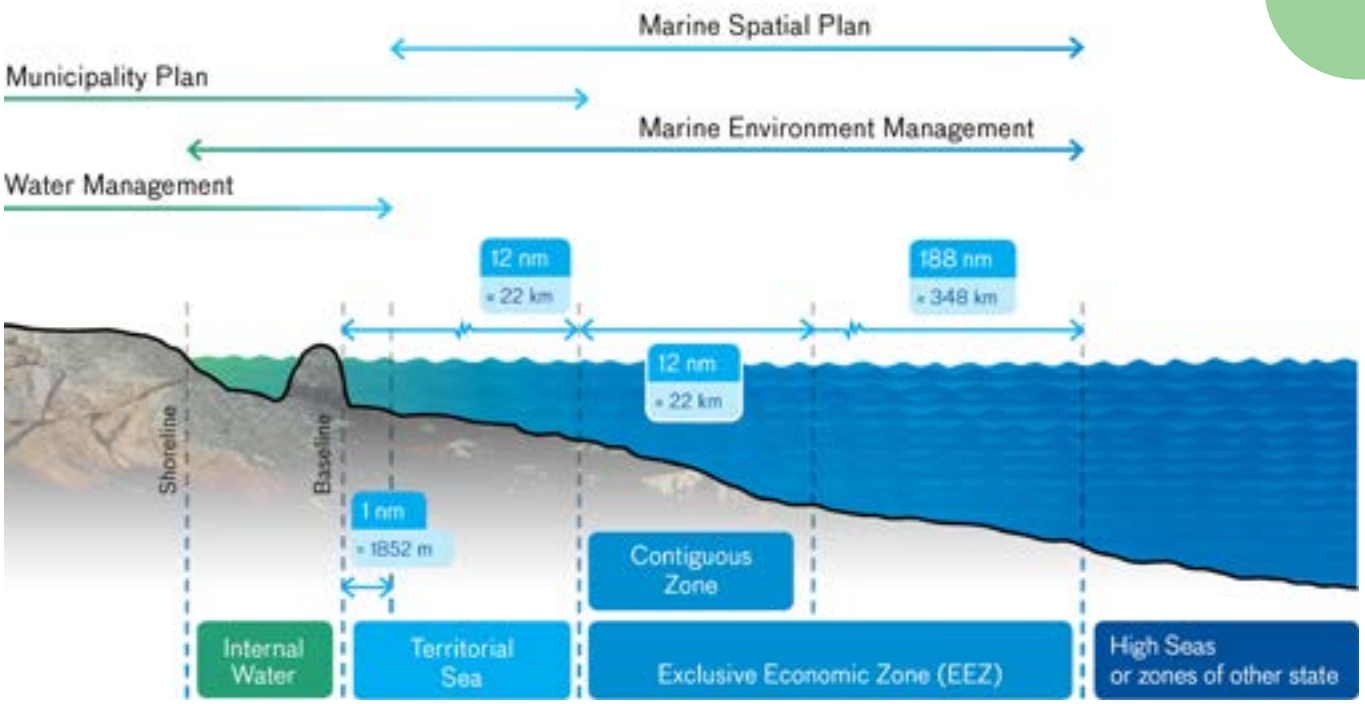


Figure 4. Terms, boundaries and planning responsibilities. The government shares planning responsibilities with municipalities in territorial waters. The government has sole planning responsibility in the the exclusive economic zone.

in their coastal areas, and the right of all states to use the open sea without unnecessary limitations on the other. It contains an extensive regulatory framework with binding regulations for the protection of the marine environment.

Sweden's territorial waters comprise internal waters and the territorial sea. Internal waters are inland waters and waters in the sea inside the national border and the baselines established in the convention and other agreements in international law. The territorial sea extends twelve nautical miles from the baselines, with limitations that follow from agreements regarding e g the national border.

Sweden has sovereignty over its territorial waters. Under international law, however, other states' vessels are entitled to innocent passage through Sweden's territorial waters. Sweden's contiguous zone extends a maximum of 24 nautical miles from the baselines. Within the contiguous zone Sweden may undertake measures to exercise necessary control for the prevention or sanctioning of transgressions within Swedish territory, including its territorial waters, of laws and other statutes regarding customs duties, taxes, inward travel, or health issues, and to protect ancient remains, ancient finds and other objects of archaeological or historical interest. The sovereign rights of a coastal state with respect to fisheries and other living resources may be exercised, within the framework of an exclusive economic zone, up to 200 nautical miles from the coast. The coastal state also has jurisdiction over the construction and use of artificial islands, installations and built structures, the practice of marine scientific research and the protection and preservation of the marine environment. At the same time, most of the rights of the open sea (except e g fishing) apply in the exclusive economic zone. Sweden's exclusive economic zone comprises the areas beyond its territorial waters as specified in an annex

to the Act on Sweden's Territorial Waters and Maritime Zones (2017:1272). Sweden has some jurisdiction and certain sovereign rights within the exclusive economic zone. Swedish authorities may undertake measures in the zone consistent with the powers they have under Swedish law and in keeping with the rules of international law. Regulation of fishing is carried out within the framework of the EU's Common Fisheries Policy. The EU has delegated to the member states the right to issue certain regulations.

The marine spatial plans encompass most of the territorial waters and the entirety of the Sweden's exclusive economic zone. The national government shares planning responsibility for territorial waters with municipalities. In the exclusive economic zone, the national government has sole planning responsibility.

There is also legislation and policy at the EU level concerning the sea and activities associated with it. This includes the EU Marine Strategy Framework Directive (2008/56/EC), other environmental protection directives and EU transport, maritime shipping and energy policy, as well as the previously mentioned fisheries policy.

Many neighbouring countries to cooperate with

Sweden's marine spatial plans border on nine neighbouring countries' territorial waters or exclusive economic zones.

The neighbouring countries vary in terms of how far they have got in their marine spatial planning. The seven neighbouring countries that are members of the EU are obliged to draw up marine spatial plans under the EU Maritime Spatial Planning Framework Directive (2014/89/EU). Article 11 of the directive lays down the obligation to collaborate with neighbouring EU countries. Member states also have to strive for collaboration with neighbouring countries that are not in the EU. Sweden has taken an active role in this context by leading the EU-financed Baltic SCOPE 2015–2017 and Pan Baltic Scope 2018–2019 projects. Sweden also participated in Baltic LINes 2016–2019 and is currently participating in NorthSEE 2016–2021 and Capacity4MSP 2018–2022.

In these projects neighbouring countries work together on coordinating planning issues in different sectors, e g maritime shipping and fishing, and on coordinating data and planning evidence. Baltic SCOPE, for example, dealt with energy, fishing, nature and maritime shipping. Participating countries' responsible planning agencies took part in the project, and sector agencies were invited to take part in the discussions. Working together in the project, participants drew up needs-based recommendations for the handling of transboundary issues (Baltic SCOPE, 2017). Cross-border collaboration continued in Pan Baltic Scope, providing support to national marine spatial planning processes. This included collaboration on green infrastructure, total cumulative impacts, economic and social impact assessments of marine spatial plans, and interaction between land and sea planning. In Capacity4MSP, countries are looking at lessons learned in previous projects and continuing coordination between their respective planning processes through a special planning forum.

More formalised cooperation is also carried out within the framework of Convention on the Protection of the Marine Environment of the Baltic Sea area (HELCOM) which includes the Gulf of Bothnia and the Kattegat. There is a special forum for cooperation between the ministers responsible for spatial planning in the Baltic Sea region – Vision and Strategies Around the Baltic Sea (VASAB). VASAB and HELCOM have formed a working group for marine spatial planning which has drawn up guidelines for cross-border consultation and for how an ecosystem approach can be applied in marine spatial planning.

Dialogues between countries and the proposals for marine spatial plans and environmental impact assessments produced also take place in the form of what is known as Espoo consultation. This means that neighbouring countries including Sweden first inform each other that marine spatial planning is in progress, and then let interested neighbouring countries provide feedback.

Municipalities' spatial planning of territorial waters

Under the Planning and Building Act (2010:900) municipalities are responsible for planning of Sweden's territory, which includes internal waters and territorial waters. National marine spatial planning means that planning responsibilities in territorial waters now overlap between municipalities and the national government in 65 municipalities. Another 20 or so municipalities have sea coastlines, but not on seas which are part of the state marine spatial planning areas.

In their comprehensive plans municipalities present how they want to promote long term positive development of land and water use. Comprehensive plans are the foundation of municipalities' rights to draw up their own detailed plans and to interpret the import of public interests. Around 20 municipalities have included coastal and marine areas in their comprehensive planning. However, these plans deal more often and in greater detail with areas near land and in the coastal zone than with areas farther out in territorial waters (National Board of Housing, Building and Planning, 2018a). Over the past few years many coastal municipalities have either started preparatory work on marine spatial planning or begun comprehensive planning.

Under Chapter 7 of the Planning and Building Act the counties of Stockholm and Skåne have to carry out regional spatial planning. In Stockholm County regional planning is carried out by Region Stockholm, and the plans include policy positions regarding the archipelago areas. Amended legislation in effect from 1 January 2019 means that regional planning is also to be done in Skåne County. Planning is to be carried out by Region Skåne. The legislative proposal for this change to the law also suggested that in order to achieve greater national uniformity, regional spatial planning should be introduced in additional counties, when the need for it arises and conditions are present.

The Swedish Agency for Marine and Water Management developed a project form, KOMPIS (Kommunal planering i statlig samverkan, or State collaboration in municipal planning), to support and strengthen municipalities'

preparations for and implementation of marine comprehensive planning. The project form was also intended to support coastal county administrative boards' coordination of municipalities' work, so that national marine spatial planning could cooperate with municipal marine comprehensive planning. Grants were given to coastal county administrative boards – monies which could subsequently be applied for by each county's coastal municipalities – for implementation of the project. Between 2016 and 2018, the Swedish Agency for Marine and Water Management granted SEK 26 million to Sweden's coastal county administrative boards. When the project form was concluded in 2018 a number of projects had been carried out, resulting in new inter-municipal collaboration, inventories, and more in-depth supporting documentation integrated into municipal comprehensive plans along Sweden's coastline.

Marine spatial planning – part of marine and water management

Marine and water management affects many of society's sectors. Ecosystems know no administrative boundaries, so a fundamental principle of this management is that it has to be coordinated and integrated in all its constituent parts. Water management is strongly linked to marine management, and they have to be regarded as a whole, from source to sea. Marine policy is based on the perception that the seas make up an indispensable resource for humans and society. Marine and water management comprises several tools and instruments, from spatial planning to legal and economic instruments.

The government has highlighted the maritime sector as important to growth and development, and in 2015 adopted a national maritime strategy (Ministry of Enterprise and Innovation, 2015). This strategy is a roadmap for the continued work on developing maritime industries. In addition to developing traditional industries such as fishing and shipping, there is potential for energy extraction at sea, new forms of aquaculture, environmental technology, blue biotechnology, and marine and coastal tourism. The national strategy refers to the European Commission's guidelines for an integrated approach to maritime policy (COM/2008/0395) and to the European Commission's strategy Blue Growth – opportunities for marine and maritime sustainable growth (COM/2012/494). In May 2021 the Commission published a new strategy for a sustainable blue economy in the EU: Transforming the EU's Blue Economy for a Sustainable Future (COM/2021/240). The new strategy is part of the EU's Green Deal.

While growth and development are necessary, Sweden also faces the challenge of achieving good environmental status in our seas. The effects of eutrophication continue to be apparent and extensive. Further measures are required to reduce the transfer of nutrients from land to sea. Local programmes of measures need to be developed, as do efforts to reduce the pressure principally of phosphorous in lakes, coastal areas and seas. Reduction of the adverse environmental effects of commercial fishing must continue. This includes the need to make catches of species of fish and shellfish

sustainable for the long term. The increased presence of marine waste is a growing threat. The objective is to be able to develop use of the seas' resources in a sustainable way, so that we guarantee a good marine environment. Many adverse environmental impacts in the sea originate on land, and need to be tackled at source.

To reverse the negative environmental trend and achieve sustainable use of the seas' resources, the European Community (now the EU) adopted e g the Marine Strategy Framework Directive (2008/56/EC), implemented in Sweden through the Marine Environment Ordinance (2010:1341). The directive aims to achieve or maintain good environmental status in Europe's seas by the year 2020. There is also a Water Framework Directive (2000/60/EC) that specifies what EU member states need to achieve in terms of water quality and access to water. This directive was implemented in Sweden through the Water Management Ordinance (2004:660). The tools of the Marine Environment Ordinance include defining and assessing good environmental status, defining environmental quality standards and their associated indicators, and devising programmes of measures and for monitoring the marine environment. An assessment of the state of Sweden's administrative areas/maritime areas is summarised in a report by the Swedish Agency for Marine and Water Management, *Marine strategy for the North Sea and the Baltic Sea 2018 – 2023, Assessment of environmental status and socioeconomic analysis* (2018e).

Environmental quality standards are the legal instruments used to achieve or maintain good environmental status. The basis for defining an environmental quality standard is knowledge about what humans and nature can bear, without regard for economic or technical circumstances. The standard must therefore reflect the lowest acceptable environmental quality or the desired environmental status, but does not normally consider how human activities should be framed. However, application of environmental quality standards in e g licensing examinations and environmental inspections means that they also have an indirect influence on activities that affect or may come to affect the environmental status.

The overall environmental quality standard, which is that a good environmental status be maintained or reached in the North Sea and the Baltic Sea by 2020, is included in Section 17 of the Marine Environment Ordinance. What constitutes good environmental status is defined in Swedish Agency for Marine and Water Management regulations (HVMFA 2012:18) on what characterises good environmental status and environmental quality standards, with indicators for the North Sea and the Baltic Sea. These regulations also include other environmental quality standards with indicators to allow us to achieve good environmental status.

Marine spatial planning is a process intended to help enable the development of maritime industries while at the same time achieving and maintaining a good environmental status. Marine spatial planning creates good opportunities for a common understanding of how we should use the seas in a sustainable way. Marine spatial planning is one of several processes in overall marine and water management, which together with other management and spatial planning works towards achieving the defined goals.

3. The marine spatial planning process

Marine spatial planning is a broad process that involves many stakeholders. Marine spatial plans have now been drawn up and adopted for the first time, after which they will be implemented and followed up in a recurring, cyclical process.

Marine spatial plans are drawn up in a collaborative process

Marine spatial planning is an open process that allows for participation by those affected at the municipal, regional, national and international level. Industry organisations, non-profit and research institutions are also given the opportunity to participate in various ways and to contribute insights and knowledge.

At the national level, collaboration involves central government agencies, county councils and the Swedish Association of Local Authorities and Regions on strategic planning issues, the planning process itself, and sectoral issues. The working method has included a cross-sectoral reference group and thematic working groups.

At the regional and municipal level, county administrative boards play an important role in coordinating national and municipal planning. All 14 coastal county administrative boards participate in efforts for municipal participation and in other work in support of municipalities. The county administrative boards in Kalmar, Västernorrland and Västra Götaland counties coordinate work for the affected coastal county administrative boards. Coastal county administrative boards also produce complementary regional planning documentation, e g from municipalities and stakeholders responsible for development, or internally from the county administrative boards on matters within their remit. Coastal county administrative boards receive funding for planning since 2012.

Municipalities contribute to planning with supporting documentation, opinions and suggestions for improvements during the planning process, not least through municipal comprehensive planning for both coastal areas and territorial waters that overlap with national marine spatial planning. This means that local conditions can be integrated with the national perspective and that the connection between sea and land becomes strong.

From 1 January 2019 it is the regions that manage and develop regional growth initiatives. In Gotland County it is Gotland municipality that is in charge of this. Regional development strategies constitute the basis of planning work. The regions, county administrative boards and municipal cooperation bodies that were responsible for development under the previous legislation have participated during the marine spatial planning process.

Dialogue in several steps

The process of drawing up marine spatial plans has several steps. Under the Marine Spatial Planning Ordinance, consultation and review have to be carried out before the government decides on whether to adopt the marine spatial plans. This means that the proposals for marine spatial plans were made available on two occasions for comments by those who wished to make them. The plans were then reworked after an assessment of the opinions received. This procedure has ensured broad participation and a democratic process.

Th Swedish Agency for Marine and Water Management has also consulted with Sweden's neighbouring countries in accordance with the Espoo Convention. This addresses transboundary environmental impacts, but the countries were also invited to contribute other opinions on the planning proposals.

Dialogues have also been held regarding current state reporting, the marine spatial planning roadmap, in-depth thematic studies, and early drafts for the planning proposal.

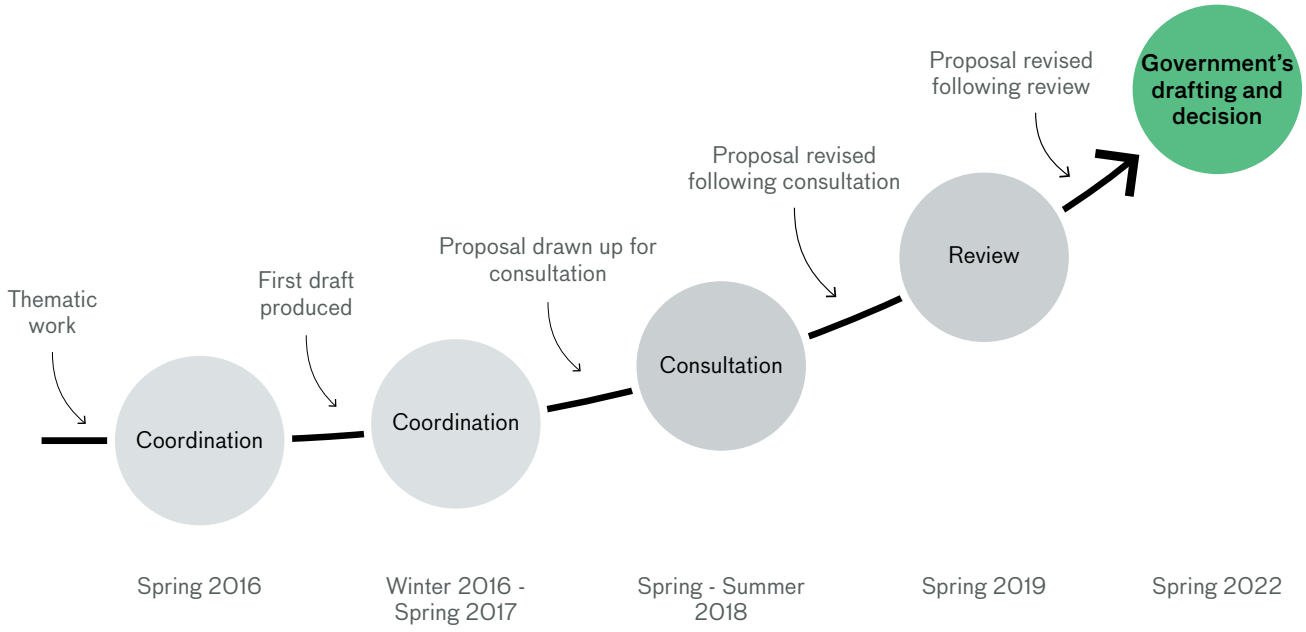


Figure 5. The process of dialogue leading to the marine spatial plans.

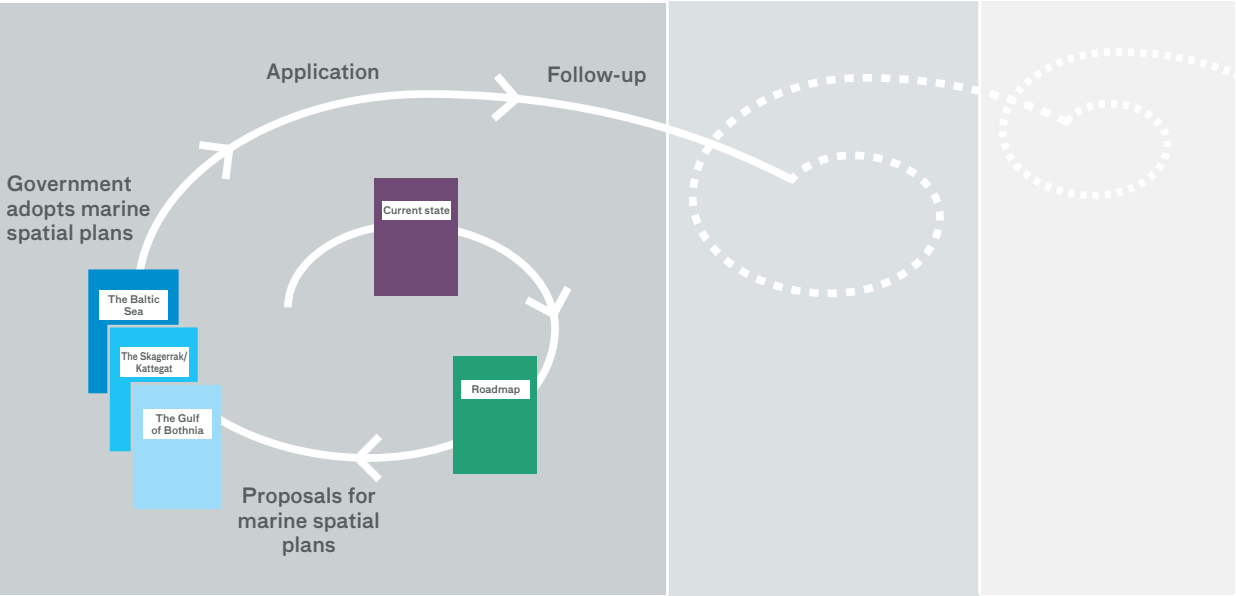


Figure 6. The marine spatial planning process continues over several years. After a number of years, new planning proposals are drawn up and the process is repeated.

Cyclical planning

Marine spatial planning can be described as a recurring process that is carried out in cycles over several years. In a number of steps, marine spatial planning goes from the acquisition of knowledge via analysis of the current state to planning, where the marine spatial plans are the result of the planning process. The plans are then applied, and follow-ups conducted on a continuous basis. Under the Marine Spatial Planning Ordinance (2015:400), the Swedish Agency for Marine and Water Management has to follow up the adopted plans and draw up new proposals for marine spatial plans when the agency identifies the need for it, or at least every eight years. Marine spatial planning requires the readiness to continuously collect, evaluate and apply new knowledge in future marine spatial plans.

Planning with an underlying ecosystem approach

Under the Marine Spatial Planning Ordinance, an ecosystem approach must be applied when marine spatial plans are drawn up. An ecosystem approach is a strategy for the preservation of nature values and the sustainable use and fair distribution of natural resources, with the objective of ensuring that use of the ecosystems does not exceed what they are able to sustain (Swedish Agency for Marine and Water Management, 2012).

The UN Convention on Biological Diversity (CBD) is one of the principal international foundations for the ecosystem approach. The approach sets out from twelve principles, referred to as the Malawi Principles after the conference in Malawi where they were first formulated.

Read more about the ecosystem approach in

- Havsplaneringens Färdplan (Roadmap for Marine Spatial Planning),
- Tillämpning av ekosystemansatsen i havsplaneringen (Applying the Ecosystem Approach in Marine Spatial Planning),
- Ekosystemansatsen – en vägmot bevarande och hållbart nyttjande av naturresurser (The Ecosystem Approach – A Route to Conservation and Sustainable Use of Natural Resources),
- The Ecosystem Approach in Maritime Spatial Planning – A Checklist Toolbox.

The twelve principles of the ecosystem approach (the Malawi Principles)

1. Management objectives are a matter of societal choice.
2. Management should be decentralised to the lowest appropriate level.
3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
4. Recognising potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem management programme should:
   - reduce those market distortions that adversely affect biological diversity;
   - align incentives to promote biodiversity conservation and sustainable use;
   - internalise costs and benefits in the given ecosystem to the extent feasible.
5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognising the varying temporal scales and lag effects which characterise ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognise that change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
11. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

An ecosystem approach is applied in marine spatial planning in several different ways that follow from the Malawi Principles.

- Marine spatial planning is predicated on the societal goals formulated on the basis of society's overall interests. Cooperation and dialogue during the course of the process allows perspectives from many different actors to be considered. This relates mainly to Malawi Principles 1 and 10.
- Marine spatial planning is carried out in an open planning process, in cooperation and dialogue with municipal, regional, national and international perspectives. The process allows for cooperation in everyday work as well as on formal occasions for procuring opinions. This relates mainly to Malawi Principles 2, 11 and 12.
- Marine spatial planning is devised in such a way as to contribute to the development of maritime industries and to the achievement or maintenance of good environmental status. This is done by balancing activities with conditions for ecosystems and ecosystem services in planning. Opportunities for avoiding or limiting adverse environmental effects are identified, as are opportunities for contributing to the rehabilitation of marine ecosystems. Planning and its consequences are assessed from environmental, social and economic perspectives. This relates mainly to Malawi Principles 3, 4, 5, 6 and 10.
- Marine spatial planning adopts a cross-sectoral systems perspective that comprises direct and indirect, total, cumulative, short term and long term, beneficial and adverse effects, as well as considering the connections between land and sea. Different geographical scales are also considered, from local to international. Global scenarios such as zero options and future scenarios are used in the assessment of plans' consequences. This relates mainly to Malawi Principles 3, 4, 5, 6, 7, 8, 9, 10 and 11.
- The approach is that marine spatial planning should be based on the best available knowledge about activities and ecosystems. A great deal of knowledge and supporting documentation is generated and collected in the course of the planning process. Tools such as Symphony are developed to evaluate environmental impacts and sensitivity in ecosystems. Assessment of the reliability of the knowledge is based on planning-related requirements. According to the precautionary principle, a lack of knowledge about environmental effects may not be used as an argument for permitting an activity. Marine spatial planning therefore highlights the need for more in-depth knowledge in certain areas. Reasonable options indicating alternative possibilities and choices are presented during the production of the marine spatial plans. This relates mainly to Malawi Principles 6, 9 and 11.
- The marine spatial planning cycle includes follow-ups, which allows for adaptive management. Because marine spatial planning is a cyclical process in which plans are updated at least every eight years, new and improved knowledge is more likely to have an impact on planning. This relates mainly to Malawi Principles 7, 8, 9 and 11.
- Marine spatial planning provides guidance at an overall and strategic level, with allowances for planning at the local and regional level. Municipalities and regions are given the opportunity to participate in national

marine spatial planning, so that consideration can be paid to local and regional needs. This relates mainly to Malawi Principle 2.

Map, analyse, prioritise

The planning procedure is forward-looking and based on an overall assessment. Overall planning objectives, claims, circumstances and expected consequences of occurrences and activities are assessed comprehensively and for specific geographical areas.

The procedure can be described as a three-step process in which each step includes dialogue and cooperation with affected actors. Recapitulations are made between the various steps

- to map
- to analyse
- to prioritise.

Mapping circumstances is about acquiring knowledge, information and supporting documentation, and about identifying knowledge deficiencies. The marine spatial planning process also produces a great deal of new knowledge. Relevant planning circumstances have to do with such things as trends in societal development, climate change, or conditions in geographical areas – e g their biology, geology, or what activities exist there. It is also a matter of mapping the needs of different activities, or needs in order to fulfil our societal goals.

The frameworks might be current legislation, for example, including environmental quality standards and economic feasibility. Conditions on land and in neighbouring countries' marine areas also influence circumstances.

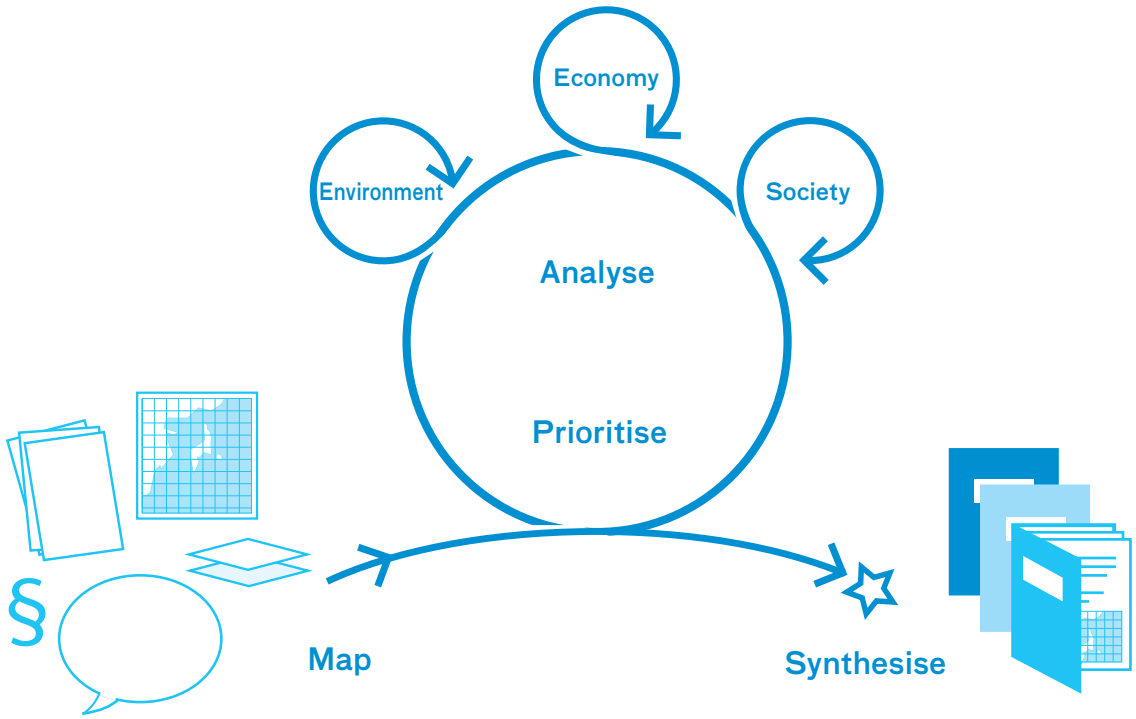


Figure 7. Marine spatial planning uses a process-oriented procedure.

Analysing circumstances is intended to generate an evaluation of most appropriate use. This evaluation is based on location, characteristics and needs. The analysis evaluates what is relevant from a general standpoint, the public interest, for the purpose of providing the national, consolidated view of the most appropriate use of the sea.

The analysis is carried out at different levels, e g for a specific place, for Sweden as a whole, for the Baltic region, or for an ecosystem. Different planning options are compared and their consequences analysed from economic, social and ecological perspectives.

Prioritising involves making tradeoffs on the basis of the analysis, to contribute to long-term sustainable development. Interests deemed to be compatible can coexist, while a tradeoff is made between interests deemed to be incompatible. Legislation determines the framework in which tradeoffs are made in marine spatial planning.

4. Assessment of consequences

A stepwise and integrated process

Read more about the results of the assessment of consequences in Part 6, Chapter 13 on page 139.

The Swedish Agency for Marine and Water Management's impact assessments have been carried out as part of the planning process for several years. This began with the production of a current status report for marine spatial planning (Swedish Agency for Marine and Water Management report 2015-2). The report included the first description of the state of the marine environment as a basis for planning. It was followed by the production of a roadmap for marine spatial planning. This included a delimitation of the environmental assessment and the defining of environmental objectives, among other things. Sweden's neighbouring countries were informed, in accordance with the Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo Convention), about its marine spatial planning and work on an environmental impact assessment in connection with consultations on the roadmap. The integration of environmental considerations continued in the thematic working group for nature conservation/marine ecology, which identified future spatial needs for nature conservation. Since then three major dialogue phases have occurred: the informal dialogue around the first drafts for marine spatial plans in 2017, the formal consultations in 2018, and the review of the marine spatial plans in 2019. Sustainability assessments and socioeconomic impact analyses of subareas have also been elaborated in various steps during the process.

Table 1. Impact assessments in the marine spatial planning process

Type of impact assessment	Early stage 2017	Consultation 2018	Review 2019	Proposal to the government 2019
Environmental impact report	For all planning drafts	For all consultation proposals	For all review proposals	For all planning proposals
Sustainability report	For the Baltic Sea planning draft	For all consultation proposals	For all review proposals	For all planning proposals
Socioeconomic impact analysis		For Gävle Bay and the South Kattegat	For the Baltic Sea review proposal	

Results of impact assessments from dialogue and consultation phases have been fed back into the planning process. It is this feedback that has allowed the Swedish Agency for Marine and Water Management to consider and make changes to draft plans on the basis of the results indicated by the impact assessments. That in turn has allowed environmental, social and economic aspects to be integrated into planning. Special coordination sessions were held in the autumn of 2018 in order to convey and discuss the results of the impact assessments, and the outcome of these has been taken into account in planning.

In preparation for the consultation phase, a guide to environmental assessments in marine spatial planning was produced for the facilitation of integrating environmental considerations. Comprehensive cartographic material showing nature assets, marine green infrastructure, was also produced and used in the planning process. This material, known as the Green Map, has continued to develop throughout the process in order to make use of the best available data.

The consultation version of the marine spatial plans included optional plans in the form of different solutions for subareas in the plan proposals. These were based on possible tradeoffs between interests identified during the process. Most were about the issue of energy use, but maritime shipping also featured. The review version of the marine spatial plans included options to be explored for shipping, and a comparison with the proposals for energy areas that were included in the consultation proposals. The Swedish Agency for Marine and Water Management's proposal to the government also included options to be explored for shipping and suggestions for possible changes to increase environmental benefit and enhance certain sustainability perspectives.

Impact assessment from a unified perspective

One assumption in Chapter 1 of the Environmental Code is that it is applied in such a way as to ensure that the use of land, water and the physical environment in general is such as to secure long-term good management in ecological, social, cultural and economic terms. The Marine Spatial Planning Ordinance and the Environmental Code contain requirements for strategic environmental assessments in marine spatial planning and for environmental impact assessments to be carried out in connection with consultations. The ordinance also states that the proposal for a marine spatial plan must present the implications and consequences of using the marine area as described in the plan. As the purpose of marine spatial plans is to contribute to long-term sustainable development, there is additionally a need to assess the marine spatial plans' sustainability. This makes it necessary to produce environmental and sustainability descriptions as well as socioeconomic analyses of the marine spatial plans.

The purpose of environmental impact studies and sustainability assessments is that they together provide a good overall picture of the likely effects of marine spatial plans. They are also intended to give an idea of how marine spatial plans can contribute to long-term sustainable development. The environmental assessment has the purpose, expressly stated in the Environmental Code, of contributing to the integration of environmental considerations in planning. Additional socioeconomic and sustainability assessments combine with this to fulfil the Environmental Code's overarching goal and serve its area of application for sustainable development.

In preparation for the consultation phase, the Swedish Agency for Marine and Water Management developed the Symphony planning evidence, which allows for the analysis of interacting, total cumulative environmental effects.

Symphony has been further developed and has provided support in the environmental assessment as well as the sustainability assessment in preparation for the review phase and presentation of the plans to the government. A qualitative analysis of how conditions for ecosystem services may be changed by the marine spatial plans is also part of the impact assessment.

Read the report on the Symphony tool in Symphony – Integrerat planeringsstöd för statlig havsplanering utifrån en ekosystemansats (Symphony – Integrated Planning evidence for National Marine Spatial Planning with an Ecosystem Approach) and view clickable maps in the report's annexes .

Zero option

Impact assessments show the difference, in terms of consequences, between applying the marine spatial plans and not doing so. This involves assessments of a future option with marine spatial plans and without them, a so-called zero option. The reference year for the zero option is 2030. Both the environmental impact assessment and the sustainability assessment contain descriptions of the assumptions made regarding the development of different sectors until 2030.

Uncertainties

There are considerable uncertainties in impact assessments of long-term and comprehensive plans such as national marine spatial plans. Such uncertainties include global developments, knowledge basis, impact assessments made and their methods, and how the plan will be applied in planning and management. The uncertainties that exist in the data in Symphony have been addressed in the environmental assessment, and are presented in the report *Symphony – Integrerat planeringsstöd för statlig havsplanering utifrån en ekosystemansats* (Swedish Agency for Marine and Water Management, 2018h).

5. Application of marine spatial plans

Marine spatial plans constitute the national government's comprehensive guidance for government agencies and municipalities in their planning and examining of use claims for marine areas.

Marine spatial plans provide guidance on a strategic level

The guidance in marine spatial plans is directed at government agencies, municipalities and regional planning bodies that plan, adopt, develop or implement management measures concerning the sea. Traders and business entities in sea-related activities can also benefit from the increased predictability provided by marine spatial plans.

Marine spatial plans are the national government's comprehensive view of and guide to how the sea should be used in a specific area. Considerations made in marine spatial plans are strategic and long term. This means that marine spatial plans set the direction and focus for the use of the sea. During the marine spatial planning process, different uses are assessed generally for appropriateness. Any subsequent licensing examination will include a more detailed examination, specific to the project and site, of use in a given area. It will examine for example, whether a development implies the risk of accidents, hazards to human health and safety, the risk of erosion, the risk of substantial detriment to a national interest, or the risk that it will not be possible to observe environmental quality standards.

In order for the plan's aim for long-term sustainable development to be achieved, marine management and the associated regulatory framework sometimes need to be adapted, and in other cases the government may need to issue regulations regarding bans or restrictions on certain activities or measures. This could e g involve regulations or other measures that facilitate coexistence between different interests. For measures in commercial fishing or maritime shipping, agreements or decisions are often required at the EU level or within the International Maritime Organisation, IMO.

The role of marine spatial plans in licensing

Under the Environmental Code (1998:808), marine spatial plans have to be the guiding basis for licensing examinations and other matters. Each government agency or municipality applying the Environmental Code must ensure that marine spatial plans are available when examining an activity or measure within the marine spatial planning area. The Environmental Code must be applied in matters that involve a new or altered use of a marine area. Marine spatial plans will be guiding documents in the interpretation of what constitutes most appropriate use under these provisions.

Marine spatial plans will also serve as guiding documents in certain licensing examinations under other laws, where the management provisions in the Environmental Code are applicable, e g the Act on Sweden's Exclusive

Economic Zone (1992:1140), the Continental Shelf Act (1966:314) and the Act on the Establishment, Enlargement and Closure of Public Navigation Channels and Public Ports (1983:293). This is because the provisions in Chapter 3 and 4, *inter alia*, of the Environmental Code are also to be applied in examinations of cases and matters under these acts.

The county administrative board plays an important role as it is responsible for the initiatives needed to ensure that planning and decision-making processes pay heed to Chapter 3 and 4 of the Environmental Code. When Chapter 3 and 4 of the Environmental Code have to be applied in the examination of a case or matter, the county administrative board must work in particular to ensure that national interests are provided for. In areas comprehended by an adopted marine spatial plan, the county administrative board's actions must be based on the marine spatial plan, as laid down in Section 3 of the Ordinance on Land and Water Management etc (1998:896).

The role of marine spatial plans in municipal planning

Under the Planning and Building Act (2010:900), municipalities have to produce a comprehensive plan for the entire area of the municipality,

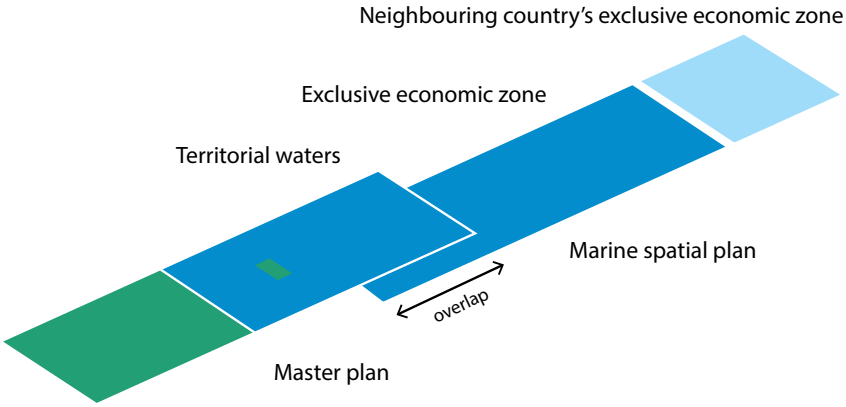


Figure 8. Municipal comprehensive plans and the national marine spatial plan overlap in a part of territorial waters. Both plans apply in these areas.

including territorial waters. Marine spatial plans serve as guidance for municipal planning.

In the area of territorial waters where national and municipal plans overlap, both plans apply, while the marine spatial plan alone applies in the outermost marine area, and the comprehensive plan alone applies in the coastal area.

The interaction between marine spatial plans and comprehensive plans is important in order for the connection between sea and land to function well. Comprehensive plans are significant for indicating local and regional considerations and claims which may be relevant to marine spatial planning.

In the event that a municipality has presented clear intentions with respect to the future use of marine areas that will be comprehended by a comprehensive plan as well as a marine spatial plan, these will be taken into account in the decision on the marine spatial plan. In municipal reviews and elaborations of comprehensive plans, marine spatial plans serve as a comprehensive source of information about the national government's view of future land and water use in the area. The same applies in relation to regional plans. Should the marine spatial plan's position be out of date, e g if new evidence has emerged since the plan was adopted, there may be cause for the municipality to deviate from the marine spatial plan in its comprehensive plan. There is no formal obstacle to adopting a comprehensive plan that differs from the marine spatial plan.

The county administrative board has two formal tools when it has to point out to a municipality during its comprehensive planning process that the municipality's view does not coincide with the view presented in the marine spatial plan.

- During the review process of a new or changed comprehensive plan, the county administrative board submits a review statement under Chapter 3, Section 16 of the Planning and Building Act. This must include an exposition of whether the municipality's proposal does not provide for a national interest under Chapter 3 or 4 of the Environmental Code, if the proposal could contribute to non-observance of an environmental quality standard as specified in Chapter 5 of the Environmental Code, if inter-municipal issues are not coordinated in an appropriate way, or if a structure is inappropriate with reference to health and safety. The county administrative board's review statement must be based on one of the items in Chapter 3, Section 16 of the Planning and Building Act, but in the assessment of whether the proposed plan provides for a national interest under Chapter 3 or 4 of the Environmental Code, the county administrative board will be guided by the marine spatial plan (see the reference above to Section 3 of the Management Ordinance).
- The county administrative board must also make a summary presentation to the municipality of any national or inter-municipal interests as may be significant for the currency of the comprehensive plan as specified in Chapter 3, Section 26 of the Planning and Building Act. This presentation must be made during the second half of the mandate period between two ordinary municipal elections. It must further specify how the interests referred to relate to the comprehensive plan, as well as whether any part of the county administrative board's review statement no longer applies.

Under the provisions of the Planning and Building Act, the county administrative board has to defend the national government's interests and issue a statement about the municipality's proposal for a detailed plan when such a proposal is presented. Even in the event that a municipality produces a detailed plan, situations could arise in which the detailed plan does not coincide with the view of future use of the marine area as presented in the marine spatial plan.

Possibilities of examining new claims in the maritime planning areas

New claims and needs are expected to arise all the time in the maritime planning areas. Such claims are dealt with in follow-ups and new proposals for marine spatial plans. Until new marine spatial plans have been adopted, guidance must be sought in existing marine spatial plans to the extent that this is relevant. If there is no immediate guidance in the marine spatial plans, planning and decision-making must be done on the basis of the plans' intentions or of the best available knowledge.

Possibilities of proposing regulations

The government may also issue regulations regarding bans or restrictions on activities and measures within an area subject to marine spatial planning, if they are needed to achieve the plan's aim. Regulations or restrictions on the use of the area subject to planning must be such that they are not comprehended by existing restriction or prohibition possibilities (according to government bill 2013/14:186, p 21). Bans and restrictions on a specific use may provide opportunities for another use of the area. The Swedish Agency for Marine and Water Management has so far not elaborated any proposals for such regulations. As it is the first time that marine spatial plans are being drawn up, the agency believes that it is important to achieve a common understanding regarding planning before any regulations are proposed. The agency's assessment is that existing management is largely capable of capturing the matters that marine spatial plans currently serve as guidance for. Still, there are areas where further restrictions or simplified measures may need to be introduced in order to achieve the plan's aims, but it is not clear whether the current regulatory framework provides sufficient scope for this. Continued analysis and assessment of regulations are therefore considered necessary. One question that needs to investigated is whether special regulations are needed against trawling near environmentally hazardous wrecks. Possibilities of issuing regulations regarding the banning or restricting of activities or measures within an area subject to marine spatial planning may in some cases be limited by international regulations, see e g the section "Boundaries in the sea and Sweden's rights" in Chapter 2 and the section "Maritime shipping" in Chapter 18.

Follow-up of the plan

Once the government has adopted marine spatial plans, the Swedish Agency for Marine and Water Management is responsible for follow-ups by continuously keeping itself informed of developments in the areas in question.

Follow-up of the plan can be divided into two different parts,

- one based on Section 21 of the Marine Spatial Planning Ordinance, which principally concerns the application and currency of the plan, such as the process of applying the plan as guidance, global monitoring such as development within different sectors, national policy, legislation and regulatory frameworks

- and one based on requirements under Chapter 6, Section 16 and 19 of the Environmental Code, about the environmental effects of the application of the plan.

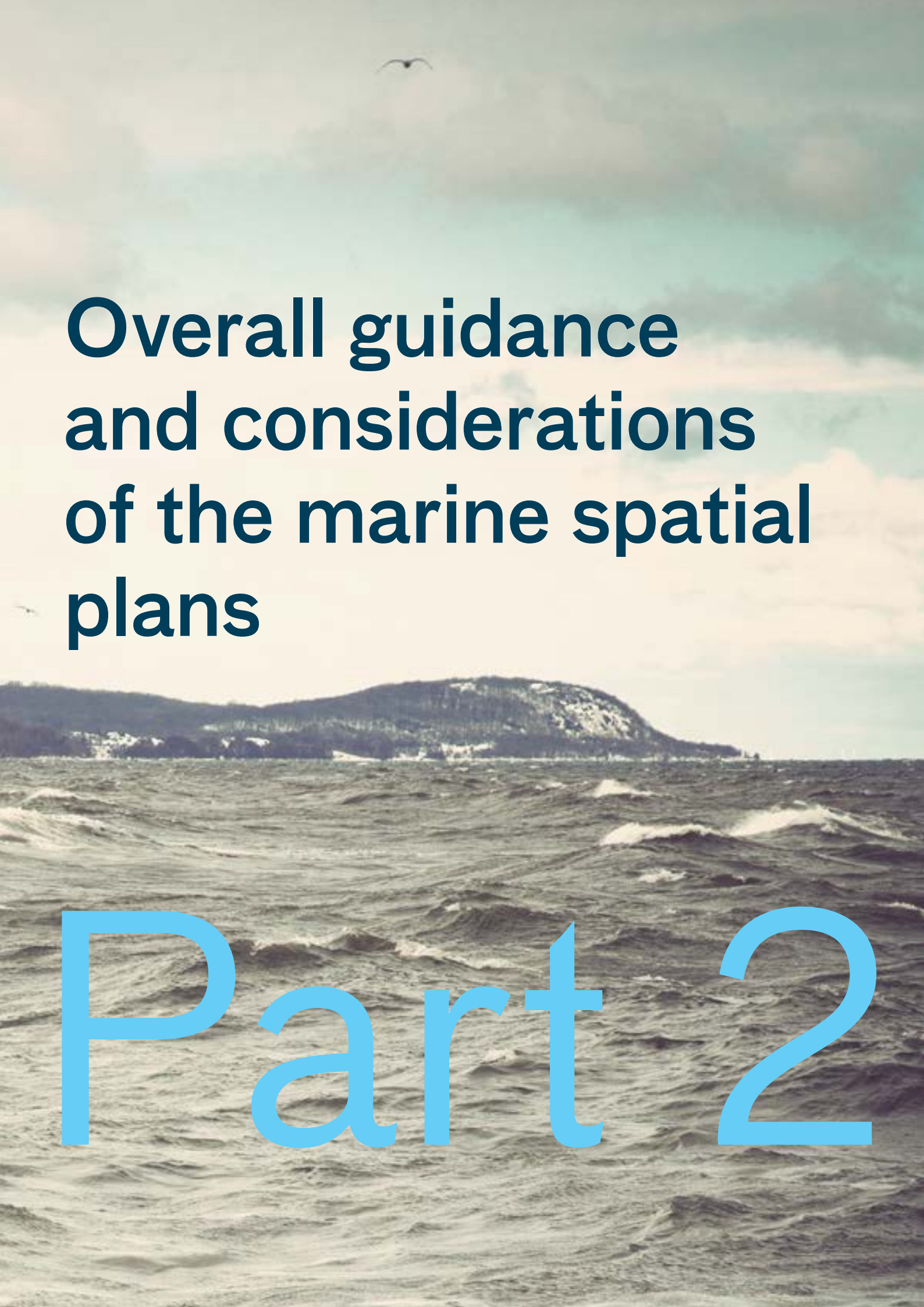
The results of the follow-up will be used in the Swedish Agency for Marine and Water Management's assessment of the currency of adopted marine spatial plans. New proposals for marine spatial plans will be drawn up at least every eight years.

With respect to follow-ups under the Environmental Code, the Swedish Agency for Marine and Water Management must separately follow up and evaluate the environmental impact of the practical application the plans. The aim is to obtain early knowledge of significant environmental impacts which have not been identified earlier, so that such impacts may be prevented or reduced. The follow-up is also intended to monitor the expected environmental impact as described in the plan's environmental impact assessment.

A presentation of follow-up and monitoring measures of significant environmental impacts that implementation of the marine spatial plans implies can be found in the environmental impact assessment.

In addition to the obligatory follow-up of the environmental impact of the plans, the agency intends to follow up their economic and social impacts as well as their effect on future planning, management and level of activity. Part of the follow-up concerns how national and municipal planning contribute to connecting land and sea.

The follow-up will also analyse how activities in the sea relieve the pressure on activities which otherwise have to be conducted on land. This analysis can contribute to an overall assessment of how society's needs can best be met from a sustainability perspective.



Overall guidance and considerations of the marine spatial plans

Part 2

6. Vision and goals of the marine spatial plans

A marine spatial plan is forward-looking and intended to help shape the future we want to attain. The target year of the marine spatial plans is 2030. We also use 2050 as a vision year, to stimulate discussion and thinking about the long term perspective of planning.

Vision – the sea in 2050

The marine spatial plans look ahead to 2050 based on a vision of how the sea is used, provided the planning goals are achieved. The vision represents the state that marine spatial planning is intended to help realise.

In 2050 we use the sea by means of competitive, innovative and sustainable maritime industries. The sea has a good environmental status and a rich biodiversity. We preserve and develop natural and cultural landscapes in the sea and safeguard its ecosystem services. There is ample public amenity value and opportunities for recreation. The sea provides enjoyment and benefit for all. Businesses and public management cooperate, and marine spatial plans provide a unified and forward-thinking approach as well as predictability. In 2050 we continue to live in peace and freedom in the Baltic and North Sea region. Climate change has been slowed and we have adapted to altered circumstances.

Planning goals

Ten planning goals have been formulated during the marine spatial planning process based on societal objectives, existing legislation, national strategies and other relevant supporting documentation (Figure 11). The planning goals consist of an overall goal buttressed by the other nine goals. These nine goals are divided into two groups with the headings *Create conditions for* and *Create preparedness for*, respectively. Claims identified as clear and extensive in the near future are grouped under *conditions*, while issues which are expected to generate potentially extensive claims in the sea only in the longer term are grouped under *preparedness*. The goals regarding preparedness signal that marine spatial planning must take future needs and activities into account.

Overall goal:
- Good marine environment and sustainable growth.

Create conditions for:
- Regional development, recreation and preservation of culture values
- Marine green infrastructure and promotion of ecosystem services
- Sustainable maritime shipping
- Good accessibility
- Further development of energy transmission and renewable electricity production in the sea
- Sustainable commercial fishing
- Defence and security.

Create preparedness for:
- Future extraction of minerals, and carbon capture and storage
- Future establishment of sustainable aquaculture.

Overall goal: Contribute to a good marine environment and sustainable growth

Overall, marine spatial plans must provide spatial conditions for meeting development needs and goals regarding sustainable growth, while at the same time contributing towards the achievement and maintenance of a good marine environment.

A good marine environment is described above all in the environmental quality objective *A Balanced Marine Environment and Flourishing Coastal Areas and Archipelagos* and its specifications. Other environmental quality objectives are also relevant, including *A Rich Diversity of Animal and Plant Life, Zero Eutrophication, and A Non-Toxic Environment*, which also encompass how environmental problems of the soil and the air also affect the sea. One of the specifications is for a good environmental status as laid down in the Marine Environment Ordinance.

Sustainable growth relates, inter alia, to Sweden's maritime strategy and to the EU's Green Deal, which includes the development of a sustainable blue economy.

Growth is sustainable when we can meet our current economic, environmental and social needs while at the same time creating the conditions that will allow future generations to meet their needs. An important premise of marine spatial planning is that sustainable growth assumes well functioning ecosystems. Consequently, and in accordance with the unified perspective of the ecosystem approach, the functions of ecosystems are considered from several time perspectives, as well as in terms of direct, indirect and total effects of claims in the sea.

Goal: Create conditions for regional development, recreation and preservation of culture values

Marine spatial plans must provide spatial conditions for sustainable development, good quality of life, equality and attractive environments regionally and locally. Different locations and areas have different conditions and outlooks for regional development. For that reason, marine spatial planning must strive to create good conditions for local and regional development along the entire coastline.

Marine spatial planning must contribute to the preservation of important nature and culture values, consider the aspect of the landscape, and create conditions for the development of industries and outdoor life associated with the sea. Recreation, which includes outdoor life and recreational fishing, has a considerable significance for people's quality of life and their health.

Culture values are important for the experience of the landscape, for people's identity and for creating attractive environments to live and work in. The sea is today home to a relatively unexplored part of our cultural heritage values. Increased knowledge about the culture values in the sea will contribute to local as well as regional identities, and to the hospitality industry. Culture values also have a value in and of themselves.

Nature and culture values along the coast and in the seas are often a prerequisite of developing and guaranteeing, respectively, commercial fishing and the hospitality industry in coastal communities. Other activities associated with the sea that contribute to development and to a sustainable blue economy in coastal areas must also be given favourable conditions for contributing to employment and quality of life.

Goal: Create conditions for marine green infrastructure and promotion of ecosystem services

Marine spatial plans must contribute to good ecosystems and the development of ecosystem services. They must support the establishment of new marine protected areas in accordance with national goals, and create conditions for strengthening and preserving representativity, functionality and ecological connections. Marine spatial planning must further contribute to the maintenance of a favourable conservation status for the species and natural habitats that protection encompasses. Favourable conservation status is a term used to describe the conditions required in order for a biotope, a habitat or a specific to remain viable in the long term. The term is used for biotopes and species indicated as particularly valuable within the framework of the European Natura 2000 network.

Marine spatial plans must contribute to guaranteeing marine green infrastructure, which is an important prerequisite of promoting ecosystem services. The plans must also guarantee sufficiently safe pathways and migratory routes within and between natural habitats in the marine environment, and migratory routes for birds.

Marine spatial plans must provide conditions for scientific investigations and long-term monitoring of the marine environment.

Green infrastructure

Green infrastructure are nature networks that contribute to functioning habitats for plants and animals, and to human well-being.

The definition is as follows: "Green infrastructure constitutes an ecologically functional network of habitats and structures, nature areas, and built elements which are designed, used and managed in such a way that biodiversity is maintained and critical ecosystem services are promoted throughout the landscape".

See the Swedish Agency for Marine and Water Management website, green infrastructure.

Goal: Create conditions for sustainable maritime shipping

Marine spatial plans must provide conditions for ecologically, socially and economically sustainable maritime shipping. This applies for short sea shipping as well as long-distance sea shipping. Marine spatial plans must give maritime shipping scope for growth while at the same time contributing to increased safety at sea, with fewer accidents and reduced risks of oil or other substances being discharged, as well as of other disruptions. Marine spatial plans must provide conditions for effective transport routes with low fuel consumption and the smallest possible environmental effects of maritime shipping, particularly in ecologically sensitive areas. Consideration must be made of the Baltic Sea's classification as a PSSA (Particularly Sensitive Sea Area) by the International Maritime Organisation (IMO).

Goal: Create conditions for good accessibility

Marine spatial plans must create conditions for the development of the maritime transport sector and other infrastructure, and make the sea accessible to the broader public.

Good accessibility in the marine transport system provides good conditions for consolidating the transport infrastructure into a coherent whole, so that

e g transferring goods from roads and railways to maritime shipping is facilitated. Preparedness must be built for the expansion of physical infrastructure, e g future tunnels or bridges.

Good conditions must be maintained for fishing vessels in terms of access to and use of the sea and ports necessary for fishing activities.

Spatial conditions must be provided for the using the sea for electronic communications infrastructure in the form of subsea cables and radio systems.

Conditions must also be created for giving people access to the sea for outdoor life and recreation. This can contribute to public health as well as to growth in the hospitality industry.

Goal: Create conditions for further development of energy transmission and renewable electricity production in the sea

Marine spatial plans must support efforts to integrate and connect to the European power grid, and provide conditions for existing, planned and potential subsea cables for power transfer in Sweden and between Sweden and other countries. This also applies to cables for energy transmission from offshore electricity production.

Marine spatial plans must contribute to creating conditions for Sweden's future needs in terms of extraction of renewable energy. To this end, planning must support Sweden's national goals for renewable energy by creating conditions for the expansion of offshore wind power.

Preparations must be in place for other offshore electricity production from other types of renewable sources, and marine spatial plans must provide conditions for the testing of new technology in the field.

Goal: Create conditions for sustainable commercial fishing

Marine spatial plans must contribute to environmentally sustainable, resource efficient, innovative, competitive and knowledge-based fishing within the framework of ecosystem-based management which includes consideration of important natural habitats for fish as well as other species. Well-managed fish stocks and natural habitats for fish are prerequisites for sustainable and competitive commercial fishing.

It is particularly important to integrate with planning for coastal areas, as there are important natural habitats for fish there, in the form of spawning and nursery areas.

Goal: Create conditions for defence and security

Marine spatial plans must create conditions for the defence of Sweden and Swedish interests in short as well as the long term. Stakeholders in both military and civil defence must be given conditions to carry out their activities, including holding exercises under different circumstances as well as other activities significant for military defence, such as signals intelligence. Marine spatial plans must also provide conditions for meeting Sweden's need of strategic supply in peacetime, in emergencies and in war.

Goal: Create preparedness for possible future extraction of minerals and for carbon capture and storage

Consideration must be made of possible future needs for increased extraction of finite resources such as sand, gravel and other minerals, and for carbon capture and storage, to counter climate change. Extraction of oil or gas in Sweden's territorial waters or exclusive economic zone is not planned, however.

Goal: Create preparedness for future establishment of sustainable aquaculture

Marine spatial plans must have spatial preparedness for the development of aquaculture and its potential to use the sea efficiently for sustainable production.

In view of the development potential of aquaculture and increased research in the field, aquaculture beyond the coastal zone could become a reality within the 2030 time frame and the 2050 vision year of marine spatial planning. Marine spatial planning must therefore consider the possibility that aquaculture becomes a reality in the marine spatial planning areas in the future.

Figure 9. Planning goals and some of the overall goals and asssumptions underlying their formulation.

Societal goals and other basic principles underlying the goals of marine spatial planning

Marine spatial plans reconcile business policy goals, social goals and environmental goals. They also relate to several policy areas and to legislation concerning the sea, see Figure 11.

The Sustainable Development Goals were adopted by the UN. They are indivisible and represent a balance between the three dimensions of sustainable development: economic, social and ecological. Swedish marine spatial plans relate principally to the following goals, see Figure 12.

- Goal 7 Affordable and Clean Energy
- Goal 8 Decent Work and Economic Growth
- Goal 9 Industry, Innovation and Infrastructure
- Goal 11 Sustainable Cities and Communities
- Goal 12 Responsible Consumption and Production
- Goal 13 Climate Action
- Goal 14 Life Below Water
- Goal 15 Life on Land.

Sweden's national environmental objectives comprise an overall generational goal that guides the aspirations of environmental efforts at all levels in society, and of the 16 environmental quality objectives.

Sweden's maritime strategy for competitive, innovative and sustainable maritime industries able to contribute to increased employment, a reduced environmental impact, and an attractive living environment, was adopted in 2015. It has three equal pillars:

- A balanced marine environment
- Competitive maritime industries
- Attractive coastal areas

The strategy comprises and integrates many policy areas and is thus an instrument for implementing an integrated Swedish maritime policy. The maritime strategy highlights national marine spatial plans as an important instrument for managing the development of Sweden's outermost marine areas.

Figure 10. The UN Global Sustainable Development Goals (Source: United Nations Development Programme, UNDP)

Further reading: En svensk maritim strategi - för människor, jobb och miljö (A Swedish Maritime Strategy – for People, Jobs and the Environment)

7. Guidance on most appropriate use and particular considerations

The plan description and the plan maps provide guidance on the use of the sea. Plan maps show the geographical areas for different uses and for particular consideration. This chapter describes how the plan maps should be read, as well as the meaning of uses and particular consideration.

Indications on plan maps

The uses shown on plan maps have been judged in the marine spatial planning process to be the most appropriate, and as such have priority over other uses. Other uses within the area must be adapted to the conditions and needs of the specified uses in management, planning and licensing examinations.

In many cases several uses are indicated as most appropriate in one and the same place. These enjoy an equal degree of priority over other uses. Where more than one use is specified, coexistence is judged to be feasible. Uses judged to be capable of coexisting may nonetheless need to be adapted to one another.

The guidance on most appropriate use specifies precedence for certain uses. It also specifies a need for particular consideration in certain areas. Guidance in the marine spatial plans does not amount to bans or mandatory restrictions.

Examples of this include vessels' right of passage regardless of what the marine spatial plans state – provided there are no restrictions in maritime shipping regulations; the possibility of applying for a licence to extract energy in other areas than those specified in the plans; consideration of nature and culture values even where they are not specified in the plans; and that commercial fishing is carried out across larger areas than those specified for that use in the plans, and is regulated via the EU.

Plans comprise all the spaces in the planning area – the sea, the space above the sea's surface, the sea bed and the stratum of soil and rock beneath it. Note that the demarcation between private water and public water has not been fully determined. Planning areas' real demarcation towards the coast may therefore deviate from the demarcation shown in marine spatial plan maps. Under Chapter 4, Section 10 of the Environmental Code, marine spatial plans have to comprehend Sweden's exclusive economic zone and those areas which are not part of Swedish private property in Swedish territorial waters beyond the special line of delimitation, one nautical mile from the baselines, as specified in the Act on Sweden's Territorial Waters and Maritime Zones (2017:1272).

Plan maps should be interpreted at the approximate scale of between 1:700,000 and 1:1,000, 000. Boundaries and markings on the maps are approximate, as dictated by the strategic level of marine spatial plans. The planning area maps (Maps 1, 5 and 11) are at 1:2,300,000 scale in full A4, while the marine area maps (Maps 2–4, 6–10 and 12–13) are at 1:1,000,000 scale in full A4.

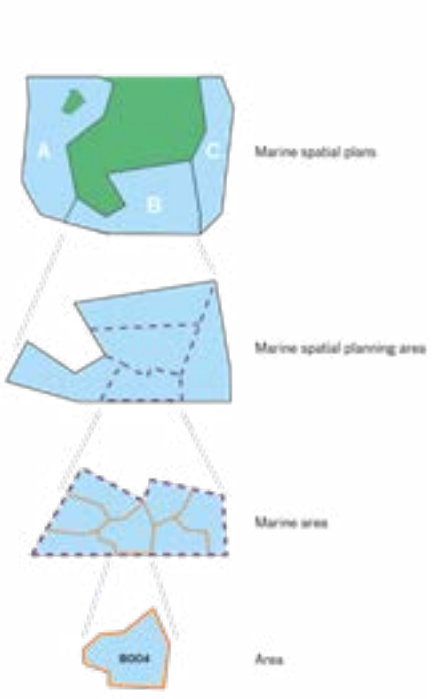


Figure 11. Marine spatial plans are divided into progressively smaller areas.

In order to make more detailed descriptions of planning, each marine spatial planning area is divided into marine areas. The three marine spatial plans consist of 10 marine areas. The division into marine areas has no legal significance.

Uses are indicated in different ways on the plan maps:

- The six uses energy extraction, investigation area for energy extraction, defence, general use, cultural landscape, and nature are indicated by a letter and delimited with lines forming areas. Each area has a number, e g Ö200.
- Sand extraction and investigation area for sand extraction are marked with a point.
- The five uses electricity transmission, recreation, maritime shipping, investigation area for maritime shipping, and commercial fishing are delimited by their own geographical markings.

Most appropriate use

Below are descriptions of the uses, and the approaches which are important for them in management, planning and licensing examinations.

Electricity transmission

Conditions for infrastructure to distribute and transmit electricity must be maintained. There must be good prospects for keeping and servicing the infrastructure.

E

Energy extraction

Area for energy extraction. Conditions for energy extraction must be maintained. Infrastructure for distributing and transmitting electricity, stability on and under the sea bed for possible foundations, and good accessibility for vessels during construction, operation and maintenance must be considered.

E(utr)

Investigation area for energy extraction

Area for further study to determine whether energy extraction is the most appropriate use.

F

Defence

Area for defence activities, comprising marine exercise areas and influence areas of installations outside of the marine spatial planning area. Conditions for defence activities must be maintained.

G

General use

Area where no particular use has priority. Uses delimited by their own geographical markings have priority where specified.

K

Culture

Areas with cultural or natural heritage landscapes. Cultural and natural heritage values must be maintained.

Nature

Area for nature. The area has nature values which must be preserved and developed to guarantee biodiversity and the promotion of ecosystem services.

Recreation

Area for recreation including outdoor life. Conditions for recreation and good accessibility for the general public must be maintained.

Sand extraction

Area for sand extraction. Conditions for sand extraction and good accessibility for vessels during extraction must be maintained.

Investigation area for sand extraction

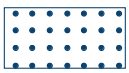
Area for further study to determine whether sand extraction is the most appropriate use.

Maritime shipping

Area of particular significance for maritime shipping. Conditions for maritime shipping activities must be maintained and traffic safety with sufficient space for manoeuvring must be considered.

Investigation area for maritime shipping

Area for further study to determine whether maritime shipping is the most appropriate use.



Commercial fishing

Area for commercial fishing. Conditions for pursuing commercial fishing must be maintained. Good accessibility for commercial fishing vessels to ports and to fishing areas appropriate on the basis of annual and seasonal variations must be considered.

Specific conditions for cables and pipelines

Laying out, operation and maintenance of data and telecom cables, power cables, pipelines and gas pipelines must be enabled where appropriate. This applies to the entire planning area.

Particular considerations

f

Particular consideration of the interests of total defence

Within the area particular consideration must be made of the interests of total defence in management, planning and licensing examinations.

In areas designated Gf or Nf such consideration concerns height limitations of tall objects due to flight operations.

In areas designated Ef it is possible for defence reasons to build fixed installations for energy extraction, but not always in all parts of the area. The risks of total effects of energy extraction on defence interests must be considered.

Particular consideration of high cultural landscape values

Within the area particular consideration must be made of high cultural landscape values in management, planning and licensing examinations.

The consideration designation also includes cultural landscapes located mainly outside of the marine spatial planning areas. Particular consideration relates to the aspect of the landscape, and impacts need to be assessed from the perspective of local circumstances. Influence areas may be larger than the areas specified in marine spatial plans.

n

Particular consideration of high nature values

Within the area particular consideration must be made of high nature values in management, planning and licensing examinations.

Values identified in the marine spatial planning process are listed by marine area in Parts 3, 4 and 5.

Figure 12. Examples of how uses and particular consideration are presented in the plan maps. Areas have an ID number underneath the use designation. This ID number can then be referenced against tables and maps online, for further information.

8. Overall considerations

This chapter describes overall considerations for the uses that marine spatial plans specify and how planning addresses the development of maritime industries, good environmental status, and coexistence.

Assessment of most appropriate use and particular considerations

Use

Marine spatial plans specify uses of the sea for different geographical areas. The uses specified are those deemed most appropriate in consideration of the characteristics and location of each area, of existing needs and of the overall aim of the plans. The geographical delimitations of uses in marine spatial plans are based on one of the three following types of public interest:

- Areas of national interest under Chapter 4, Section 8 of the Environmental Code, i e Natura 2000 areas.
- National interest claims under Chapter 3 of the Environmental Code.
- Other public interests of substantial significance.

The uses proposed in the marine spatial plans are consistent with Chapters 3 and 4 of the Environmental Code (1998:808).

An activity or intervention which may significantly impact a Natura 2000 area always requires a special licensing examination. The Natura 2000 provisions are in Chapter 7 and Chapter 4, Section 8 of the Environmental Code.

Several public interests overlap in many areas of the sea. Marine spatial plans treat overlapping interests in the following three ways:

A. Several interests are regarded as compatible:
   - The marine spatial plan specifies several interests as most appropriate use in the same area since they can coexist.

B. A national interest claim under Chapter 3 of the Environmental Code exists in an area that is also a national interest under Chapter 4 of the Environmental Code:
   - The national interest claim under Chapter 3 will not be designated a use in the marine spatial plan if that use is judged not to be able to coexist with the national interest under Chapter 4.

C. Different national interest claims under Chapter 3 of the Environmental Code are regarded as incompatible:
   - The marine spatial plan gives priority to the national interest claim or claims judged to be the most appropriate use in the area.
   - Defence interests are given priority if the area is necessary for a total defence installation, in accordance with provisions in the Environmental Code.

All existing national interest claims remain, even when a marine spatial plan gives priority to another interest or claim. What may be affected is how existing national interest claims are considered in licensing examinations and planning.

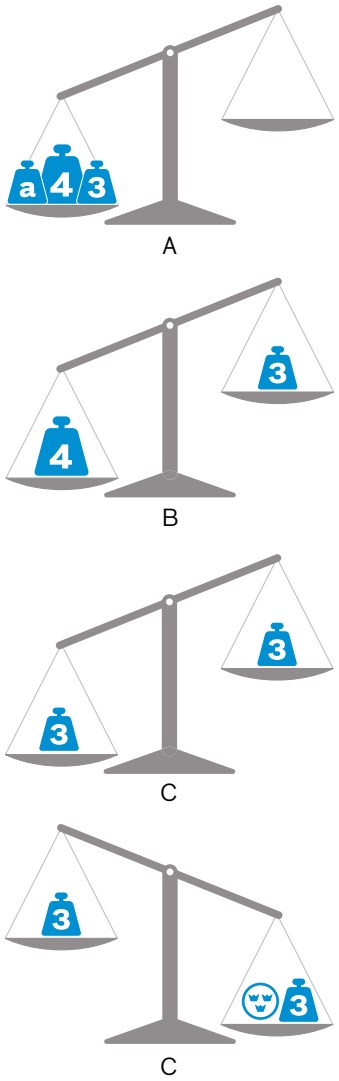


Figure 13. Tradeoffs between interests in different situations.

Particular consideration

Marine spatial plans specify areas where particular consideration has to be made of total defence interests, high cultural landscape values or high nature values. These considerations concern values it is important to preserve or strengthen in order to allow for sustainable use of the sea. The need for specifying particular considerations has been identified in the marine spatial planning process as a complement to specifying uses.

Read more about coexistence through particular consideration under Coexistence through particular consideration, page 62

About national interests

If an area is comprehended by a national interest claim or is of national interest, these will be prioritised over other public interests in the event of a trade-off in spatial planning.

Areas comprehended by national interest claims

Areas comprehended by national interest claims are designated as such by government agencies and regulated in the management provisions relating to operations in Chapter 3 of the Environmental Code. They include preservation interests as well as interests relating to development or extraction for a specific end. An area comprehended by national interest claims must be protected against interventions that could significantly damage the area's value. "Significantly" here means that the intervention must have a lasting adverse effect on the interest in question, or a temporary very adverse impact on it.

Areas that are of national interest under Chapter 4 of the Environmental Code

Areas that are of national interest are regulated in the management provisions relating to geographical location in Chapter 4 of the Environmental Code. Areas with very considerable values in terms of nature conservation and culture, tourism and outdoor life are specified in Chapter 4. These areas are of national interest in their entirety. Natura 2000 areas are also of national interest under Chapter 4 of the Environmental Code. Activities or interventions that may significantly affect such a nature area require special licensing examinations.

Public interests of substantial significance

In general, public interests in spatial planning of land and water are interests that contribute to the achievement of societal goals for economically, socially and environmentally sustainable development. Which interests are public interests of substantial significance, which under the Maritime Spatial Planning Ordinance (2015:400) have to be presented in marine spatial plans, is determined at the national level in the marine spatial planning process. One of the following should apply for the interest in a geographical area in order for it to be deemed a public interest of substantial significance in marine spatial planning:

- It is of considerable national importance.
- It is needed for important societal functions now or in future.
- It is needed in order to attain considerable societal benefit.
- It is needed for the fulfilment of Sweden's international commitments.
- It is needed in order to implement or maintain structures of national or international importance.

A local, municipal, regional or international issue may be a public interest of substantial significance if any of the criteria above is met.

Electricity transmission

Read more about the assumptions underlying the various uses of the marine spatial plans and consideration in Part 7: Planning assumptions, page 154

Needs

One condition for achieving national and European goals for energy and climate policy is that there are increased possibilities of interconnecting electricity systems in Sweden with those in different European countries. The Swedish energy policy agreement (Government of Sweden, 2016) specifically highlights how improved interconnection between the power grids in the countries around the Baltic Sea will create better conditions for a socioeconomically efficient expansion of offshore wind farms.

Areas with national interest claims

Installations for energy distribution may be designated as national interests under Chapter 3, Section 8 of the Environmental Code. The Swedish Energy Agency is the authority that identifies these national interest claims. There are no national interest claims for energy distribution in the marine spatial planning areas.

Areas of substantially significant public interest

Transmission and regional networks are judged to be public interests of substantial significance.

In addition to the national interest claims, further areas for energy extraction have been identified in the marine spatial planning process, together with the Swedish Energy Agency and other agencies. These areas are judged to be of substantially significant public interest for national production of renewable electricity, and contribute to the possibility of achieving the energy goals.

The areas have been identified on the basis of an overall assessment that considers whether it is an ongoing project for offshore energy extraction, if it is included in current municipal comprehensive planning, or if the area has suitable conditions. These conditions include depth, average winds, sea bed conditions, and the proximity to power grids on land and to areas of elevated consumption.

Areas in the marine spatial plans for energy transmission use

Areas specified for energy transmission use are based on Sweden's existing transmission network, which constitutes a public interest of substantial significance in the marine spatial planning areas. Specifying energy transmission as a use implies prioritising this interest in management, planning and licensing examinations in the areas in question.

Energy extraction

Needs

Under an agreement on Swedish energy policy (Government of Sweden, 2016), Sweden must have a robust electrical power system with a good continuity of supply, low environmental impact, and electricity at competitive prices. This is seen as a way to provide a long term view and clarity for market stakeholders, and to contribute to new jobs and investments. The agreement constitutes a roadmap for a controlled transition to a fully renewable electrical power system, with the goal of 100 per cent renewable electricity production by 2040. The Swedish Energy Agency's assessment is that in order to achieve the goals of the energy agreement, around 80–120 TWh of renewable electricity production needs to be installed in Sweden until 2040–2045. In 2018 the agency made the assessment that the ambition of marine spatial plans should be to enable around 50 TWh of offshore wind power (Swedish Energy Agency, 2018b).

Areas with national interest claims

The Swedish Energy Agency designates areas of national interest for energy production, in this case wind power stations, as specified in Chapter 3, Section 8 of the Environmental Code. The marine spatial planning process has shown that the designated areas will not contribute enough to achieve the energy goals, in part because of competing interests. For several areas where there are national interest claims for wind power stations, the marine spatial plan specifies a different use. This is because the uses are judged to be incompatible and the other use is given precedence.

Areas of substantially significant public interest

In addition to the national interest claims, further areas for energy extraction have been identified in the marine spatial planning process, together with the Swedish Energy Agency and other agencies, or on the basis of other supporting evidence. These areas are judged to be public interests of substantial significance for national production of renewable electricity. They contribute to the possibility of achieving the energy goals.

The areas have been identified on the basis of an overall assessment that considers whether they possess appropriate conditions. These conditions include depth, average winds, sea bed conditions, and the proximity to connections to electricity networks on land, and to areas where power consumption is high.

Other uses are specified for several areas. This is because the uses are judged to be incompatible and the other use is given precedence.

Areas in the marine spatial plans for energy extraction use

In the areas where energy extraction is the specified use in this round of planning, this refers to wind power. They are based on areas with national interest claims and areas of substantially significant public interest for energy extraction, as identified during the marine spatial planning process.

When areas are specified for energy extraction use, this implies giving that interest priority in management, planning and licensing examinations in those areas. Licensing applications for the establishment of wind power may also be made for areas not specified in the marine spatial plan. In order to build an offshore wind farm, licensing has to be examined by the Land and Environment Court or the government.

A large proportion of the areas specified for energy extraction in the marine spatial plans are located in the southern part of the Gulf of Bothnia marine spatial planning area. Wind and depth conditions are judged to be favourable there, and possibilities for expanding infrastructure to transfer the power to areas of elevated consumption in southern Sweden are also good. Similar conditions are also present in other marine spatial planning areas, but competition over space is greater in them and the possibility of coexistence with other uses smaller.

Areas in the marine spatial plans for investigation area for energy extraction use

In areas where establishment of energy extraction is expected to require what is known as a Natura 2000 permit under Chapter 7, Section 28a of the Environmental Code, the specification is "area for investigation area for energy extraction use".

About incompatible ends

Defence interests and energy extraction were shown during the marine spatial planning process to be incompatible ends in several areas, above all in the Baltic Sea planning area. The provisions of the Environmental Code give precedence to the interests of total defence in the event of a trade-off between two incompatible national interests. During the planning process, the Swedish Agency for Marine and Water Management held various stages of dialogue with the Swedish Armed Forces and the Swedish Energy Agency about claims, limitations and possible solutions. However, in several areas where there were claims for the establishment of wind power this has been deemed unfeasible on the basis of the Swedish Armed Forces' assessment of consequences for defence interests.

The relocation of defence technology installations was discussed as a possible measure. The Swedish Armed Forces stated that there are problems with the current procedure for establishing wind power stations. These problems are an obstacle to energy areas due to uncertainty regarding the extent, likelihood and timing of wind power establishment, which affects the possibility of planning and implementing measures to compensate for disruptions. A greater degree of coexistence is required in order for societal goals of both the defence sector and the energy sector to be achievable, and for the marine spatial plan to achieve its purpose regarding sustainable development.

Defencer

Needs

Sweden's total defence is made up of military activities and civil defence activities. The Swedish Armed Forces need exercise areas in the sea and in coastal zones without disruptions caused by physical or technical obstacles. Signals intelligence requires protection in order to prevent interference from other activities. Civil defence requires a functioning supply of goods and services. Sea lanes to strategic ports need to be kept clear, and conditions for subsea cables for power supply and communications need to be maintained.

Areas with national interest claims

There are defined national interests for military defence in and in proximity to the sea. The Swedish Armed Forces designates military areas of national interest under Chapter 3, Section 9 of the Environmental Code. Within the marine spatial planning areas, these are for marine exercise areas.

The marine spatial planning areas also include national interest claims for total defence which are classified, and are therefore not presented here. They are, however, included in the considerations made in marine spatial planning.

Areas of substantially significant public interest

Influence areas for defence installations in the sea (national interest claims for total defence) beyond the marine spatial planning areas are judged to be of substantially significant public interest as they are needed for the functioning of defence installations.

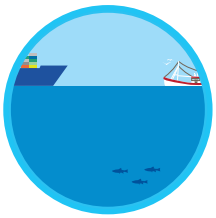
Areas in the marine spatial plans for defence use

Areas specified for defence use are based on national interest claims in the marine spatial planning areas (marine exercise areas) and influence areas for national interest claims beyond the marine spatial planning areas. When areas are specified for defence use, this implies giving that interest priority in management, planning and licensing examinations in those areas.

Areas in the marine spatial plans with particular consideration of the interests of total defence

In those areas where particular consideration of the interests of total defence is specified, any activity that includes fixed installations needs to consult with the Swedish Armed Forces about how facilities may be designed so as not the affect defence interests adversely. The overall assessment is that activities that include fixed installations can coexist with defence interests under certain circumstances and with the correct process regarding planning and implementation.

General use



Goals and needs

New types of claims and claims in new geographical areas are expected to occur in future. There is therefore a need to set aside spaces which are particularly appropriate for the examination of such new claims. Such new claims may be examined anywhere in the marine spatial planning area, however.

Areas in the marine spatial plans for general use

General use is specified where there are currently no claims for energy extraction, investigation area for energy extraction, defence, culture or nature, or where a trade-off between interests has led to guidance for general use. Areas for general use are deemed to be particularly appropriate for examination of future claims. In areas specified for general use, varying degrees of overlap exist with other uses delimited with their own markings, such as electricity transmission, recreation, sand extraction, investigation area for sand extraction, maritime shipping or commercial fishing. Those uses take precedence where they are specified.

Culture

Needs

National cultural landscape goals state that cultural landscape efforts have to promote a sustainable society with a diversity of cultural landscapes which are preserved, used and developed, as well as a unified view of landscape management which implies that cultural landscapes are safeguarded in societal development.

Areas with national interest claims

The Swedish National Heritage Board designates areas of national interest for cultural landscape conservation as laid down in Chapter 3, Section 6 of the Environmental Code. There are currently no national interest claims in the marine spatial planning area. There are, however, national interest claims for cultural landscape conservation adjacent to or near the marine spatial planning areas.

Areas of substantially significant public interest

World heritage sites are landmarks or areas considered so valuable for their cultural or natural landscapes that they are a concern for all of humanity. They are designated under UNESCO's World Heritage Convention. The marine spatial planning area for the Gulf of Bothnia includes the Höga Kusten world heritage site.

Read more about world heritage sites on the Swedish National Heritage Board's website

A county administrative board or a municipality can decide, under Chapter 7, Section 9 of the Environmental Code, that an area is to be protected and managed as a culture reserve. The aim of this is to enable maintenance and

preservation of valuable cultural landscapes. There are currently no culture reserves in the marine spatial planning areas.

Landscape aspect protection is a form of protection that was introduced under Section 19 of the Nature Conservation Act in its wording prior to 1 January 1975. The purpose of the protection is to protect large areas from major impacts or change. The provisions for areas with landscape aspect protection apply until such time as they are replaced by other forms of protection. Within the marine spatial planning area landscape aspect protection applies for one area by Öregrund and Östhammar.

The Swedish National Heritage Board has identified cultural heritage characteristics and has indicated core cultural heritage sites on that basis (Nordström, 2003). Areas with core cultural heritage sites are included in the marine spatial plans. In addition to the general consideration distance which is included, analysis is needed of how culture values may be affected by local conditions such as topography etc, and in relation to the planned activity.

The areas described above are deemed in the marine spatial planning process to be of substantially significant public interest. Additional documentation to improve the state of knowledge about high culture values in and adjacent to marine spatial planning areas may give rise to areas of substantially significant public interest in future planning.

Areas in the marine spatial plans for culture use

Areas for culture use are currently so specified on the basis of their world heritage classification.

When areas are specified for culture use, this implies giving that interest priority in management, planning and licensing examinations in those areas. High culture values are also found in other areas.

Areas in the marine spatial plans with particular consideration of high cultural landscape values

Areas requiring particular consideration of high cultural landscape values are so specified on the basis of areas with landscape aspect protection and areas classified by the Swedish National Heritage Board as core cultural heritage sites (Nordström, 2003).

When areas are specified as requiring particular consideration of high cultural landscape values, this implies giving that interest particular consideration in management, planning and licensing examinations.

Nature

Needs

Biodiversity must be preserved. When the sea and its resources are utilised, this must be in a sustainable manner, for current and future generations. Some marine environments need special safeguarding in relation to other activities. These needs may justify protection or other measures in

management and licensing examinations, in order to ensure a reduced environmental impact on marine ecosystem services such as production of fish.

Vigorous marine environments strengthen and ensure access to ecosystem services. This in turn requires continuous, representative and ecologically functional structures. Additionally, sustainable management is needed of areas which are particularly important for marine ecosystems as the climate changes, so-called climate refugia.

Areas of national interest and with national interest claims

Three different national interests impinge on nature values in the sea:

- Areas of national interest as laid down in Chapter 4, Section 8 of the Environmental Code, i e Natura 2000 areas, are proposed by county administrative boards. The selection is then reviewed by the Swedish Environmental Protection Agency, and areas proposed to the government. The government thereafter determines whether to propose to the European Commission that these areas be made part of the Natura 2000 network. Natura 2000 areas are part of the marine area protection scheme.
- Areas of national interest for nature conservation as laid down in Chapter 3, Section 6 of the Environmental Code are designated by the Swedish Agency for Marine and Water Management.
- Areas of national interest for commercial fishing, with respect to spawning and nursery areas, as laid down in Chapter 3, Section 5 of the Environmental Code are designated by the Swedish Agency for Marine and Water Management.

Areas of substantially significant public interest

In the marine spatial planning process national interests and national interest claims are not regarded as sufficient, on their own, for achieving good environmental status, preserving biodiversity, strengthening ecosystem services and protecting important areas and species as the climate changes. For that reason, additional areas with high nature values were highlighted or identified in the marine spatial planning process, and deemed to be of substantially significant public interest. These areas include ones which are already protected under Chapter 7 of the Environmental Code as well as areas identified within the framework of the marine spatial planning process.

The areas which of substantially significant public interest for high nature values identified in marine spatial planning were selected on the basis of a large amount of supporting evidence collected or produced by the Swedish Agency for Marine and Water Management (Swedish Agency for Marine and Water Management, 2019d). This evidence indicates biotopes and species that occur in and are representative of each marine spatial planning area. The assessment is based on the following criteria:

A. The area is comprehended by area protection (Marine Protected Area, MPA) under HELCOM (Convention on the Protection of the Marine Environment of the Baltic Sea Area) and OSPAR (Convention for the Protection of the Marine Environment in the North-East Atlantic), but is not protected under Swedish legislation.

Climate refugia

A climate refugium is an area which may need special protection in order for important plants and animals to be preserved when the climate changes and their distribution becomes reduced.

These areas are often the more stable parts of a species' larger distribution area, which are expected to remain after salinity and temperatures change.

A climate refugium is regarded as important for the species' continued presence in the marine area.

Read more in the report Underlag för klimatrefugier i havsplaneringen 2017.

B. The area has nature values or consideration needs confirmed in numerous evidence documents. This refers to evidence regarding nature value mapping and environmental impact. Evidence is also included regarding areas which are important for species and ecosystems in a future changed climate, known as climate refugia.

C. The area has confirmed nature values or consideration needs on the basis of individual evidence documentation. The evidence underlying the assessment has a low level of uncertainty.

D. The area has confirmed nature values with a high level of autochthony. Autochthony is defined as areas with a relatively low environmental impact combined with high ecology values.

Marine nature reserves and national parks are judged to be areas of substantially significant public interest. These areas are part of the marine area protection scheme along with Natura 2000 areas. Planned marine protection area schemes of the Natura 2000 and marine nature reserve type, with expected decisions in 2021, are also included in the marine spatial plans as areas of substantially significant public interest.

Some areas of substantially significant public interest are not currently comprehended by existing area protection. Marine spatial plans contribute to highlighting and strengthening potential ecological connections between areas comprehended by a marine protection scheme and areas of substantially significant public interest by identifying the latter. Planning thus reinforces the prospects of a continuous green infrastructure, through areas which are important for the preservation of ecosystem services.

Read more about considerations, evidence and assessment of nature values in PM Natur i havsplaneringen (the memorandum Nature in Marine Spatial Planning).

Areas in the marine spatial plan for nature use

The areas specified for nature use are based on areas comprehended by:

- Marine area protection, i e Natura 2000, marine nature reserves and national parks. Also includes areas planned to become marine protection areas.
- National interest claims for nature conservation under Chapter 3, Section 6 of the Environmental Code.
- National interest claims for commercial fishing, with respect to spawning and nursery areas under Chapter 3, Section 5 of the Environmental Code. Refers to national interest claims that apply from 1 February 2020.

Areas in the plan which are based on planned protection areas comprise protection that is expected to be ratified by 2021.

When areas are specified for nature use, this implies giving that interest priority in management, planning and licensing examinations in those areas. Nature values needing protection may also exist in other areas.

Environmental monitoring stations are placed in specific locations in the sea. They are not shown in the marine spatial plans due to the plans' small scale. These stations should nonetheless be considered in planning, management and licensing examinations.

Areas in the marine spatial plan with particular consideration of high nature values

Areas specified with particular consideration of high nature values are based on identified substantially significant public interests. In areas with particular consideration of high nature values there may be particular needs for future measures in management, planning and licensing examinations in order to

guarantee ecosystem services connected with the areas' values, structures and circumstances. Nature values to take into consideration may also exist in other areas.

Recreation

Needs

The overall goal of outdoor life policy is to support people's opportunities for spending time in nature and pursuing outdoor activities based on the right of public access. Everyone must have the opportunity for nature experiences, well-being, community life and increased knowledge about nature and the environment. Development of businesses related to outdoor life can help make outdoor life accessible to more people.

Areas with national interest claims

The Swedish Agency for Marine and Water Management designates areas of national interest for outdoor life under Chapter 3, Section 6 of the Environmental Code. Only a few areas have been designated in the marine spatial planning areas, primarily in close proximity to the coastline and by some seabed banks, i e shallow areas in the open sea.

Areas of substantially significant public interest

In this planning round no areas of substantially significant public interest are specified. In future planning, such areas may consist e g of important passages for recreational vessels, areas which are attractive to visit, and recreational areas identified in municipal comprehensive plans.

Areas in the marine spatial plan for recreation use

The areas specified for recreation use are based on national interest claims for outdoor life.

When areas are specified for recreation use, this implies giving that interest priority in management, planning and licensing examinations in those areas.

Sand extraction

Needs

Extraction of natural gravel on land will be reduced as part of securing Sweden's groundwater supply and meeting the environmental quality objective Good-quality Groundwater. Natural gravel builds up many natural ground and drinking water reservoirs, and often has high nature and culture values. Crushed rock is the main replacement material for natural gravel in efforts to achieve this goal. However, there are a few areas of use, such as the fine aggregate in concrete, where it is currently very costly or energy intensive to produce replacement materials from crushed rock, and the process also

generates residue. In these areas of use, marine sand and gravel can serve as a replacement for natural gravel from land.

Marine sand and gravel can also be used to counteract the coastal erosion taking place along certain sections of coastline in southern Sweden. Extracting the sand close to the usage site is advantageous in terms of costs and environmental impacts of long transportation routes. Sustainable extraction of marine sand in Sweden can reduce imports of sand extracted in less sustainable ways.

Areas with national interest claims

Deposits that contain valuable substances or materials may be designated as areas of national interest under Chapter 3, Section 7 of the Environmental Code. This is done by the Swedish Geological Survey There are no national interest claims for sand in the marine spatial planning areas.

Areas of substantially significant public interest

On instructions from the government, the Swedish Geological Survey has identified areas with the potential for environmentally sustainable extraction of marine sand and gravel, where material of the right quality is available. Several aspects of environmental sustainability are assessed (Swedish Geological Survey, 2017a):

- The area must not be too near the coast as that risks causing changes to the sediment dynamics, which can lead to increased coastal erosion.
- Shallow, biologically productive and sensitive areas exposed to sunlight must be avoided.
- Biodiversity must be preserved, and ecosystems in and around the area of extraction must not be affected to the extent that their ability to deliver ecosystem services is lost or irrevocably reduced.

The identified areas were assessed in the marine spatial planning process to be of substantially significant public interest as sand extraction is considered an important element of climate adaptation and for the achievement of environmental quality objectives, as well as for materials supply.

Read more in a report by the Swedish Geological Survey about the identified areas in Förutsättningar för utvinning av marin sand och grus i Sverige (Conditions for Extraction of Marine Sand and Gravel in Sweden).

Areas in the marine spatial plan for sand extraction use

The areas specified for sand extraction use are areas of substantially significant public interest identified in the marine spatial planning process. The areas specified in the marine spatial plans as appropriate for sand extraction are not clearly delimited. What parts of these areas would allow for sustainable extraction needs to be further investigated on the basis of the evidence compiled by the Swedish Geological Survey and the Swedish Agency for Marine and Water Management.

When areas are specified for sand extraction use, this implies giving that interest priority in management, planning and licensing examinations in those areas. The areas need to be carefully evaluated, including in terms of physical, cultural heritage and biological aspects, before any extraction

operations can begin. Continuous evaluation using appropriate monitoring programmes is also necessary.

Many of the areas indicated for sand extraction in the marine spatial plans are in southern Sweden, where consumption of natural gravel is high while access to natural gravel on land is limited. Construction in southern Sweden is expected to continue expanding. The marine conditions and the relatively low transport costs to the areas of consumption, as well the high costs of other replacement materials, justify sand extraction use in parts of the marine area. Another justification is the need for sand to counter coastal erosion in southern Sweden.

Areas in the marine spatial plan for investigation area for sand extraction use

In areas where sand extraction is expected to require what is known as a Natura 2000 permit under Chapter 7, Section 28a of the Environmental Code, the specification is "area for investigation area for sand extraction use".

Maritime shipping

Needs

The overall goal of transport policy is to ensure a socioeconomically efficient transport system, sustainable over the long term, for citizens and businesses throughout Sweden. Efficient, sustainable and large-capacity goods transportation is a priority issue for the government. Among the aims of the national transportation system plan 2018–2029 are promoting the transfer of goods transports from roads to railways and maritime shipping, reducing the environmental impact of the transport sector, and creating the conditions for developing the transportation system of the future. Maritime shipping is very significant for maintaining supply chains of goods and services to Sweden, which is also relevant for total defence.

Read more in Nationell plan för transportinfrastrukturen 2018–2029 (National Transport Infrastructure Plan 2018–2029).

Areas with national interest claims

The Swedish Transport Administration designates areas of national interest for transportation with respect to maritime shipping under Chapter 3, Section 8 of the Environmental Code.

Areas of substantially significant public interest

Routes that constitute particularly important links between Sweden and neighbouring countries are deemed to be a public interest of substantial significance.

Areas in the marine spatial plans for maritime shipping use

The areas specified for maritime shipping use are based on national interest claims for maritime shipping, and areas of substantially significant public interest as identified in the marine spatial planning process. Maritime shipping is carried out in all marine areas. Due to various factors, however,

much of the international traffic in particular is carried out with larger vessels along certain delimited routes. These routes are only recommendations, which means that vessel traffic of very considerable importance for Sweden can also, and does, occur outside of the routes specified for maritime shipping use in the marine spatial plans. In order to function well, maritime shipping as a whole has significantly larger space claims than provided for in the routes indicated on the plan map.

When areas are specified for maritime shipping use, this implies giving that interest priority in management, planning and licensing examinations in those areas. They represent the routes which are most important to enable the maintenance and development of efficient, safe and accessible maritime shipping transportation, but in no way limit maritime shipping to these routes. Access by maritime shipping to other areas, and its use of those areas, is what allows the designated routes in maritime spatial plans to be of such limited geographic scope. Vessels are entitled to innocent passage in territorial waters under the law of the sea. Maritime shipping is regulated above all by the International Maritime Organization (IMO).

Areas in the marine spatial plan for investigation area for maritime shipping use

Where areas are specified for investigation area for maritime shipping use, further investigation is needed in order to determine whether maritime shipping is the most appropriate use. This is specified where there are claims for more than one use in the same area and further investigation is required of the uses' needs in the area before a decision can be made about most appropriate use. National interest claims for maritime shipping remain even if the national interest claim is for investigation area for maritime shipping use. This use is also specified where there is insufficient evidence to delimit the extent of the use in greater detail.

Commercial fishing

Needs

Commercial fishing is a marine industry that is significant for food supply and production. Commercial fishing also provides land-based jobs in port operations and processing industries, which contributes to viable archipelago communities that maintain their identity and cultural landscape. Maintaining sustainable production of foods with a high nutritional value is important for society. Fish from our surrounding area is an important contribution to our food supply. This requires that good environmental status in the sea is achieved and maintained, and that the ecosystem services fishing depends on are secured. Commercial fishing requires fairly large areas since different fishing methods and target species imply different fishing areas which change seasonally, from year to year, and over the longer term.

Areas with national interest claims

The Swedish Agency for Marine and Water Management designates areas of national interest for commercial fishing with respect to fishing areas and fish landing ports under Chapter 3, Section 5 of the Environmental Code.

Areas in the marine spatial plans for commercial fishing use

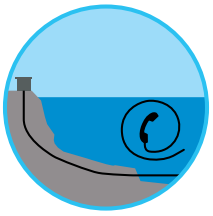
The areas specified for commercial fishing use are based on existing national interest claims in respect of fishing areas which apply as of 1 February 2020.

National interest claims for commercial fishing, with respect to spawning and nursery areas, are included in areas for nature use in the marine spatial plans. Potentially important areas for fish habitats outside of areas of national interest are included in areas with *particular consideration of high nature values.*

How commercial fishing is practised and what equipment is used may change in the future, e g due to changes in fish stocks or technical development of equipment. It may also change due to the introduction of restrictions are introduced that affect a particular fishing activity or fishing method.

When areas are specified for commercial fishing use, this implies giving that interest priority in management, planning and licensing examinations in those areas. Commercial fishing is also practised in other areas, which makes it important in licensing examinations to seek up-to-date information about fishing in the area in question.

Data and telecommunications cables

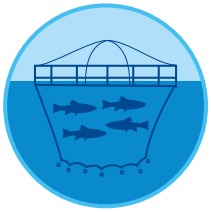


There is no overall sector planning for data and telecommunications cables. Locations for laying such cables should be checked against marine spatial plans early when planning cable routing in order to minimise conflicts with other claims.

Carbon capture and storage

Estimates show that there is considerable capacity for carbon capture and storage in Sweden and within Sweden's exclusive economic zone (Swedish Geological Survey, 2016b). More data and research are needed, however, before any areas for capture and storage can be proposed in marine spatial plans.

Aquaculture



There is currently no comprehensive national mapping of potential geographical aquaculture development areas in the planning area. There is, however, a localisation study regarding algaculture in the Skagerrak/Kattegat. The national strategy for aquaculture has as one of its goals that a majority of Sweden's municipalities identify and include suitable locations for aquaculture in their comprehensive plans. Such new supporting documentation, together with developments in cultivation techniques, can eventually provide improved planning conditions for aquaculture in the planning

area. At this stage the marine spatial plans provide preparedness for aquaculture, but do not designate any specifically delimited areas intended for aquaculture.

Planning in order to promote coexistence

Marine spatial plans must promote coexistence of different activities and areas of use. Marine spatial plans' specification of coexistence creates flexibility and encourages activities to seek mutual adaptation and development. Coexistence can also lead to synergies. The considerations below are intended as guidance to how coexistence can work and as an explanation of how marine spatial plans relate to coexistence between the different uses specified. They are arranged under one of two headings depending on the degree of adaptation normally considered necessary for coexistence – *some adaptation* and *more adaptation*. In order for coexistence to work, some activities may e g need to be further regulated and/or special conditions be prescribed by licensing agencies. It may also be that special regulations are necessary in order for the aim of the marine spatial plans to be achieved, and which the government would issue under Chapter 4, Section, second paragraph of the Environmental Code.

Figure 14. Example of how coexistence is shown on the map. The plan map indicates coexistence by overlapping use designations. The uses defence, nature, recreation and maritime shipping coexist in area Ö222.

It may also be the case that coexistence between uses is deemed feasible in one location but unfeasible in another location. Similarly, coexistence may be deemed feasible from a general perspective, but not within the planning horizon. When uses are deemed not to be able to coexist, one interest is given precedence.

Where coexistence may require some adaptation

Defence and maritime shipping

The marine spatial plans specify coexistence between defence and maritime shipping. Maritime shipping can often be carried on without restrictions within a defence area. When there are defence exercises, passage through a marine exercise area may need to be suspended temporarily.

Defence and commercial fishing

The marine spatial plans specify coexistence between defence and commercial fishing. Commercial fishing can often be carried on without restrictions within a defence area. When there are defence exercises, access to a marine exercise area may need to be suspended temporarily. However, defence exercises may damage the resources of commercial fishing through fish morbidity and damage to spawning and nursery areas.

Culture and nature

The marine spatial plans specify coexistence between culture and nature. Cultural landscapes are often well integrated in nature. Nature conservation measures such as management of marine waste and removal of lost fishing equipment, if carried out using incautious methods, may damage ancient remains. Wrecks may in some cases constitute a culture value while at the same time negatively impacting the environment.

Culture and recreation

The marine spatial plans specify coexistence between culture and recreation. Cultural landscapes are often among the values that underpin recreation or make an area attractive to visitors. This contributes to synergies, but a high visitor intensity can also have an adverse effect on the cultural landscape. There is great value in making our underwater cultural heritage accessible, to divers for example. However, diving and other recreational activities such as recreational fishing and boating could also imply a risk of damage to the cultural heritage.

Nature and recreation

The marine spatial plans specify coexistence between nature and recreation. Nature is often among the values that underpin recreation or make an area attractive to visitors. This contributes to synergies, but a high visitor intensity can also have an adverse effect on nature values. The development of scenic locations for tourism activities may imply a conflict with nature conservation interests, as may the noise from recreational craft, jet-skis and similar activities.

Recreation and sand extraction

Sand extraction can lead to adverse impacts on nature values. Increased traffic for transporting the sand away can also affect recreation conditions adversely. However, sand extraction and the associated transportation are typically only carried out during limited periods of time.

Recreation and commercial fishing

The marine spatial plans specify coexistence between recreation and commercial fishing. Commercial fishing sustains fishing communities along the coast which are attractive for recreation. Conflicts of interest can occur between recreational fishing and commercial fishing if both wish to fish in the same location and their respective equipment is incompatible.

Sand extraction and maritime shipping

The marine spatial plans specify coexistence between sand extraction and maritime shipping. Sand extraction can generate a certain amount of traffic, which may limit accessibility for maritime shipping. However, sand extraction is only carried out during very limited periods of time, which means effects are limited.

Maritime shipping and commercial fishing

Commercial fishing with mobile equipment is often feasible in areas with maritime shipping if certain adaptations are made, but can sometimes be hindered in the event of intensive traffic or traffic separation.

Where coexistence may require more adaptation

Energy extraction and defence

In many areas energy extraction and defence interests are difficult to combine, as wind farms can have a considerable impact on the Swedish Armed Forces' installations and activities. In some areas it is possible to establish energy installations if particular consideration is paid to the interests of total defence. The energy areas in the marine spatial plans therefore have a specification for particular consideration of the interests of total defence

Energy extraction and culture

Energy installations can have an adverse impact on cultural landscapes and the aspect of the landscape. Large-scale wind farms near the coast may become dominant in a location, thus affecting values related to remains or signs of important historical events, which previously gave the location its character. Installations such as foundations or cables on the sea bed may have an adverse impact on ancient remains. During construction the influence are area on the sea bed may be significantly larger than the development area itself. Archaeological investigations and studies may be required.

Localisation and adaptation measures in the design of energy installations may limit their adverse effects. In areas comprehended by a national interest under Chapter 4, Section 3 of the Environmental Code, wind power requiring licences is not permitted, with the exception of Öland. Marine spatial plans do not specify energy extraction in such areas.

Energy extraction and nature

Energy extraction use is not specified together with nature use in areas where nature values are so high and of such a type that there is considerable uncertainty about whether installations for energy extraction can be established without damaging nature values or making their preservation more difficult.

The assessment of the possibility of coexistence is made from a unified perspective which also considers total effects of energy areas or other planned activities in the surrounding area over the longer term. Assessments are made in the same way in all areas with nature use. The licensing examination of an activity that may have a significant effect on a Natura 2000 area must assess whether the activity is consistent with the provisions in Chapter 7, Sections 28b–29 of the Environmental Code. Licensing examinations are carried out in greater detail than the overall assessments of marine spatial planning.

Energy extraction in the form of wind power installations which are anchored to the sea bed may impact the sea bed environment adversely. Such impacts are often local and limited in duration. During the installation phase there is usually underwater noise caused by pile driving and traffic, which may impact animal life adversely. Cables on the sea bed may damage valuable natural environments, and electric cables that generate electromagnetic fields may impact marine organisms to varying degrees. At the same

time wind power stations can constitute artificial reefs that create protected feeding grounds for fish. Rotating blades can affect birds adversely.

Energy extraction and recreation

Energy areas may reduce accessibility for recreation, particularly in areas near the coast, but energy areas can also constitute landmarks and tourist destinations.

Energy extraction and sand extraction

Energy extraction using wind power stations requires a stable sea bed for foundations. Sand extraction involves removing sand from the sea bed by means of suction or digging, which alters its stability.

Energy extraction and maritime shipping

The marine spatial plan does not usually specify energy extraction and maritime shipping in the same area. Which interest is given precedence depends on which of the uses is deemed most appropriate in the specific location, and on whether the needs may be met in another location. In several locations, nearby areas are deemed capable of meeting maritime shipping accessibility needs.

In several cases it is possible to adapt the design of the wind farms in such a a way that they don't adversely impact shipping accessibility. However, maritime shipping is usually unable to pass through an area with fixed installations such as wind farms if the area is small or the turbines are close to each other. Subsea cables can impact possibilities of emergency anchorage and thus come into conflict with shipping, particularly in busy navigation channels.

Energy extraction and commercial fishing

Fixed installations in an energy extraction area may make commercial fishing that uses active equipment, such as trawling, more difficult. The assessment is that adaptations of e g the design of the wind farm, or of fishing equipment, are possible in some cases. Technological developments may also contribute to improved conditions for coexistence. There are international examples of this from e g the United Kingdom (Gray, Stromberg & Rodmell, 2016).

Defence and culture

The marine spatial plans usually specify coexistence between defence and culture. Defence activities at sea may imply a risk of adverse impacts on cultural remains and cultural landscapes on the sea bed. At the same time, defence facilities may constitute part of the cultural heritage along the coast.

Defence and nature

The marine spatial plans usually specify coexistence between defence and nature. Where coexistence is not deemed appropriate, one interest is given precedence. If the area is a Natura 2000 area, the rules in the Environmental Code on activities in Natura 2000 areas apply. Where nature values are made up of substantially significant public interests or are comprehended by national interest claims, the interests of total defence are given precedence

under Chapter 3 of the Environmental Code. Defence activities may involve traffic, noise, explosions and other activities that risk adversely impacting nature values. Military marine activities may need to be adapted such that damage to nature values is minimised. The Swedish Armed Forces can do this e g by planning their exercises in the area in a way that minimises their impact on the nature values – which indeed is something the Swedish Armed Forces includes in its planning already.

Defence and recreation

The marine spatial plans specify coexistence between defence and recreation. Defence activities may involve traffic, noise, explosions and other activities that risk adversely impacting recreation, including outdoor life. In several cases the activities can be adapted to one another.

Defence and sand extraction

The marine spatial plan does not usually specify coexistence between defence and sand extraction. The interests of total defence are given precedence under Chapter 3 of the Environmental Code. Defence activities that result in ammunition waste products, for example, may make the sand unfit for extraction.

Culture and sand extraction

Cultural remains may be adversely impacted by sand extraction that involves alterations to the sea bed. Archaeological investigation may be required.

Culture and maritime shipping

The marine spatial plans specify coexistence between culture and maritime shipping. Maritime shipping is the source of several of the cultural landscapes that we have today, as well as of ancient remains in the form of wrecks. Shipping routes and channels with intensive traffic may imply discharges, altered landscape aspect and dredging that impacts culture values adversely. Maritime shipping can lead to erosion that may strip, abrade and completely remove exposed parts of remains. Maritime shipping can also result in shallow-lying remains being damaged by anchors or ships' hulls.

Culture and commercial fishing

Commercial fishing is an industry which in many cases has contributed to valuable cultural landscapes, e g fishing communities, which are part of the cultural heritage. Fishing with active equipment, as in trawling, can adversely impact cultural remains on the sea bed.

Nature and sand extraction

The marine spatial plans specify coexistence between nature and sand extraction where such coexistence is deemed to be possible. The licensing examination of an activity that may have a significant effect on a Natura 2000 area will assess whether the activity is consistent with the provisions in Chapter 7, Sections 28b–29 of the Environmental Code. Licensing examinations are made in greater detail than the overall assessments of marine spatial planning. Sand extraction can affect an area's nature values, particularly

if they are concentrated to the bottom environment. The fact that extraction is local and that it occurs during brief periods of time using relatively benign techniques may serve to limit the impact.

Nature and maritime shipping

The marine spatial plans usually specify coexistence between nature and maritime shipping. The expected environmental impact is deemed not to be appropriate for certain shipping routes. This applies above all to underwater noise and oil discharges that affect protected species. The marine spatial plan proposes studies of environmental impacts and of whether the needs of maritime shipping can be met in nearby areas, as well as of e g economic aspects.

Maritime shipping may cause stresses on nature in the form of underwater noise, dredging and oil discharges. At the same time, optimally operated maritime shipping can constitute a climate-efficient means of transport in comparison with other means.

Nature and commercial fishing

The marine spatial plans specify coexistence between nature and commercial fishing. In some areas coexistence is deemed inappropriate, and one interest is given priority. Which interest is given priority depends on which one of the uses (i e the interests) is deemed most appropriate in the specific location and on whether there are other locations where the needs are deemed possible to meet.

Fishing can have considerable effects on marine ecosystems, primarily on the species it is intended to capture, but also on other species and habitats which may need to be protected. Commercial fishing carried out with active equipment such as bottom trawls, or that involve a by-catch of protected and threatened species, may imply adverse impacts on nature values. In some cases commercial fishing does not cause any impact, but when it does there are often possibilities of adapting fishing methods so that impacts on nature values are limited. Adaptation of fishing methods is a commonly used regulatory measure in fisheries management, but there are many other ways of adapting commercial fishing to nature conservation needs.

Recreation and maritime shipping

The marine spatial plans specify coexistence between recreation and maritime shipping. Maritime shipping is an industry which in many cases has contributed to locations that are attractive to visit. Maritime shipping can also contribute good accessibility. However, shipping routes with intensive traffic may imply disruptions such as noise and discharges, or constitute barriers to recreational fishing and leisure craft traffic, for example.

Sand extraction and commercial fishing

The marine spatial plans specify coexistence between sand extraction and commercial fishing. Sand extraction affects the bottom environment, which in turn can affect fish habitats and thus the fish stocks that commercial fishing depends on. Such effects, however, are usually local and limited in duration,

which in certain cases can provide scope for adaptation e g by avoiding periods when the area is important for fish, such as during spawning.

Coexistence through particular consideration

Particular consideration of the interests of total defence

Particular consideration of the interests of total defence may e g mean that the location and design of a wind farm needs to be adapted to defence interests. This also applies to other types of fixed installations and other uses. Particular consideration of the interests of total defence may also mean that an adaptation needs to be made when several energy areas together have an effect on total defence. In other words, the risk of total effects on defence interests must be considered. This means that development of one energy area may affect the possibility of using another area which has been designated E for energy extraction in the plan.

Particular consideration of high cultural landscape values

The assessment of effects on cultural landscapes needs to be carried out at an early stage for individual projects, and from a unified perspective on the basis of local circumstances. Cultural landscapes that may be affected by an altered landscape aspect are mainly located outside of the marine spatial planning areas. The connection between land and sea needs to be taken into consideration. Installations and activities in the sea may need to be adapted in design or location such that cultural landscape values are preserved.

Particular consideration of high nature values

Particular consideration of high nature values may e g mean that activities are adapted in terms of locations and seasons so as to minimise direct, indirect or total damage to nature values. Examples of this include:

- that the Swedish Armed Forces plan their operations in consultation with municipalities and county administrative boards regarding local circumstances, and adapt exercises and activities in terms of locations and seasons so that high nature values are not damaged
- adaptations in the design and technology of installations for energy extraction, or the concentration of civil engineering works and operations to particular seasons
- the introduction or extension of marine protected areas
- fisheries regulation regarding areas, equipment or periods for fishing
- adaptations of speed, maximum draught or periods of operation of maritime shipping vessels.

Marine spatial plans don't specify what measures may need to be undertaken in order to meet particular consideration recommendations in a specific area. Appropriate measures may be specified, as needed, by the government or by other agencies in licensing examinations or other administrative procedures.

Planning to allow industries associated with the sea to develop

For planning to contribute to the development of maritime industries, marine spatial plans set out from the national strategy for sustainable regional

Further reading:

- En svensk maritim strategi - för människor, jobb och miljö (A Swedish Maritime Strategy – for People, Jobs and the Environment)

growth and attractiveness, and from *Sweden's maritime strategy*, both of which were adopted by the government in 2015.

One of the big challenges for marine spatial planning is to balance the use of the sea in such a way that ecosystem functions are guaranteed and can develop such that the sea can be used in accordance with society's needs. Marine spatial plans contribute to a balanced marine environment by specifying areas for protection and consideration of nature and ecosystems where they are most needed, and by specifying areas where different activities can be practised in an efficient manner without adversely impacting the environment. This approach serves to promote balanced ecosystems and a rich biodiversity so that the ecosystems services provided by the sea are secured.

The current status of the environment severely limits access to ecosystem services, according to economic assessments in *Marine strategy for the North Sea and the Baltic Sea 2018 – 2023, Assessment of environmental status and socioeconomic analysis* (Swedish Agency for Marine and Water Management, 2018e). The activities principally affected by a worsened marine environment are commercial fishing and marine tourism and recreation. Marine spatial plans are intended to help secure the ecosystem services that maritime industries need. Spawning and nursery areas for fish are therefore a basis for nature use and for areas with particular consideration of high nature values. Similarly, the plans propose that maritime shipping be analysed where its impact on surroundings is deemed high, and that areas be planned for energy and sand extraction where impacts on the surroundings is judged to be limited.

Marine spatial plans also promote the securing of ecosystem services for people's well-being and opportunities for recreation. This is done e g by planning areas for recreation where the landscape is particularly favourable for outdoor life, and ensuring that cultural landscape values are considered. Planning is done in consideration of the existing coastal values, which contributes to the continued attractiveness of coastal areas for visiting, living and working in. This is also expected to lead to favourable conditions for the tourism and hospitality industry. In many respects maritime industries are what underpin a vigorous and vibrant coast and archipelago.

The coexistence that characterises marine spatial plans can contribute to innovation and new technology, which will benefit developing maritime industries such as energy extraction, sand extraction and aquaculture.

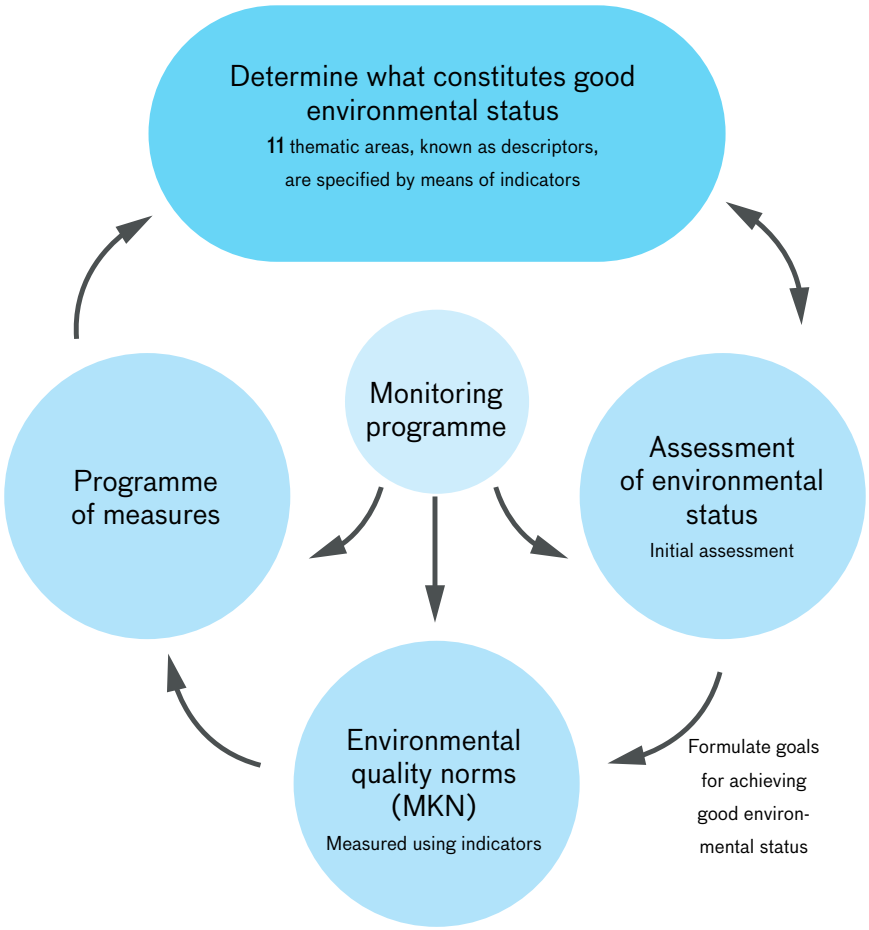


Figure 15. General flowchart for the process and terminology of the Marine Spatial Planning Ordinance.

Marine spatial plans provide a comprehensive picture of the uses of the sea, which contributes to increased predictability for maritime industries. This in turn promotes growth and jobs, and improves industries' competitiveness.

Planning for good environmental status

In most cases good environmental status is not estimated to have been achieved by 2020. This assessment was made within the framework of national implementation of the EU's Marine strategy framework directive. It is presented in the report *Marine strategy for the North Sea and the Baltic Sea 2018 – 2023, Assessment of environmental status and socioeconomic analysis* (Swedish Agency for Marine and Water Management, 2018e). Human activities give rise to various types of stresses that can impact the environment in such a way that its state deteriorates. These stresses and their impacts, taken together, are judged to be too great today.

Marine spatial plans are intended to contribute to the achievement and maintenance of good environmental status. Marine spatial planning is one of several instruments for achieving or maintaining good environmental status.

Marine spatial planning has an effect on various types of stresses and on the state of the marine environment. Physical disruptions can be caused e g by changes to the sea bed due to dredging, cable and pipeline laying, anchoring of fixed installations such as wind power stations, and fishing with a trawl. Pollution that leads to eutrophication is caused to a great extent by land-based activities such as agriculture, but also by maritime shipping. It is not within the remit of marine spatial planning, however, to provide guidance regarding discharges of pollutants from agriculture or maritime shipping; regulation of such discharges is handled elsewhere. Still, these discharges and their consequences constitute a planning assumption in the marine spatial planning process.

The ambition is for marine spatial plans to contribute to the reduction of various types of stresses by planning those activities that cause stresses such that they are kept away from areas where they cause the greatest harm. This applies to harm within the marine spatial planning areas as well as outside them, e g towards the coast. An example of this is the proposal to analyse shipping in the southeast Baltic (investigation area for maritime shipping use), where oil spills from maritime shipping are judged to have an adverse impact on the environment.

Assessments indicate that climate change will potentially worsen the effect of existing stresses on our marine areas. Marine spatial plans contribute to the transition to renewable energy, which over time can help slow climate change, by specifying areas where energy extraction should be prioritised.

At the overall level, marine spatial plans contribute to the achievement or maintenance of good environmental status:

- Adaptation of marine activities: Various species of fish and seabird as well as marine mammals benefit from identification in the marine spatial plans of areas for particular consideration of high nature values, where activities associated with the sea may have to be adapted for the purpose of reducing stresses on valuable species and habitats.
- Strengthened protection of valuable habitats: Protection and restoration of valuable marine habitats in an ecologically representative, continuous and functional network of marine protected areas benefit from

The Gulf of Bothnia: guidance and considerations

Part 3

9. Guidance and considerations for the marine areas in the Gulf of Bothnia

This chapter begins with a summary of the main features of the plan for the marine spatial planning area. The map of the marine spatial planning area is presented at 1:2,300,000 scale, in full A4. This is followed by a presentation of the focus of use and considerations for the marine areas in the Gulf of Bothnia. Each marine area is represented by a section of the plan map at a scale of 1:1,000,000.

The plan map is to be interpreted at the approximate scale between 1:700,000 and 1:1,000,000. Boundaries and markings on the map are general, based on the strategic level of the marine spatial plans.

There are three marine areas in the Gulf of Bothnia:

- The Bothnian Bay
- The North Bothnian Sea and North Kvarken
- The South Bothnian Sea

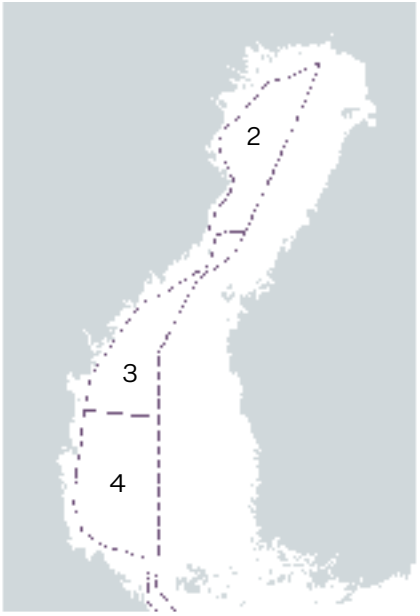


Figure 16. The three marine areas in the Gulf of Bothnia. Numbering by map numbers

Main features of planning

Good conditions for different activities

Of Sweden's three marine spatial planning areas, the Gulf of Bothnia is the least impacted by human activities, but its environmental state nonetheless needs to be improved in order for good environmental status to be achieved. It includes large areas with high outdoor life and nature values, and good conditions for different activities. Many big and important industries are located in Norrland, for example, and use the maritime route for their transports. In the south there are several areas with favourable conditions for renewable energy extraction in the form of offshore wind power, There is also an area in the Bothnian Bay which may be appropriate for sand extraction. Sweden's total defence has interests within the marine spatial planning area, including a marine exercise area in the North Bothnian Sea and influence areas for activities on land.

Many of the activities in the Gulf of Bothnia are judged to function well together, i e they are able to coexist. Sometimes coexistence has to be regulated in order to work, however. This might be a matter of suspending areas during defence exercises, or of rules for how vessels, e g active fishing vessels, are allowed to navigate in channels which are part of traffic separation systems. Such regulations are not included in the marine spatial plan, but are instead found in other legislation.

Renewable electricity production

Marine spatial plans have to contribute to achieving the societal goal of 100 per cent renewable electricity production by 2040. In some areas of the Gulf of Bothnia, however, competition between wind power stations and other

uses, such as various nature values or defence interests, is so strong that co-existence is deemed not achievable. Planning has therefore strived to identify new areas appropriate for wind power, in addition to the existing national interest claims for wind power. Planning in areas for energy extraction is based on an overall assessment of how the marine spatial plan best can contribute to the achievement of the energy goals. The South Bothnian Sea in particular has been judged to possess good conditions for contributing to the energy transition. Some of the proposed areas for energy extraction are comprehended by Natura 2000 legislation, which means that wind power can only be established there if there is no risk of it harming or disrupting the habitats or species that are to be protected

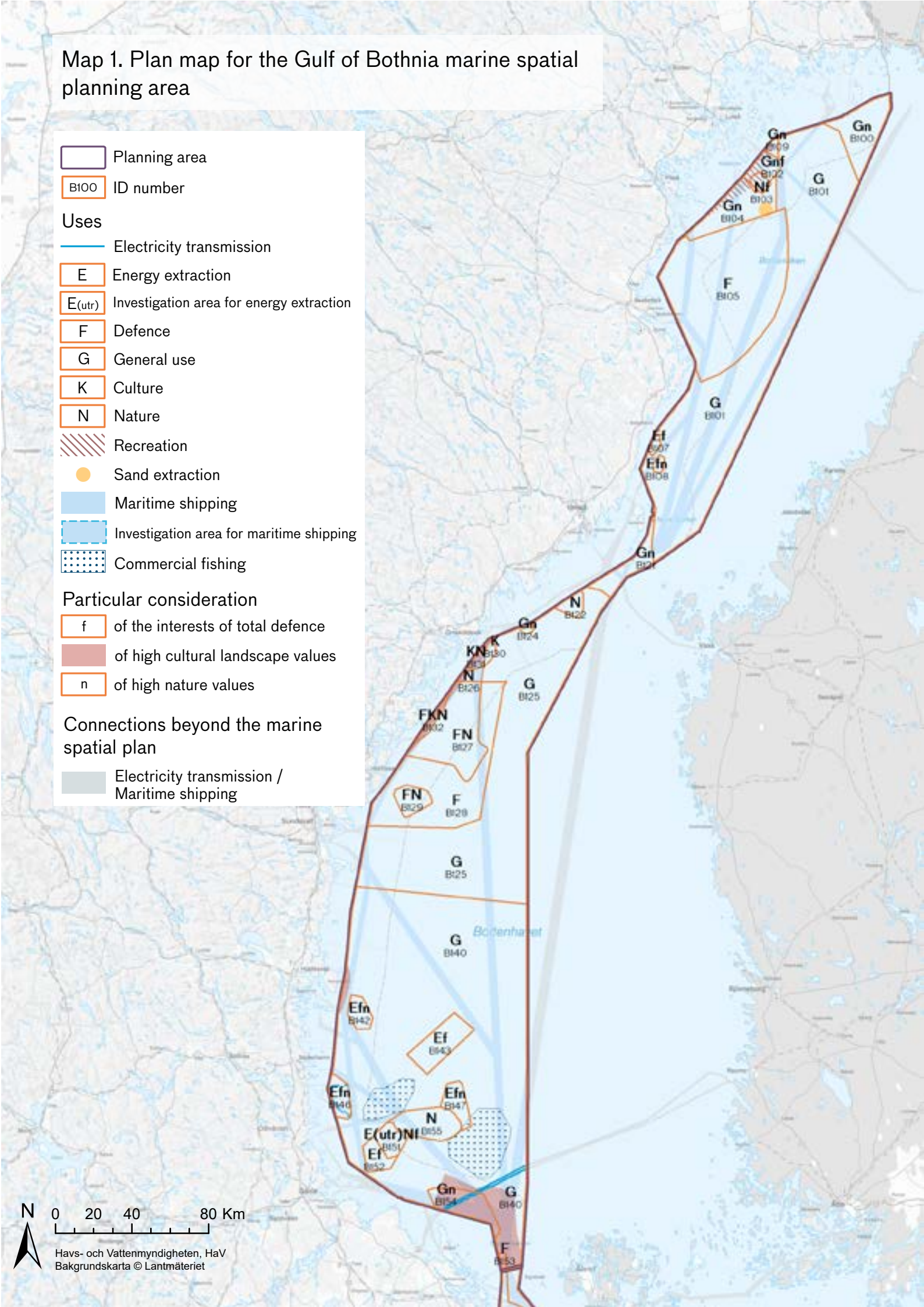
World heritage sites, small-scale fishing and valuable nature

The Höga Kusten world heritage site has many tourist visitors throughout the year, but is busiest during the summer. Tour boats and leisure craft fill the area's ports at that time of year. Early autumn sees the beginning of the fermented herring (surströmming) season, which is also well known and much visited.

Commercial fishing in the Gulf of Bothnia is mostly small-scale. Vessels are few and far between in the open sea, while coastal waters are busier. Commercial fishing use is specified for the South Bothnian Sea planning area in the zones with the biggest concentration of commercial fishing activity. A significant part of the offshore fishing is carried out by Finnish fishing vessels. That fishing activity is not included in the evidence for commercial fishing use, but coexistence is judged to be feasible.

The marine spatial planning area includes large areas with high nature values, and many of these are nature reserves, Natura 2000 areas or national interest claims for commercial fishing, with respect to fishing areas and fish spawning and nursery areas, respectively. These are specified for nature use in the marine spatial plan. Additionally there are areas with high nature values that require particular consideration in order to be able to continue contributing valuable ecosystem services. Other activities need to show particular consideration for these values.

Map 1. Plan map for the Gulf of Bothnia marine spatial planning area



The Bothnian Bay

The Bothnian Bay has demanding winter conditions. There are important ports here for Sweden's primary industries. There are also valuable coastal and archipelagic landscapes.

Energy extraction

In Robertsfors municipality to the south there are two areas with energy extraction use. These are Ricklegrundet (B107) and Rata Storgrund (B108). The two wind power areas specified in municipal comprehensive planning are deemed to be of national importance and thus a public interest of substantial significance. There are also national interest claims for offshore wind power stations off Piteå and Luleå, and national interest claims for maritime shipping and total defence (B104–B105). Wind power stations are not deemed compatible with the other national interest claims. National interest claims for maritime shipping and total defence are given precedence over national interest claims for wind power stations.

Defence

The marine spatial plan specifies defence use at the Tåme firing range in Skellefteå municipality, which has a large influence area extending into the marine spatial planning area (B105). Particular consideration of the interests of total defence is specified for the air exercise area at Kallax (B102–B103), where a small portion of an area with height restrictions on built objects overlaps with the marine spatial planning area. Particular consideration of the interests of total defence is also specified for the areas for energy extraction at Ricklegrundet (B107) and Rata Storgrund (B108).

Culture

There are areas with national interest claims for cultural landscape conservation along the coast towards land, outside of the marine spatial planning area. There are also core cultural heritage sites identified by the Swedish National Heritage Board outside of the marine spatial planning area. Consideration distances to the core sites need to be assessed from a local perspective, e g possible effects on cultural landscape values of energy extraction at Ricklegrundet (B107) and Rata Storgrund (B108).

Nature

The marine spatial plan specifies nature use for an area outside of Luleå (B103) which is protected through Natura 2000. Particular consideration of high nature values is specified in the far north (B100), in parts of Luleå and Piteå municipalities (B102, B104, B109) and at Rata Storgrund (B108). Almost the entire national interest claim for nature conservation by Kinnbäcksfjärden lies outside of the marine spatial planning area. A small part of the national interest claim overlaps with the marine spatial plan's area B105. The national interest claim is provided for, but due to the marine spatial plan's overall scale does not constitute a use in the marine spatial plan. The stable winter ice on the Bothnian Bay is a particular feature of the pelagic

You can explore the areas on the Swedish Agency for Marine and Water Management's website, where you can search for more information about them. Search by name or ID number on the map. You can also view and compare various documentary evidence.

There is also information regarding the individual areas in the environmental impact report (Swedish Agency for Marine and Water Management, 2019c) and the sustainability report (Swedish Agency for Marine and Water Management, 2019b). The report *Natur i havsplaneringen* (Swedish Agency for Marine and Water Management, 2019d) presents information (in Swedish) about areas with particular consideration of high nature values.

Read more about uses in Part 2, Chapter 7 Guidance on most appropriate use and particular considerations, page 38

Climate refugia

A climate refugium is an area which may need special protection in order for important plants and animals to be preserved when the climate changes and their distribution becomes reduced.

These areas are often the more stable parts of a species' larger distribution area, which are expected to remain after salinity and temperatures change.

A climate refugium is regarded as important for the species' continued presence in the marine area.

Read more in the report Underlag för klimatrefugier i havsplaneringen 2017.

marine environment. The ice provides a habitat for photosynthesising algae, and ringed seal need the ice in order for their pups to survive. As climate change reduces the extent of stable sea ice, the northern parts of the Bothnian Bay become increasingly crucial. Climate refugia for ringed seal have been identified adjacent to the marine spatial planning area along parts of the northern coast (Swedish Agency for Marine and Water Management, 2017c).

Recreation

In the northern part of the marine area the entire coastline towards land, outside of the marine spatial planning area, is an area of national interest for mobile outdoor life and a national interest claim for outdoor life. The national interest and national interest claim extend into the marine spatial planning area. The marine spatial plan specifies recreation use (B101–B104, B109). Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Sand extraction

The marine spatial plan specifies sand extraction use for the farthest reaches of Luleå municipality's offshore areas on the Svalan and Falken shallows (B104). Sand extraction is judged not to be appropriate from a risk perspective in contiguous areas that overlap with the influence area for the Tåme firing range (B105).

Maritime shipping

The marine spatial plan specifies maritime shipping use for the open sea and for ports within the marine area (B101–B105, B107–B108). Several important ports, including Skellefteå and Luleå, lie along the coast of the Bothnian Bay, and maritime traffic is important for industries in northernmost Sweden. Approaches to these ports are often long and pass through the shallow archipelago. Consideration must be made of continuous post-glacial rebound.

Wintertime conditions in the Bothnian Bay include thick and extensive sea ice. This influences circumstances for maritime shipping, which requires large sea areas to ensure accessibility.

The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

Commercial fishing

Commercial fishing is sparse in the pelagic waters of the Bothnian Bay. Such fishing as is done is mostly with passive equipment and close to the shore. Autumn fishing of vendace, for vendace roe, is economically significant. It is carried out close to the shore, with active equipment, and principally outside of the marine spatial planning area.

Map 2. Plan map for the Bothnian Bay marine area

Havs- och Vattenmyndigheten, HaV
Bakgrundskarta © Lantmäteriet

Table 2. Bothnian Bay marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
B100	General use	High nature values: fish spawning and mammal area. High cultural landscape values.		
B101	General use Maritime shipping	High cultural landscape values.		
B102	General use Recreation Maritime shipping	Interests of total defence. High nature values: Fish spawning, bird and mammal area. High cultural landscape values.		
B103	Nature Recreation Maritime shipping	Interests of total defence.		
B104	General use Recreation Sand extraction Maritime shipping	High nature values: Reef habitat, fish spawning, bird and mammal area.	Defence and maritime shipping have precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. National interest claims for maritime shipping have precedence over national interest claims for wind power stations. The uses are deemed unable to coexist.
B105	Defence Maritime shipping	High cultural landscape values.	Defence and maritime shipping have precedence over energy extraction and sand extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations and over substantially significant public interests of sand extraction. National interest claims for maritime shipping have precedence over national interest claims for wind power stations. The uses are deemed unable to coexist.
B107	Energy extraction Maritime shipping	Interests of total defence.		
B108	Energy extraction Maritime shipping	Interests of total defence.		
B109	General use Recreation	High nature values: Fish spawning, bird and mammal area.		

The North Bothnian Sea and North Kvarken

Defence

The marine spatial plan specifies defence use for the Harnö marine exercise area, which extends from the coast through territorial waters and into Sweden's exclusive economic zone, as well as for the influence area for the Skärsviken firing range (B127–B129, B132).

Culture

The Höga Kusten world heritage site, with unique cultural and natural landscapes, extends into the sea. Along the Höga Kusten shoreline is a concentration of shore-bound remains of continuous human activity extending over 7,000 years. The shorelines of the various eras have settlement sites and trapping pits from the Stone Age as well as Bronze Age cairns. Other types of remains along the shorelines include burial mounds from the Iron Age and harbours and building foundations from the previous millennium (Swedish National Heritage Board, 2019). For these areas the marine spatial plan specifies culture use (B130–B132). On the Finnish side is the Kvarken archipelago world heritage site. Höga Kusten is also a national interest as an unbroken coastline.

There are areas with national interest claims for cultural landscape conservation along the coast towards land, outside of the marine spatial planning area. Core cultural heritage sites identified by the Swedish National Heritage Board lie mainly outside of the marine spatial planning area. However, one such area extends into the planning area at Höga Kusten, where it is comprehended by particular consideration of high cultural landscape values (B125–B127, B130–132). Consideration distances to the core sites need to be assessed from a local perspective.

Nature

The marine spatial plan specifies nature use in several areas, from Bonden and Sydostbrotten in the north to the Vänta Litet shallows in the south. Sydostbrotten (B122) is comprehended by Natura 2000 as well as the Örefjärden-Snöan Archipelago nature reserve. There are national interest claims for nature conservation along Höga Kusten (B126–B127, B131–B132). The Vänta Litet shallows (B129) are comprehended by Natura 2000. The shallows have been classified as one of the most valuable offshore banks in the Gulf of Bothnia (Swedish Environmental Protection Agency, 2006).

Particular consideration of high nature values is specified outside Holmön (B121) and by the Vallin shallows (B124), which have reef habitats, fish spawning areas and occurrence of birds and mammals. The area by Holmön (B121) also serves as a passage for migratory birds of prey (Hansson, 2019). Overall, the marine area is characterised by a low level of use, and environmental impacts are therefore relatively limited, with a high level of autochthony (Swedish Agency for Marine and Water Management, 2018h). The Holmöarna Natura 2000 area and overlapping nature reserves and national interest claims for nature conservation lie mainly in the coastal zone,

but a small part extends into the marine spatial planning area's delimitation towards Holmöarna and the coast (B121). The national interest claim is provided for, but due to the marine spatial plan's overall scale nature use is not specified on the plan map.

Recreation

There is a national interest claim for mobile outdoor life along Höga Kusten that borders on the marine spatial planning area. In the planning area south and east of Holmöarna (B121) are national interest claims for outdoor life. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

The marine spatial plan specifies maritime shipping use for several shipping routes to and from North and South Kvarken (B121, B125–B128, B130–B132). Several important ports are located along the coast on the North Bothnian Sea. Maritime traffic is important, with traffic to the coast as well as southwards via South Kvarken into the Baltic and also further northwards via North Kvarken to both Swedish and Finnish ports on the Bothnian Bay. Since the winter ice cover moves in unpredictable ways, maritime shipping needs large sea areas and alternative routes within the Gulf of Bothnia.

North Kvarken, which links the Bothnian Bay to the Bothnian Sea, is very important to industries in the north. For safety reasons maritime shipping through North Kvarken is managed in a traffic separation system (TSS), as the passage is narrow and shallow, giving vessels limited room for manoeuvre. European Route 12 crosses Kvarken via a ferry line between Umeå and Vaasa in Finland, and the area is specified for maritime shipping use in the plan.

The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

Commercial fishing

Such fishing as is done is limited, with passive equipment and close to the shore. Some offshore fishing is done in the south.

Map 3. Plan map for the North Bothnian Sea and North Kvarken marine area

Table 3. North Bothnian Sea and North Kvarken marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
B121	General use Recreation Maritime shipping	High cultural landscape values.		
B122	Nature			
B124	General use	High nature values: Reef habitat, fish spawning, bird and mammal area.		
B125	General use Maritime shipping	High cultural landscape values.		
B126	Nature Maritime shipping	High cultural landscape values.		
B127	Defence Nature Maritime shipping	High cultural landscape values.		
B128	Defence Maritime shipping			
B129	Defence Nature			
B130	Culture Maritime shipping	High cultural landscape values.		
B131	Culture Nature Maritime shipping	High cultural landscape values.		
B132	Defence Culture Nature Maritime shipping	High cultural landscape values.		

Area B101 is presented in the table for the Bothnian Bay.

The South Bothnian Sea

Electricity transmission

Electricity transmission use is made up of two transmission network cables (Fenno-Skan) extending from the area at Forsmark in Sweden across to Finland.

Energy extraction and investigation area for energy extraction

The marine spatial plan specifies energy extraction for several areas in the South Bothnian Sea:

- In the open sea (B143), which has been identified in the marine spatial planning process as a substantially significant public interest for energy extraction.
- At Storgrundet (B146), where there is a licensed project and a national interest claim for wind power stations.
- On Gretas Klackar (B142), east of Finngrunden (B147) and west of Finngrunden (B152), where there is a national interest claim for wind power stations.

The marine spatial plan specifies investigation area for energy extraction use for an area in the South Bothnian Sea, on and around the west bank of Finngrunden (B151), where there are national interest claims for wind power stations.

Wind conditions, shallows and the proximity to good connection points make conditions favourable for energy extraction in the marine area. From a national energy perspective, Gävle Bay is a strategic area for offshore wind power (Swedish Agency for Marine and Water Management, 2018b).

Finngrunden's western, northern and eastern banks all have favourable conditions for wind power, which is confirmed by national interest claims for wind power stations. There is also a national interest claim for commercial fishing which concerns fish spawning and nursery areas. Natura 2000 areas have been established on the banks for the protection of valuable habitats. A compilation of evidence from current and earlier wind power project planning and licensing examinations, and from the establishment of the Natura 2000 areas, has been made in order to bring together the large amount of information about the area that exists in earlier administrative processing (Swedish Agency for Marine and Water Management, 2018b).

This compilation shows that the risk of harm to long-tailed duck has been a decisive factor for the assessment that wind power on Finngrunden's eastern bank was not consistent with Nature 2000 legislation (B155). Data on the distribution of long-tailed duck indicate that Finngrunden's eastern and northern banks are the most important wintering sites in the marine area. In its inventory of offshore banks, the Swedish Environmental Protection Agency has indicated Finngrunden's eastern bank as particularly important to exclude from all forms of development (Swedish Environmental Protection Agency, 2006). Evidence from e g the the marine spatial plan's environmental impact assessment indicates that the northernmost part of the western

bank is important for birds. Finngrunden's eastern and northern banks are therefore specified for nature use (B155). Other parts of Finngrunden's western bank, and the surrounding area, are specified for investigation area for energy extraction and nature use (B151). The area is specified for investigation area for energy extraction because part of it is a Natura 2000 area. Coexistence may be possible, but needs to be examined under Natura 2000 legislation. At the easternmost point there is a specification for energy extraction with particular consideration of high nature values (B147).

The marine spatial plan deems wind power capable of coexisting with the area's nature values on parts of Finngrunden. Wind power stations have surrounding areas where suppression effects of birds may occur. The plan therefore excludes other areas (B155) on Finngrunden from wind power in order to guarantee areas for wintering seabirds. This makes it no less important for any installations to be designed with particular consideration of nature values, which also applies for wind power at Storgrundet (B146) and Gretas Klackar (B142). An activity or intervention that may significantly affect an area which is protected under Chapter 4, Section 8 of the Environmental Code, i e Natura 2000, always requires a special licensing examination. This also applies to activities or interventions which are outside of the Natura 2000 area but may impact values within it.

By Finngrunden is also a fish spawning and nursery area that constitutes a national interest claim for commercial fishing (B151, B155). Provided that establishment of wind power does not substantially harm overlapping national interest claims for commercial fishing with respect to fish recruitment areas, coexistence is judged to be possible in area B151.

In the event of energy development, particular consideration must be made of the interests of total defence. The many areas specified for energy extraction by the marine spatial plan in the South Bothnian Sea imply a risk of cumulative effects on the interests of total defence (B142–B143, B146–B147, B151–B152). This risk must be taken into consideration, which may imply limitations to the extent of development overall or in individual areas.

An important shipping route that is comprehended by a national interest claim for maritime shipping passes through Finngrunden, where there is also a national interest claim for wind power stations (B150). Maritime shipping is given precedence over wind power stations. The shipping route constitutes an important link, and the assessment is that there are no suitable alternative routes for the shipping route due to nature values on Finngrunden's northern, western and eastern banks, and because guidance in the marine spatial plan specifies investigation area for energy extraction in area B151.

At Campsgrund in the south there are national interest claims which are not deemed compatible (B140). The part of the national interest claim for wind power stations in Tierp and Älvkarleby municipalities which is in the marine spatial planning area is deemed not to be compatible with overlapping national interest claims for total defence or for maritime shipping. National interest claims for total defence and for maritime shipping are therefore given precedence over the national interest claim for wind power stations.

Defence

Defence use is specified within Östhammar municipality due to an area of influence with special obstacle clearance needs (B153).

Culture

The coast to the south, at Gräsö towards South Kvarken, is comprehended by the highly-developed coast national interest. There are areas with national interest claims for cultural landscape conservation along the coast outside the marine spatial planning area. One area at Öregrund and Östhammar is landscape aspect protected and comprehended in the marine spatial plan by particular consideration of cultural landscape values (B140, B153–B154). Core cultural heritage sites identified by the Swedish National Heritage Board lie mainly outside the marine spatial planning area. However, one such area extends into the planning area at Hudiksvall, where it is comprehended by particular consideration of high cultural landscape values (B140). Consideration distances to the core sites need to be assessed from a local perspective, including the possible effects on cultural landscape values of energy extraction in several areas of the South Bothnian Sea (B142, B146, B151–B152). Along the coast there is also a historical waterway, St Olav, which extends from Åland to Trondheim.

Nature

The marine spatial plan specifies nature use for the three Finngrunden banks (B151, B155), where there are Natura 2000 areas. There are wintering areas for seabirds on Finngrunden. The shallows are the northernmost outpost for wintering long-tail duck, which is an endangered species in Sweden. There is also a national interest claim for commercial fishing concerning fish spawning and nursery areas extending across Finngrunden.

There is a national interest claim for nature conservation by the Nordanstig coast, part of which overlaps with the Lillgrund seal protection area. A small part of the national interest claim and the seal protection area extends into the marine spatial planning area (B140). The national interest claim is provided for, but due to the small scale of the marine spatial plan it is not labelled as nature use on the plan map.

The marine spatial plan specifies particular consideration of high nature values on other offshore banks in the marine area, including Gretas Klackar (B142), Storgrundet (B146), Finngrunden's easternmost portion (B147) and in the area between Grundkallen and the Argo shallows (B154).

Recreation

The coastal zone has shallow archipelagos with authentic fishing villages. In Hudiksvall municipality there are national interest claims for outdoor life in proximity to the marine spatial planning area. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

Maritime shipping use is specified for several shipping routes to and from South Kvarken (B140, B153–B155). Several important ports are located along the coast in the South Bothnian Sea. Maritime traffic in the area is crucial for many industries, with destinations both along the coast itself and in other parts of Sweden and Finland. Since the ice is weather-dependent and unpredictable, maritime shipping needs space for many alternative routes.

One of the areas specified for energy extraction (B143) is judged potentially to affect the accessibility of maritime shipping and may, if wind power is developed, require less of a detour for shipping compared to shipping routes that have a national interest claim for maritime shipping. The assessment is that good access to the ports along the south Norrland coast remains, even if vessels may need to take a slightly more easterly route than earlier. The plan thus provides for both wind power and maritime shipping interests.

The plan map presents the most important shipping routes, not the entire need for space of maritime shipping.

Investigation area for maritime shipping

The marine spatial plan specifies investigation area for maritime shipping use by the at the approaches to Ljusne and Vallvik. In order to achieve coexistence with energy extraction use (B146), the impact on vessel traffic as well as possibilities of changing or moving the routes vessels take into the ports need to be studied. Adaptations may then be necessary to both maritime shipping and energy extraction.

Commercial fishing

The existing inshore fishing that characterises many of the smaller coastal communities is done mostly with passive equipment in and beyond the seaboard. Periodically intensive offshore fishing is carried out above all around the offshore banks and in the marine area's south-eastern parts. Fishing by Finnish vessels is carried out as well as fishing by Swedish vessels (Backer & Frias, 2013). The marine spatial plan specifies commercial fishing use in two areas (B140, B147) in the southern parts of the marine area.

Map 4. Plan map for the South Bothnian Sea marine area

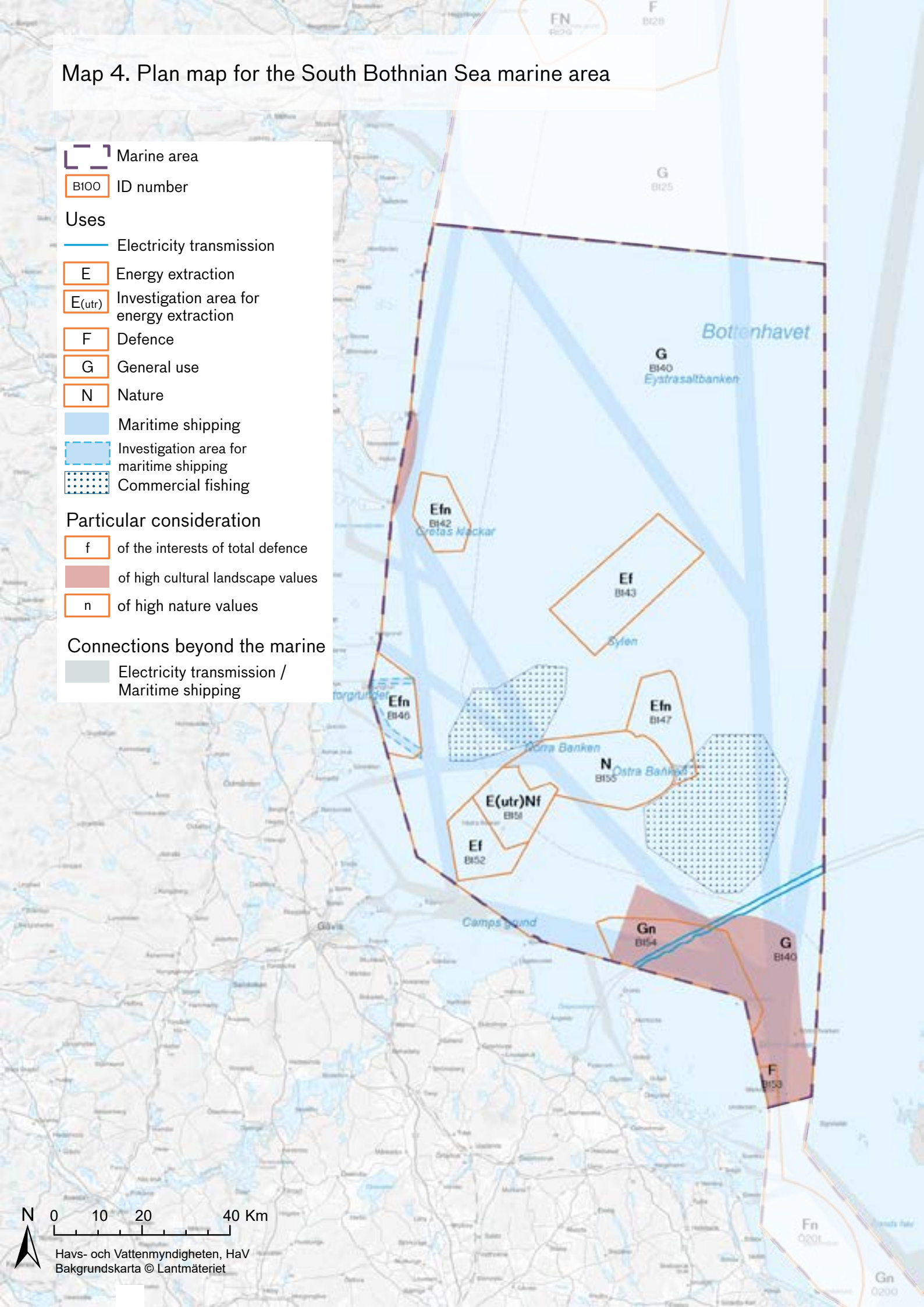


Table 4. South Bothnian Sea marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
B140	General use Maritime shipping Investigation area for maritime shipping Commercial fishing Electricity transmission	High cultural landscape values.	At Campsgrund to the south, defence has precedence over energy extraction.	National interest claims for total defence and for maritime shipping have precedence, under Ch 3, Section 10 of the Environmental Code, over that part of a national interest claim for wind power stations which lies within the planning area. The uses are deemed unable to coexist.
B142	Energy extraction	Interests of total defence. High nature values: Reef habitat, fish spawning and mammal area.		
B143	Energy extraction	Interests of total defence.		
B146	Energy extraction Investigation area for maritime shipping	Interests of total defence. High nature values: Reef habitat, fish spawning and mammal area.		
B147	Energy extraction Commercial fishing	Interests of total defence. High nature values: Reef habitat, fish spawning and bird area with particularly low environmental impact.		
B151	Investigation area for energy extraction Nature	Interests of total defence.	Energy extraction to be adapted to nature.	An activity or intervention which may significantly impact an area protected under Ch 7, Section 28 of the Environmental Code, i e Natura 2000, always requires a special licensing examination.
B152	Energy extraction	Interests of total defence.		
B153	Defence Maritime shipping	High cultural landscape values.		
B154	General use Maritime shipping Electricity transmission	High cultural landscape values. High nature values: Reef habitat, fish spawning, bird and mammal area.		

The Baltic Sea: guidance and considerations

Part 4

10. Guidance and considerations for the marine areas in the Baltic Sea

The chapter begins with summary of the main features of the plan for the marine spatial planning area. The map of the marine spatial planning area is presented at 1:2,300,000 scale, in full A4. This is followed by a presentation of the focus of use and considerations for the marine areas in the Baltic Sea. Each marine area is represented by a section of the plan map at a scale of 1:1,000,000.

The plan map is to be interpreted at the approximate scale between 1:700,000 and 1:1,000,000. Boundaries and markings on the map are general, based on the strategic level of the marine spatial plans.

There are five marine areas in the Baltic Sea:
- The North Baltic Sea and South Kvarken
- The Central Baltic Sea
- The Southeast Baltic Sea
- The South Baltic Sea
- The Southwest Baltic Sea and Öresund

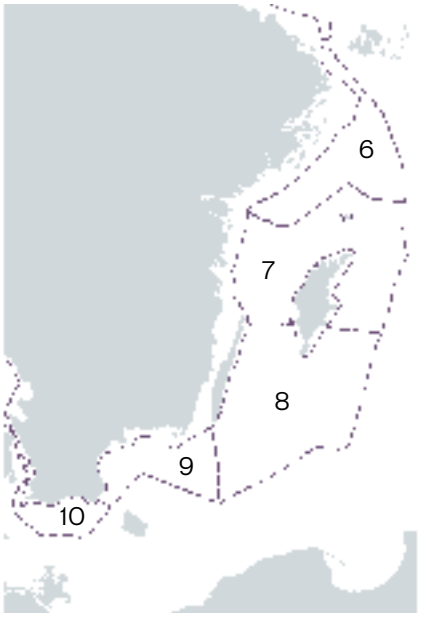


Figure 17. The five marine areas in the Baltic Sea. Numbering by map numbers.

Main features of planning

Nature and people

The Baltic Sea marine spatial planning area has high nature values and attractive living environments for people. The coastal and archipelago landscapes are much used for recreation and outdoor life, and there are high culture values both along the coastal rim and in the sea.

The marine spatial planning area includes large areas with high nature values, and many of these are nature reserves or Natura 2000 areas which are specified for nature use in the marine spatial plan. In addition to these there are areas where activities need to pay particular consideration to high nature values.

While conditions for various activities are good, the environment in the Baltic Sea nonetheless needs to improve in order to achieve good environmental status. There are, for example, large areas of the sea bed that are dead due to oxygen depletion.

Business and maritime shipping link all parts of the region

The Baltic Sea is very significant for international trade, which also makes it one of the busiest areas in the world in terms of traffic. The many shipping routes connect countries and contribute towards the goal of linking all parts of the Baltic region through the transportation of people and goods. On this basis, shipping routes that extend from Sweden's neighbours into the Swedish exclusive economic zone have been identified as substantially significant public interests and are specified for maritime shipping use.

The marine spatial planning area contains a few areas where sand extraction may be possible, and there are favourable technical conditions for offshore energy extraction. Commercial fishing is carried out over very large areas, and fishing areas furthermore change from one year to the next and over longer periods of time. For that reason, the area specified for commercial fishing in the marine spatial plan is extensive. Improvement of fish stocks is crucial for fishing opportunities; the situation for cod stocks is difficult, which has an adverse effect on fisheries.

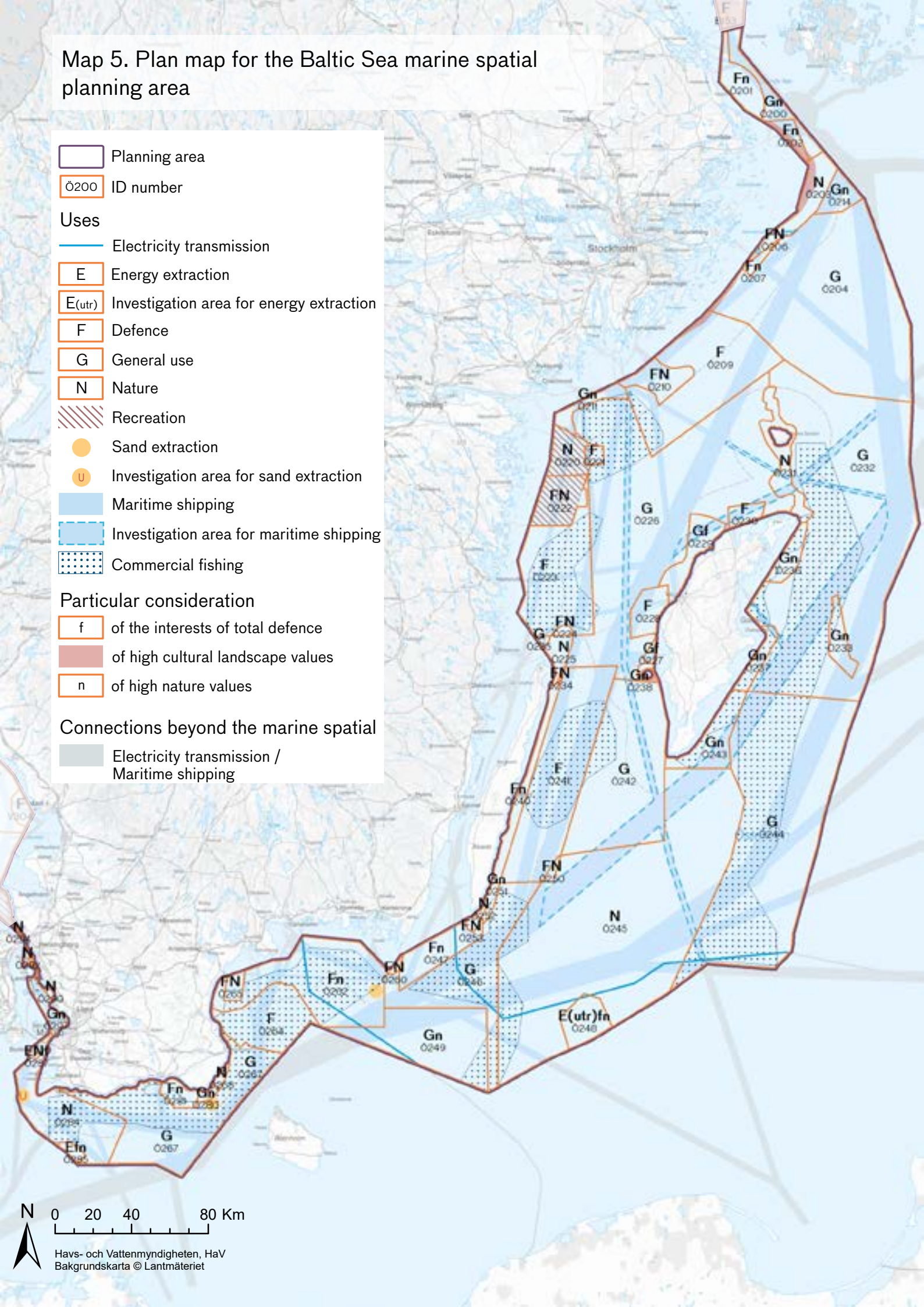
Competition between uses

There are high nature values in the marine spatial planning area, which impacts future prospects of wind power establishment and sand extraction. These activities are judged to be possible, but in many cases there are requirements for examinations under Natura 2000 legislation.

Sweden's total defence has extensive interests in the marine spatial planning area, including in the form of marine exercise areas. For that reason, wind power stations are inappropriate in several areas in view of the interests of total defence.

Operational oil discharges from maritime shipping south of Gotland have an adverse impact on the population of long-tailed duck. Maritime traffic may also affect porpoises because of noise. One way of avoiding such effects could be to reroute traffic, but there may also be other solutions. Making changes in any part of the traffic system is complex and could have consequences in other parts of the system. Further analysis is needed of the impact of maritime shipping on the natural environment, as well as of what measures may be appropriate for reducing the adverse effects of maritime shipping. For this reason the marine spatial plan specifies investigation area for maritime shipping areas to the south, north and east of Gotland. The population of long-tailed duck can be adversely affected by wind power as well. This has been taken into consideration in the overall assessment for wind power in the marine spatial planning area.

Map 5. Plan map for the Baltic Sea marine spatial planning area



The North Baltic Sea and South Kvarken

Energy extraction

Wind conditions are favourable and depths suitable in the North Baltic Sea for offshore wind power stations, while electricity needs are considerable due to the high consumption in the Mälaren Valley region. In several areas along the coast from Norrtälje to Oxelösund there are national interest claims for wind power stations (Ö203–Ö204, Ö209–Ö211, Ö214). The marine spatial planning process has identified two areas as having a substantially significant public interest for energy extraction. One is located off Svenska Björn (Ö204, Ö214) and the other, which is judged to have good conditions for floating wind turbines, is northeast of Kopparstenarna (Ö204). However, the marine spatial plan does not specify any energy extraction areas in the North Baltic Sea and South Kvarken. The national interest claims for wind power stations and substantially significant public interests in the marine area are currently judged not to be compatible with national interest claims for total defence, and defence interests are therefore given precedence.

Defence

The marine spatial plan specifies defence use along large parts of the coastline in the marine area, due to national interest claims for total defence and to influence areas. The Väddö firing range is in Norrtälje municipality by South Kvarken, with the associated influence area extending out over the sea (Ö201). The marine spatial plan also specifies defence use for influence areas by the Söderarm and Korsö firing ranges in Norrtälje and Värmdö municipalities respectively (Ö202, Ö206–Ö207). In the southern Stockholm archipelago, the Utö firing range and Nåttarö marine exercise area extend from the coast through territorial waters out into Sweden's exclusive economic zone outside the municipalities of Värmdö, Haninge and Nynäshamn (Ö209–Ö210).

Culture

The entire coastline in the marine area is comprehended by the highly-developed coast national interest. Immediately adjacent to the marine spatial planning area, there are national interest claims for cultural landscape conservation in Norrtälje and Värmdö municipalities. Core cultural heritage sites identified by the Swedish National Heritage Board lie mainly outside of the marine spatial planning area. However, two such sites extend into the planning area outside of the Stockholm archipelago and Norrtälje, where they are comprehended by particular consideration of high cultural landscape values in the marine spatial plan (Ö200–Ö204, Ö206, Ö209). Consideration distances to the core sites need to be assessed from a local perspective.

Nature

The marine spatial plan specifies nature use in three areas around and south of the Stockholm archipelago, where there are national interest claims for

You can explore the areas on the Swedish Agency for Marine and Water Management's website, where you can search for more information about them. Search by name or ID number on the map. You can also view and compare various documentary evidence.

There is also information regarding the individual areas in the environmental impact report (Swedish Agency for Marine and Water Management, 2019c) and the sustainability report (Swedish Agency for Marine and Water Management, 2019b). The report *Natur i havsplaneringen* (Swedish Agency for Marine and Water Management, 2019d) presents information (in Swedish) about areas with particular consideration of high nature values.

Read more about uses in Part 2, Chapter 7 Guidance on most appropriate use and particular considerations, page 38

Climate refuges

A climate refuge is an area which may need special protection in order for important plants and animals to be preserved when the climate changes and their distribution becomes reduced.

These areas are often the more stable parts of a species' larger distribution area, which are expected to remain after salinity and temperatures change.

A climate refuge is regarded as important for the species' continued presence in the marine area.

Read more in the report Underlag för klimatrefugier i havsplaneringen 2017.

nature conservation (Ö203, Ö206 and Ö210). The area by Norrtälje municipality also comprises a planned marine nature reserve (Ö203). Just outside of the marine spatial planning area (Ö204), an marine national park is planned in the the Nämndö archipelago.

The marine spatial plan specifies particular consideration of high nature values in several areas. The Åland Sea (Ö200–Ö201) constitutes a feeding ground for birds. It also serves as a passage for migratory birds of prey (Hansson, 2019). The Åland Sea additionally has unique oxygenated deep waters, migrating salmon and viable cod stocks. North and southeast of Svenska Högarna are four areas with potential climate refuges for blue mussel – four of the eight such areas identified in the Baltic Sea (Swedish Agency for Marine and Water Management, 2017c). These climate refuges are protected through particular consideration of high nature values (Ö200–Ö202, Ö207, Ö214). In the far southwest of the marine area, particular consideration of high nature values is specified as there are reef environments, spawning areas and mammal areas.

Some national interest claims for nature conservation which are mainly in the coastal zone extend into the marine spatial planning area. Due to the small scale of the marine spatial plan they are not labelled as nature use in the plan, but the national interest claims are provided for. This applies e g at Simpnäs klubb (Ö200–Ö202) and west of Hävringe in Nyköping municipality (Ö211).

Recreation

The marine spatial plan specifies recreation use outside parts of the Östergötland archipelago (Ö211, Ö226). Guidance for recreation use here is based on national interest claims for outdoor life.

The North Baltic Sea includes the outer part of the Stockholm archipelago, with high culture, outdoor life and nature values. Across South Kvarken, and together with the Åland archipelago and Finland's west coast, it makes up a chain of shallow archipelagos that is unique in the world. The Stockholm archipelago is one of the most visited in Sweden, with many natural harbours and marinas. Outdoor life and leisure maritime activities are extensive here. Much of the leisure craft and ferry traffic goes to and from the Gulf of Bothnia in the north, the Gryt and Sankt Anna archipelagos in the south, to Gotland and across the Åland Sea.

On the same latitude as the marine area's southern part, the coast outside of the marine spatial planning area is comprehended by the mobile outdoor life national interest. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

The marine spatial plan specifies maritime shipping use in lanes in the open sea as well as in towards ports on the coast (Ö200–Ö204), Ö206–Ö207, Ö209–Ö211, Ö214, Ö226). These shipping routes are also part of the Baltic Sea's larger traffic system, including connections with the Gulf of Finland, Åland and the Baltic states. In order to connect shipping routes from

Stockholm to Latvia, the area east of the easternmost (deep) waterway in Sweden's exclusive economic zone is specified for maritime shipping use (Ö204). The narrow waters of South Kvarken constitute the passage between the North Baltic Sea and the Bothnian Sea. In order to make these waters safe, a system of traffic separations is used – located in Sweden as well as Finland. The passages via Lake Mälaren via the Södertälje Canal to Stockholm, the route into the port of Oxelösund and the large new port being built in Nynäshamn municipality are other important lanes for maritime shipping use in the marine area.

The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

Investigation area for maritime shipping

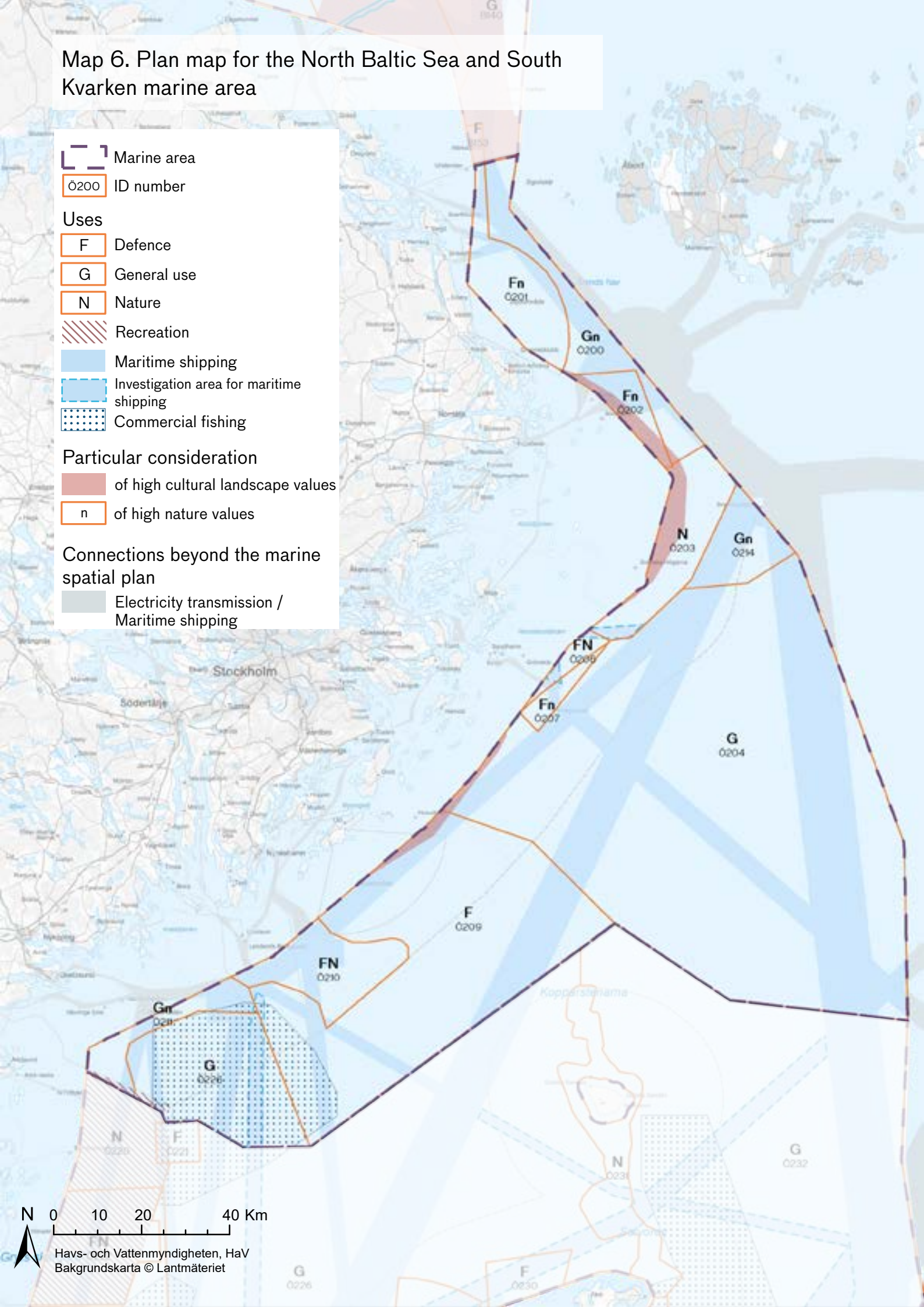
The Horssten channel is a possible future channel through the Stockholm archipelago to the port of Stockholm. The projected channel is not in the marine spatial planning area, but is connected via two national interest claims for maritime shipping to the traffic system in the marine spatial planning area (Ö206–Ö207 and Ö203, Ö206, respectively). The Horssten channel is not included in the National Plan for Infrastructure 2018–2029. It is not within the legal remit of national marine spatial planning to consider whether the projected channel outside the marine spatial planning area is appropriate. However, the marine spatial plan should highlight the possibility of a future need for a new channel in towards Stockholm. For this reason the connections are labelled for investigation area for maritime shipping use.

A lane that extends from Nynäshamn towards Gdansk in Poland is also specified for possible maritime use in the marine spatial plan (Ö209, Ö211 and Ö226). The same applies for the area around Gotland and in the Central and Southeast Baltic marine areas; this is described in greater detail under the heading Investigation area for maritime shipping in the section about the two marine areas.

Commercial fishing

Pelagic fishing of herring/Baltic herring and sprat is carried out throughout the North Baltic Sea, from Värmdö municipality southwards, as well as in a small area in South Kvarken. Commercial fishing use is specified in the far south of the area (Ö209, Ö211, Ö226).

Map 6. Plan map for the North Baltic Sea and South Kvarken marine area



Havs- och Vattenmyndigheten, HaV
Bakgrundskarta © Lantmäteriet

Table 5. North Baltic Sea and South Kvarken marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö200	General use Maritime shipping	High cultural landscape values. High nature values: Reef habitat, bird and mammal area with high autochthony, and climate refuge for blue mussel.		
Ö201	Defence Maritime shipping	High cultural landscape values. High nature values: Bird area.		
Ö202	Defence Maritime shipping	High cultural landscape values. High nature values: Reef habitat, bird and mammal area with high autochthony, and climate refuge for blue mussel.		
Ö203	Nature Maritime shipping Investigation area for maritime shipping	High cultural landscape values.	Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö204	General use Maritime shipping	High cultural landscape values.	Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations and substantially significant public interests of wind power stations. The uses are deemed unable to coexist.
Ö206	Defence Nature Maritime shipping Investigation area for maritime shipping	High cultural landscape values.		
Ö207	Defence Maritime shipping Investigation area for maritime shipping	High nature values: Reef habitat and mammal area with high autochthony, and climate refuge for blue mussel.		

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö209	Defence Maritime shipping Investigation area for maritime shipping Commercial fishing	High cultural landscape values.	Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö210	Defence Nature Maritime shipping		Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö211	General use Recreation Maritime shipping Investigation area for maritime shipping Commercial fishing	High nature values: Reef habitat, bird and mammal area.	Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö214	General use Maritime shipping	High nature values: Reef habitat, bird and mammal area, and climate refuge for blue mussel.	Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.

Area Ö226 is presented in the table for the Central Baltic Sea.

The Central Baltic Sea

Energy extraction

There are favourable conditions for energy extraction in the Central Baltic Sea. However, the marine spatial plan does not specify any areas for energy extraction. The Östergötland archipelago includes part of a national interest claim for wind power stations (Ö220) which is judged not to be compatible with the interests of total defence. National interest claims for total defence are given precedence over national interest claims for wind power stations.

Defence

There are several areas in the Central Baltic Sea which are specified for defence use in the plan. Along the mainland coast are the Sandsänkan (Ö221) and Urban marine exercise areas, which extend through territorial waters and into Sweden's exclusive economic zone outside Valdemarsvik, Västervik and Oskarshamn municipalities (Ö222–Ö224). South of Visby and out into territorial waters the use specification is for defence as the area is an influence area for the Tofta firing range (Ö228). A little farther north is the Fårö marine exercise area (Ö230). The Martin marine exercise area is mainly in the Southeast Baltic Sea, but a small part is in the Central Baltic Sea and is specified for defence use (Ö234, Ö241). The Sankt Olof marine exercise area (Ö239) is east of Gotland and Fårö. The marine spatial plan specifies particular consideration of the interests of total defence for parts of the west coast of Gotland due to an area with height restrictions on built objects for Visby airport (Ö227, Ö229).

Culture

There are areas with national interest claims for cultural landscape conservation along the coastlines outside of the marine spatial planning area and on Gotska Sandön. Core cultural heritage sites identified by the Swedish National Heritage Board lie mainly outside of the marine spatial planning area. However, one smaller such area extends into the planning area at Stora Karlsö (Ö238) and off the northern tip of Öland (Ö225) and is comprehended by particular consideration of high cultural landscape values in the marine spatial plan. Consideration distances to the core sites need to be assessed from a local perspective.

Outside of the marine spatial planning area there is an unbroken coastline national interest which includes the east and west sides of Öland and extends along the mainland coast from Västervik to Arkösund in the north. The coasts of Gotland outside of the marine spatial planning area are comprehended by the highly-developed coastline national interest.

Nature

The marine spatial plan specifies nature use for several areas, particularly along the mainland coast and north of Gotland. The areas along the coasts of Östergötland and Kalmar counties are comprehended by national interest claims for nature conservation (Ö220, Ö222, Ö224–Ö225, Ö234). The area by Gotska Sandön and Salvorev are comprehended by Natura 2000

and several other nature protection schemes, including nature reserves and HELCOM MPA (Marine Protected Area) (Ö231). There are national interest claims for nature conservation which are mainly in the adjacent coastal zone, but which extend into the marine spatial planning area, including in Västervik municipality (Ö223). The national interest claims are provided for, but due to the small scale of the marine spatial plan they are not labelled as nature use in the plan.

At the Sandsänkan marine exercise area in the Östergötland archipelago (Ö221) is a national interest claim for total defence, and in the western part of the area is a small part of a national interest claim for nature conservation. The area where the national interest claims overlap is small at the geographical scale of the plan map and is therefore not labelled as FN use. Defence activities should be carried out in such as way as to avoid adverse impacts on nature values that underlie the national interest claim for nature conservation.

East of Gotland the plan specifies particular consideration of high nature values for three areas. The areas north and south of Slite (Ö236–Ö237) are characterised by reef environments and fish spawning areas with a low environmental impact. The Klint bank (Ö233) is a potential climate refuge for blue mussel. And west of Gotland, around Stora Karlsö (Ö238), the marine spatial plan specifies particular consideration of high nature values as the area is important for bird species such as common guillemot and razorbill.

Recreation

The marine spatial plan specifies recreation use outside parts of the Östergötland archipelago (Ö220-Ö222). The guidance for recreation use here is based on national interest claims for outdoor life. Outdoor life and leisure maritime activities are extensive, and there are valuable areas along the entire coast along the Gryt and Sankt Anna archipelagos to North Öland, and around Gotland.

The coast from Västervik municipality southwards and the coast of Gotland, outside of the maritime planning area, are comprehended by the mobile outdoor life national interest. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

The marine spatial plan specifies maritime shipping use in several shipping routes in the Central Baltic Sea (Ö220–Ö230, Ö232–Ö235, Ö238–Ö239). Several important ports are located along the coast. Maritime traffic is important, with traffic to the mainland, to Gotland and further northwards or southwards, and to Swedish and foreign ports around the Baltic Sea. One shipping route, which extends from the Gulf of Riga and connects to the deep waterway east of Gotland in Sweden's exclusive economic zone, is a substantially significant public interest. The route is labelled for maritime shipping use (Ö232).

The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

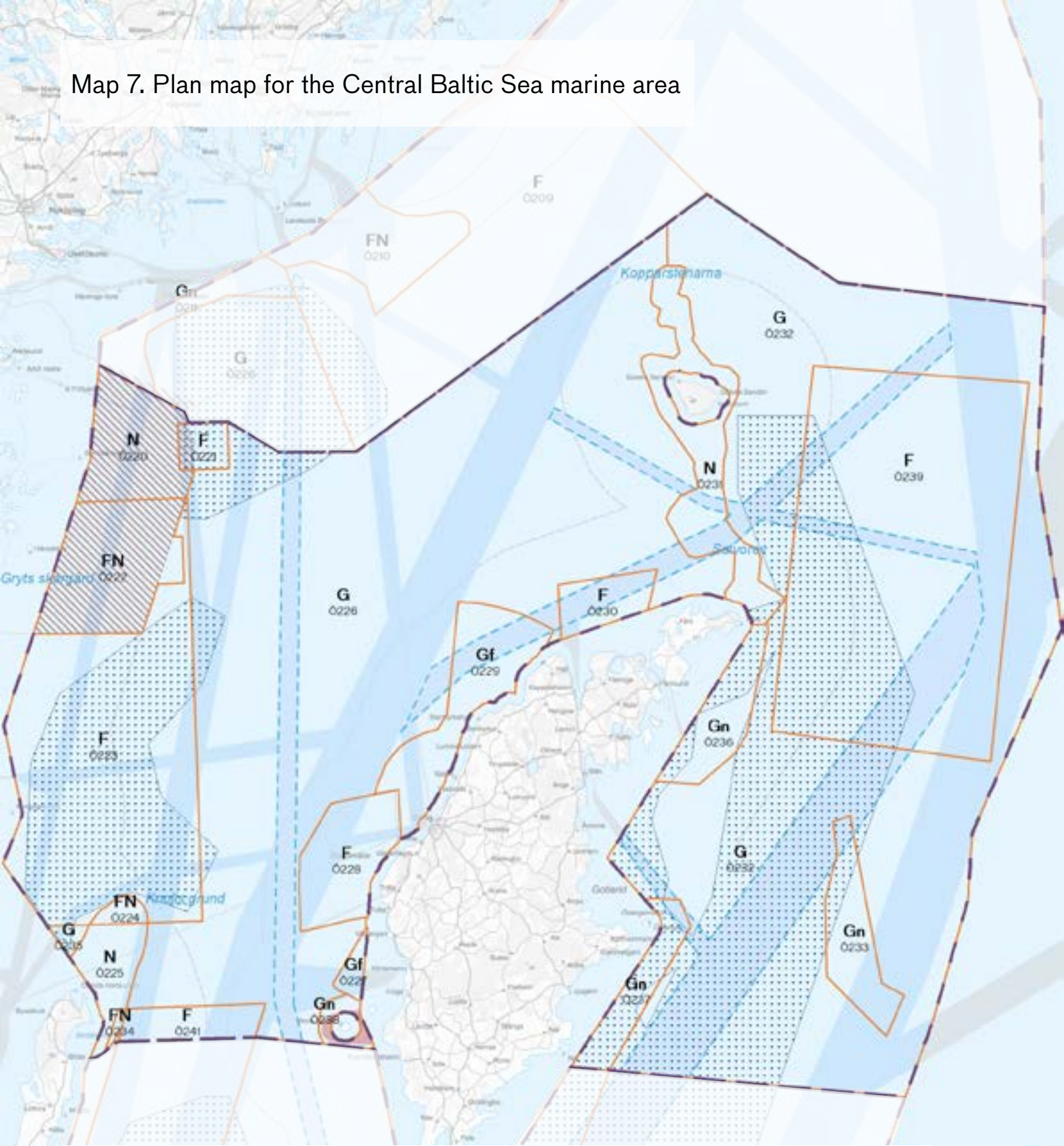
Investigation area for maritime shipping

Across Salvorev, between Fårö and Gotska Sandön, there are currently two passages for maritime traffic through an area with very high nature values, including the red-listed species long-tailed duck. A study by the Swedish Agency for Marine and Water Management (2017f) shows that long-tailed ducks are adversely affected by operational oil discharges from vessels. The need to analyse the impact of maritime shipping on the area around Salvorev, and what measures may be suitable for reducing its adverse impact, is closely linked to the need for analysis of the busier area around the Hoburg bank, south of Gotland. The effect of maritime shipping on porpoises there must be analysed, as well as its effect on long-tailed duck. The porpoise is a red-listed species which is adversely affected by noise from maritime traffic. The overall effect of this needs to be further analysed, and the plan therefore specifies the shipping routes across Salvorev for investigation area for maritime shipping use. Another shipping route east of Gotland and the channel leading in to Slite, as well as two lanes from Nynäshamn towards the Gulf of Riga and Poland, respectively, are also part of the investigation area for maritime shipping use area which may affect maritime shipping in the Central Baltic Sea. Read more about this in the section on the focus of use in the Southeast Baltic Sea.

Commercial fishing

The plan specifies commercial fishing use towards the inner limit of the marine spatial plan (Ö221, Ö223, Ö226) and east of Gotland (Ö231–Ö233, Ö235–Ö237, Ö239). There are corresponding national interest claims for commercial fishing. Commercial fishing is widespread in the Central Baltic Sea. Most of it is pelagic fishing for herring/Baltic herring and sprat, and is done throughout the open sea area. Some fishing with passive equipment is done closer to the coast.

Map 7. Plan map for the Central Baltic Sea marine area



Marine area
Ö200 ID number

Uses
F Defence
G General use
N Nature

Recreation
Maritime shipping
Investigation area for maritime shipping
Commercial fishing

Particular consideration
f of the interests of total defence
of high cultural landscape values
n of high nature values

Connections beyond the marine spatial plan
Electricity transmission / Maritime shipping

N 0 10 20 40 Km

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Bakgrundskarta © Lantmäteriet

Table 6. Central Baltic Sea marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö220	Nature Recreation Maritime shipping		Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö221	Defence Recreation Maritime shipping Commercial fishing			
Ö222	Defence Nature Recreation Maritime shipping			
Ö223	Defence Maritime shipping Commercial fishing			
Ö224	Defence Nature Maritime shipping			
Ö225	Nature Maritime shipping	High cultural landscape values.		
Ö226	General use Recreation Maritime shipping Investigation area for maritime shipping Commercial fishing		Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö227	General use Maritime shipping	Interests of total defence.		
Ö228	Defence Maritime shipping			
Ö229	General use Maritime shipping Investigation area for maritime shipping	Interests of total defence.		

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö230	Defence Maritime shipping Investigation area for maritime shipping			
Ö231	Nature Investigation area for maritime shipping Commercial fishing			
Ö232	General use Maritime shipping Investigation area for maritime shipping Commercial fishing			
Ö233	General use Maritime shipping Investigation area for maritime shipping Commercial fishing	High nature values: Fish spawning and bird area, and climate refuge for blue mussel.		
Ö234	Defence Nature Maritime shipping			
Ö235	General use Maritime shipping Commercial fishing			
Ö236	General use Commercial fishing	High nature values: Reef habitat and bird area.		
Ö237	General use Investigation area for maritime shipping Commercial fishing	High nature values: Reef habitat and bird and mammal area.		
Ö238	General use Maritime shipping	High cultural landscape values. High nature values: Bird area.		

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö239	Defence Maritime shipping Investigation area for maritime shipping Commercial fishing			

The Southeast Baltic Sea

Electricity transmission

Electricity transmission use is made up of the NordBalt transmission cable which passes through the marine area. It connects Nybro in Sweden with Klaipeda in Lithuania.

Energy extraction

The conditions for energy extraction in the Southeast Baltic Sea are favourable, and electricity needs are considerable due to high consumption in southern Sweden. The many offshore banks have favourable wind conditions as well as suitable depths for offshore wind power stations. At the same time there are very high nature values. The outermost eastern and western parts of the North Midsjö bank and a part of the South Midsjö bank are comprehended by national interest claims for wind power stations. Both banks, except for a portion of the South Midsjö bank, are comprehended by Natura 2000.

The marine spatial plan does not specify energy extraction use on the North Midsjö bank (Ö245). It is comprehended by Natura 2000 and by area protection under HELCOM (MPA). The cumulative impact on the nature values in the area is deemed potentially too high if wind power stations are installed on or adjacent to the South Midsjö bank.

At Kårehamn (Ö240–Ö241) there are national interest claims for both wind power stations and total defence. In one part of the area is an existing wind farm. This farm is limited in extent, and due to the small scale of the marine spatial plan it does not specify energy extraction in the area, but the interest is provided for. Future expansion of the area is judged in the marine spatial plan not to be compatible with the interests of total defence, which is why the marine spatial plan does not provide for the national interest claim that lies outside of the already existing wind farm.

Investigation area for energy extraction

The marine spatial plan specifies investigation area for energy extraction use on the South Midsjö bank (Ö248). The area includes part of a national interest claim for wind power stations. The plan specifies particular consideration

of high nature values in the area as it is very important for porpoise and as a seabird wintering area. The area borders on the Natura 2000 area of Hoburg bank and the Midsjö banks (Ö245), which include the same species. The assessment is that this implies requiring special licensing examinations under Chapter 4, Section 8 of the Environmental Code, also known as a Natura 2000 examination. For this reason the area is specified for investigation area for energy extraction.

By adapting e g the timing of the installation works, noise levels during wind turbine erection and precise location, wind power is deemed capable of coexisting with the nature values. However, such coexistence must be examined in what is known as a Natura 2000 examination. The environmental impact assessment of the marine spatial plan (Swedish Agency for Marine and Water Management, 2019c) indicates that there may be locations outside of area Ö248 where the risk of environmental impacts is smaller than within area Ö248. Poland is also planning wind power establishment in the Polish exclusive economic zone on the South Midsjö bank, which may imply the need for coordination in order to prevent extensive environmental impacts.

Satisfactory coordination can also promote the efficient use of infrastructure. Any development must make particular consideration of the needs of total defence.

Defence

Defence use is specified for the Hanö and Martin marine exercise areas located off Öland (Ö240–Ö241, Ö250, Ö253). The Martin marine exercise area extends from the coast through territorial waters out into Sweden's exclusive economic zone outside the municipalities of Borgholm and Mörbylånga. The northernmost part of the Hanö marine exercise area lies within the territorial waters south of Öland. The marine spatial plan specifies particular consideration of the interests of total defence on the South Midsjö bank (Ö248).

Culture

The coast of Öland is comprehended by the unbroken coastline national interest, and the coast of Gotland by the highly-developed coast national interest. South Öland's agricultural landscape is a world heritage site and is also comprehended to a large extent by landscape aspect protection. There are several areas comprehended by national interest claims for cultural landscape conservation outside of the marine spatial planning area, in the coastal areas around Gotland and Öland. Core cultural heritage sites identified by the Swedish National Heritage Board are mainly outside of the marine spatial planning area. However, a small part extends into the planning area off Öland's east coast (Ö240) and is comprehended in the marine spatial plan by particular consideration of high cultural landscape values. Consideration distances to the core sites need to be assessed from a local perspective.

Nature

The marine spatial plan specifies nature use in a large area that extends from the southern tip of Gotland at Hoburgen via the Hoburg bank to the North Midsjö bank and the South Midsjö bank (Ö245), and a smaller, adjacent area (Ö250). They are comprehended by Natura 2000 and have very valuable nature assets. In large parts of this area environmental impacts are low, and the marine environment can be regarded as relatively autochthonous (Swedish Agency for Marine and Water Management, 2018h). The nature values comprise valuable sea bed environments, mating areas for the threatened Baltic porpoise, and the most important wintering areas for long-tailed duck. Both species are red-listed by the Swedish Species Information Centre. The area also has feeding areas for long-tailed duck and other bird species, as well as spawning areas for fish. The marine area's banks are specified as potential climate refuges for several species, which indicates that the ecological significance of the area may become very high in the future (Swedish Agency for Marine and Water Management, 2017c). A preservation plan with preservation goals for the Natura 2000 area is being drawn up (Ö245).

The marine spatial plan specifies nature use at the southern tip of Öland (Ö252–Ö253), where there is a planned marine nature reserve.

The marine spatial plan specifies particular consideration of high nature values in several areas along the coasts and adjacent to areas with nature protection where there are also important nature values (Ö240, Ö243, Ö248, Ö251).

Recreation

Outdoor life and leisure maritime activities are extensive in parts of the Southeast Baltic Sea. There are several areas comprehended by national interest claims for outdoor life outside of the marine spatial planning area, in the coastal areas around Gotland and Öland. The coasts of Gotland are comprehended by the mobile outdoor life national interest. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

Maritime shipping use is specified for several shipping routes within the marine area (Ö240–Ö242, Ö244–Ö247, Ö250, Ö253). Maritime traffic is important in the Southeast Baltic Sea, with extensive movement to both foreign and Swedish ports. West of Gotland the traffic is mainly to Swedish destinations, while international traffic to and from the Gulf of Finland and the Baltic states dominate south and east of Gotland (Swedish Agency for Marine and Water Management, 2017d). Three shipping routes which extend from ports in the Baltic states (Ventspils, Liepaja and Klaipeda) and connect to the deep waterway southeast of Gotland in Sweden's exclusive economic zone are substantially significant public interests. The routes are specified for maritime shipping use (Ö244–Ö245).

Investigation area for maritime shipping

The marine spatial plan specifies investigation area for maritime shipping for one lane from Gdansk in Poland to Nynäshamn. The marine spatial plan also specified investigation area for maritime shipping between the North Midsjö bank and the Hoburg bank. Maritime shipping there currently passes through an area of shallows with very high nature values for the red-listed species porpoise and long-tailed duck, and this area is also comprehended by Natura 2000. Studies show that the long-tailed duck population is adversely affected by operational oil discharges from vessels, and that porpoises are disrupted by noise from shipping routes (Swedish Agency for Marine and Water Management, 2016c & 2018a). From a nature conservation point of view there is reason to analyse the impact of maritime shipping on the natural environment, and what measures might be suitable for reducing the adverse effects of maritime shipping.

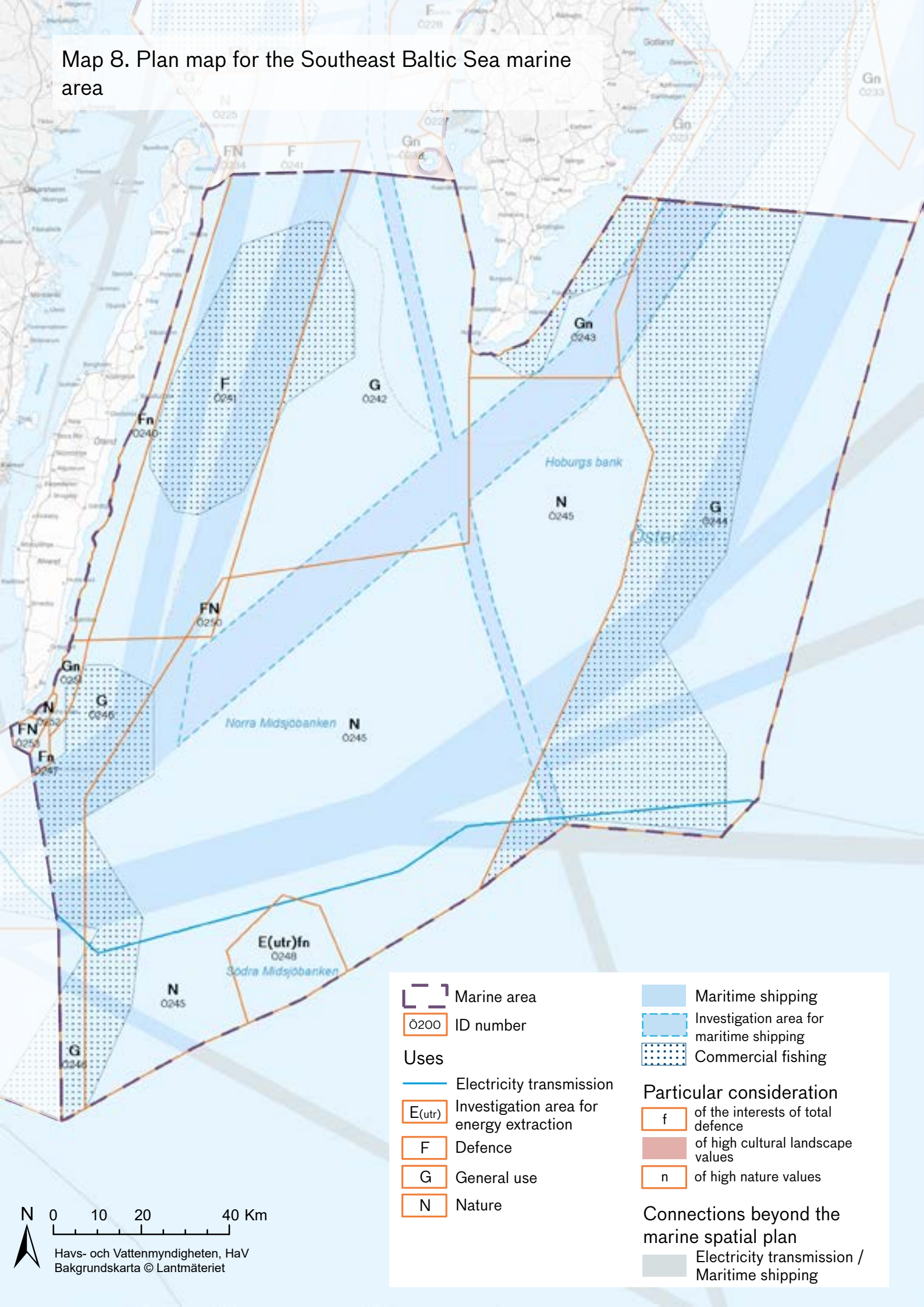
Several areas in the Southeast and Central Baltic Sea are directly or indirectly affected by the problems described above. Any measures could affect traffic flows along the deep-water route which lies south of the route Hoburg bank–North Midsjö bank and north of the South Midsjö bank, as well as the routes west and east of Gotland and in our neighbouring countries.

Before a final position can be adopted on the shipping routes, these problems need to be further analysed, including the environmental impact of maritime traffic and different types of measures, socioeconomic consequences for transportation and maritime shipping nationally and internationally, and other consequences as a result of measures. Most of the changes concerning maritime shipping imply decisions taken internationally, such as route alterations, and thus require international agreement as well as being consistent with international law and the law of the sea.

Commercial fishing

Commercial fishing is specified as a use in several larger areas (Ö241–Ö246, Ö251). Commercial fishing is widespread in the Southeast Baltic Sea, but is rarely carried out on the offshore banks. Cod fishing is mostly done in the southwestern parts of the marine area, with trawling in the open sea and passive fishing nearer the coast. Pelagic fishing for herring/Baltic herring and sprat is carried out in many parts of the open sea, but not on the banks. Some fishing with passive equipment occurs off the coast of Öland.

Map 8. Plan map for the Southeast Baltic Sea marine area



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Bakgrundskarta © Lantmäteriet

Table 7. Southeast Baltic Sea marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö240	Defence Maritime shipping	High cultural landscape values. High nature values: Reef habitat, bird and mammal area with particularly low environmental impact.	Defence has precedence over increased energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. Part of the area has an existing wind power installation. Future expansion of the area is not deemed compatible with the interests of total defence.
Ö241	Defence Maritime shipping Commercial fishing		Defence has precedence over increased energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. Part of the area has an existing wind power installation. Future expansion of the area is not deemed compatible with the interests of total defence.
Ö242	General use Maritime shipping Investigation area for maritime shipping Commercial fishing			
Ö243	General use Investigation area for maritime shipping Commercial fishing	High nature values: Reef habitat and bird and mammal area.		
Ö244	General use Maritime shipping Investigation area for maritime shipping Commercial fishing Electricity transmission			
Ö245	Nature Maritime shipping Investigation area for maritime shipping Commercial fishing Electricity transmission		Nature has precedence over energy extraction.	Under Ch 3 and 4 of the Environmental Code, Natura 2000 has precedence over two national interest claims for wind power stations. The uses are deemed unable to coexist.

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö248	Investigation area for energy extraction Electricity transmission	Interests of total defence. High nature values: Reef habitat, bird and mammal area, and climate refuge for blue mussel.	Energy extraction to be adapted to nature values.	An activity or intervention which may significantly impact an area protected under Ch 7, Section 28 of the Environmental Code, i e Natura 2000, always requires a special licensing examination.
Ö250	Defence Nature Maritime shipping			
Ö251	General use Commercial fishing	High nature values: Reef habitat, bird and mammal area.		
Ö252	Nature			
Ö253	Defence Nature Maritime shipping			

Area Ö246 and area Ö247 are presented in the table for the South Baltic Sea.

The South Baltic Sea

Electricity transmission

Electricity transmission use is made up of two transmission cables linking Sweden with other countries. The NordBalt cable extends between Sweden and Lithuania, connecting to Nybro in Sweden and Klaipeda in Lithuania. SwePolLink is the marine area's other transmission cable, linking Karlshamn to Slupsk in Poland.

Energy extraction

Conditions for energy extraction are favourable in the South Baltic Sea, and electricity needs are great due to high consumption in southern Sweden. Both offshore banks and the coast have favourable wind conditions and suitable depths for offshore wind power stations. There is a national interest claim for wind power stations near the coast in Kristianstad and Sölvesborg municipalities. The area (Ö262, Ö264) has one licence for installation of a wind farm, but project development has stopped. The licence to install a wind farm expires during 2021. The area also has a national interest claim for total defence. The marine spatial plan gives precedence to the defence interest.

In the northern part of the marine area is part of another national interest claim for wind power stations. Within the area there are also national interest claims for total defence. The government has rejected an application for wind power in the area on the grounds that a national interest claim for total defence takes precedence over national interest claims for wind power stations. The marine spatial plan gives precedence to the defence interest (Ö262).

Defence

Defence is the specified use in large parts of the marine area (Ö247, Ö260, Ö262, Ö264–Ö265). The naval port of Karlskrona is one of Sweden's biggest and most important navy bases. The Ravlunda and Rinkaby firing ranges have influence areas in the sea outside Simrishamn, Kristianstad and Sölvesborg municipalities. The Hanö marine exercise area is in territorial waters and Sweden's exclusive economic zone in the Bight of Hanö and south of Öland.

At Utlippan (Ö260) coexistence is specified of defence, nature, recreation, maritime shipping and commercial fishing. In the northern part of the area are national interest claims for total defence. Within the area there are also national interest claims for nature conservation, and a marine nature reserve.

Defence activities should be carried out in such as way as to avoid adverse impacts on the nature values that underlie the marine nature reserve.

Culture

The entire coastline is comprehended by the highly-developed coast national interest. There are areas with national interest claims for cultural landscape conservation along the coast outside of the marine spatial planning area. Core cultural heritage sites identified by the Swedish National Heritage Board lie mainly outside of the marine spatial planning area. However, small sections of the sites extend into the planning area at the Bight of Hanö (Ö262, Ö264), where they are comprehended by particular consideration of high cultural landscape values. Consideration distances to the core sites need to be assessed from a local perspective.

In the Bight of Hanö planning area, and at other locations off the coasts of Skåne and Blekinge, there are preserved Stone Age landscapes on the sea bed. Beyond the mouth of the Verke river in Haväng, marine archaeologists have recently documented and made an exploratory survey of an area with Stone Age remains. Additional evidence may be used in the continuing marine spatial planning process in establishing guidance for culture use in the area.

Nature

The marine spatial plan specifies nature use for several locations in the South Baltic Sea. Utklippan (Ö260) is comprehended by a marine nature reserve, a national interest claim for nature conservation and an existing HELCOM MPA. Kiviksbredan outside Kristianstad (Ö265) has been proposed by the Skåne county administrative board, via the Swedish Environmental Protection Agency, as part of a marine Baltic region in the Natura 2000 network. The proposal is in reference to the species porpoise, grey seal and harbour seal, and the sandbank and reef biotopes. The matter is currently being processed by the Swedish Government Offices. South of Simrishamn municipality (Ö268) is an area of high nature values that runs close to the coast and is comprehended by national interest claims for nature conservation.

There are relatively small areas of protected nature in the South Baltic Sea. To promote and guarantee ecosystem services, particular consideration of high nature values is therefore specified for several areas. Outside Karlskrona (Ö247) particular consideration must be shown for reef environments and spawning and mammal areas, and farther out in the open sea for fish spawning and mammal areas with a particularly high environmental impact (Ö249). The Bight of Hanö has red-listed porpoise from the critically endangered Baltic population, including in the Swedish Armed Forces' marine exercise area. The plan specifies particular consideration of high nature values for reef environments, spawning areas, mammals and birds, as well as climate refuges for several species (Ö262). In the same area, the plan specifies particular consideration of high nature values for reef habitats, spawning areas, mammals and birds, as well as climate refuges for the three species blue mussel, bladder wrack and herring. In the northwestern corner of the Bight of Hanö (Ö265) are further areas that can constitute climate refuges for these three species (Swedish Agency for Marine and Water Management, 2017c).

Recreation

Recreation use is specified off Karlskrona (Ö260), where there is a national interest claim for outdoor life. Outdoor life and leisure maritime activities are important in the South Baltic Sea. Along the coast outside of the marine spatial planning area are several areas comprehended by national interest claims for outdoor life. The coastline in the Bight of Hanö's western part is comprehended by the mobile outdoor life national interest. Along the coast outside of Simrishamn is a national interest for mobile outdoor life that borders on the planning area. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Sand extraction

The marine spatial plan specifies sand extraction use beyond Utklippan (Ö262). The area lies in regional surroundings with expansive residential development and municipal interests in beach replenishment as a climate adaptation measure. There are also high nature values there, to which particular consideration must be made, meaning that coexistence demands are high. The area is an important cod habitat, and future extraction needs to consider cod spawning periods on order to avoid an adverse impact.

Maritime shipping

Maritime shipping use is specified in shipping routes through the area (Ö246–Ö247, Ö249, Ö260, Ö262, Ö264, Ö265, Ö267). The busiest shipping route in the Baltic Sea extends across the South Baltic Sea in systems with traffic separations along Sweden's south coast from Öresund or from Gedser between Denmark and Germany, via the Bornholm Sound towards southern Öland. A deep waterway for some ships passing east across the Baltic Sea also begins here. Some of the maritime traffic has coastal destinations, but most of it continues towards other Swedish or foreign ports.

Commercial fishing

Commercial fishing use is specified in most areas, as commercial fishing is widespread in the South Baltic Sea (Ö246, Ö249, Ö262, Ö264, Ö267–Ö268). This use corresponds to national interest claims for commercial fishing. Commercial fishing for cod is mostly done by trawling in the open sea, but also with passive equipment closer to the coast. Pelagic commercial fishing for herring and sprat is carried out in the open sea. Other fishing with passive equipment is carried out to varying degrees along the coast and in the Bight of Hanö. Fishing vessels from other EU countries also fish in the area.

Map 9. Plan map for the South Baltic Sea marine area

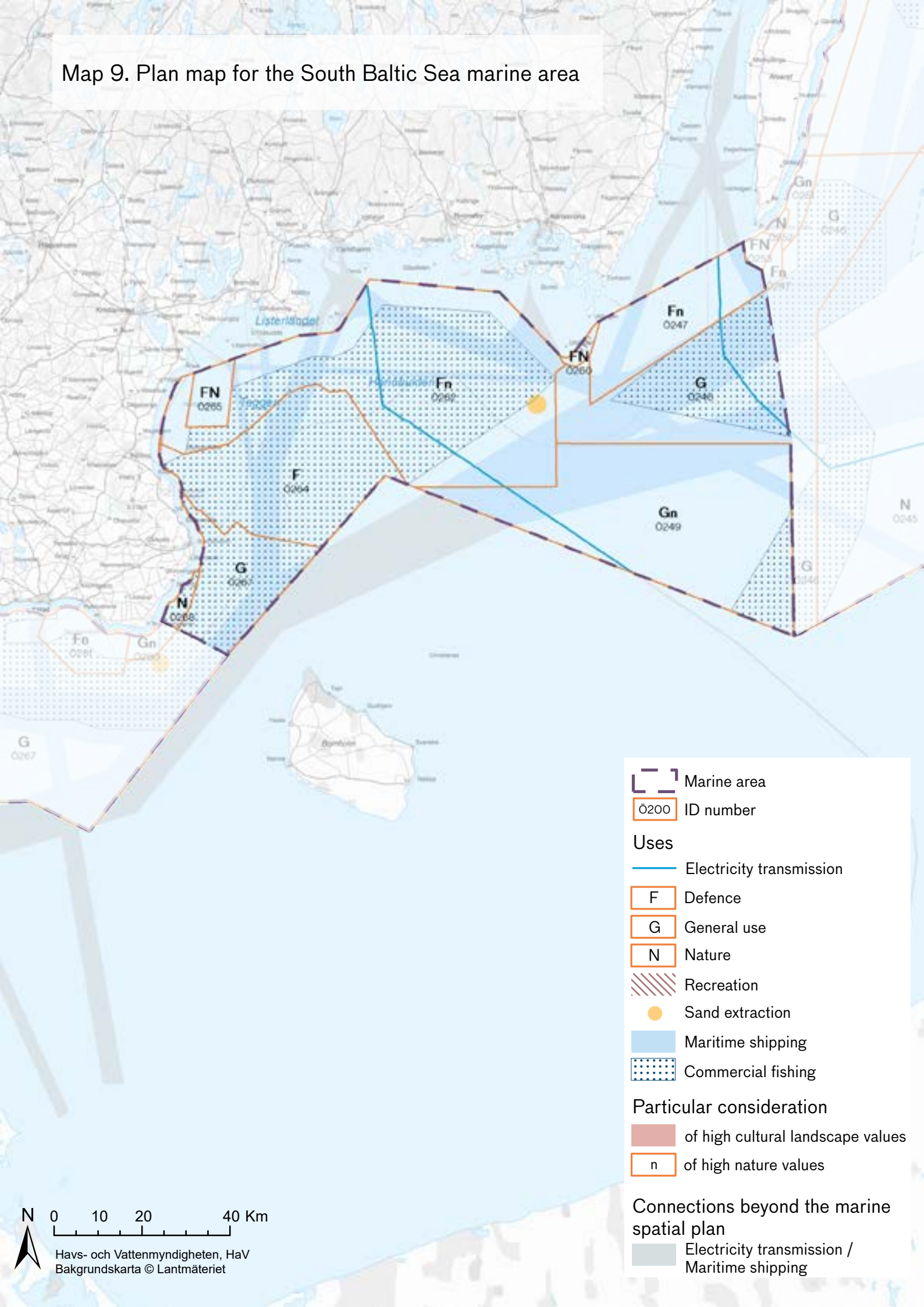


Table 8. South Baltic Sea marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö246	General use Maritime shipping Commercial fishing Electricity transmission			
Ö247	Defence Maritime shipping Electricity transmission	High nature values: Reef habitat and mammal area.		
Ö249	General use Maritime shipping Commercial fishing Electricity transmission	High nature values: Fish spawning and mammal area with a particularly high environmental impact.		
Ö260	Defence Nature Recreation Maritime shipping			
Ö262	Defence Sand extraction Maritime shipping Commercial fishing Electricity transmission	High nature values: Reef habitat, fish spawning, bird and mammal area, and climate refuge for blue mussel, bladder wrack and herring. High cultural landscape values.	Defence has precedence over energy extraction.	The government has rejected an application for wind power in the area. National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations. The uses are deemed unable to coexist.
Ö264	Defence Maritime shipping Commercial fishing	High cultural landscape values.		
Ö265	Defence Nature Maritime shipping			
Ö268	Nature Commercial fishing			

Area Ö267 is presented in the table for the Southwest Baltic Sea.

The Southwest Baltic Sea and Öresund

Electricity transmission

Electricity transmission use is present in northern Öresund (Ö294). This use is made up of the Öresund cables, two 400 kV connections between Kristinelund in Sweden and Skibstrupsgård in Denmark.

Energy extraction

There are favourable conditions for wind power in the marine area, and the need is considerable due to the high level of electricity consumption in southern Sweden. Coastal and offshore banks have good wind and depth conditions for wind turbines with foundations. Lillgrund (Ö287) is Sweden's biggest existing offshore wind farm. Any changes to the wind turbines at Lillgrund need to take the approach path to Copenhagen's Kastrup airport into consideration.

At Kriegers Flak (Ö285) there are favourable conditions for offshore wind power. There is a wind power project here, most of whose projected area is comprehended by a national interest claim for wind power stations. A small part of the projected area overlaps with a Natura 2000 area. In March 2021 the Skåne county administrative board issued a Natura 2000 licence under Chapter 7 Section 28a of the Environmental Code, for construction and operation of a wind farm and for the laying and maintenance of the requisite subsea cables.

National interest claims for wind power stations outside Skurup municipality (Ö267) are not provided for in the marine spatial plan as wind power stations are judged not to be compatible with the interests of total defence in the area. National interest claims for total defence are given precedence over national interest claims for wind power stations.

Two areas have been identified as having a substantially significant public interest for energy extraction south of Skåne (Ö267). The conditions for wind power stations are favourable, and the total cumulative environmental impact is estimated to be low. Due to the interests of total defence, however, they are not provided for in the marine spatial plan. There are other interests in the area as well.

Read more in the report Förutsättningar för utvinning av marin sand och grus i Sverige (Conditions for Extraction of Marine Sand and Gravel in Sweden).

Defence

The marine spatial plan specifies defence use for the influence area in the sea of the Kabusa firing range in Ystad municipality (Ö281). A small part of a national interest claim for total defence by the Falsterbo isthmus, designated other influence area, extends into the area comprehended by the marine spatial plan (Ö284). Due to the small scale of the marine spatial plan, this defence interest is not shown on the plan map. The national interest claim for total defence is provided for, as the defence interest and the uses specified in the marine spatial plan are judged capable of coexistence.

Particular consideration of the interests of total defence is specified at Kriegers flak (Ö285) and Lillgrund (Ö287).

Culture

The entire coastline is comprehended by the highly-developed coast national interest. There are several areas with national interest claims for cultural landscape conservation along the entire coast outside of the marine spatial planning area. A small part of a national interest claim for cultural landscape conservation by the Falsterbo isthmus extends into the area comprehended by the marine spatial plan (Ö284). Due to the small scale of the marine spatial plan, this interest is not shown on the plan map. The national interest claim for cultural landscape conservation is provided for, as the interest and the uses specified in the marine spatial plan are judged to be capable coexistence. Core cultural heritage sites identified by the Swedish National Heritage Board are outside of the marine spatial planning area, which is why the plan map does not specify areas with particular consideration of high cultural landscape values. Consideration distances to the core sites need to be assessed from a local perspective.

Nature

The marine spatial plan specifies nature use in several areas. For the area that extends from the open sea by the eastern parts of Trelleborg municipality, via the Falsterbo isthmus to the southernmost part of Öresund, this use is based on two Natura 2000 areas and a national interest claim for nature (Ö284). The area's eastern parts are comprehended by Sydvästskånes Utsjövatten, a Natura 2000 area that was established in 2016 for the protection of porpoises. A preservation plan for the Natura 2000 area is in the process of being drawn up. The area's northwestern parts are comprehended by national interest claims for nature, and to a large extent by the Falsterbohalvön/Falsterbo-Foteviken Natura 2000 area, which is protected under both the Birds Directive and the Species and Habitats Directive. There is also a marine nature reserve, Måkläppen – Limhamnströskeln. The area has considerable and unique values with respect to birds, and a geology that gives rise to a sand migration area unlike any other in Sweden. The existing wind farm at Lillgrund (Ö287) is located within a national interest claim for nature, and the marine spatial plan specifies coexistence of energy extraction and nature uses there.

The area north of Ven in Örersund (Ö292) comprehends a Natura 2000 area for porpoises and important meadows with eelgrass, the Knähaken municipal nature reserve, and national interest claims for commercial fishing – spawning area. Lundåkra Bay (Ö290) includes national interest claims for commercial fishing – spawning area, and the appealed Lundåkrabukten nature reserve. Outside of Helsingborg is the Grollegrund marine nature reserve (Ö294). There is also an important passage for migrating birds of prey here (Hansson, 2019).

The marine spatial plan specifies particular consideration of high nature values in Öresund (Ö297) where there are connected high values of significance for preservation and improved ecosystem services. These are reinforced by the occurrence of mammals, birds, valuable sea bed environments and spawning areas for fish. While nature values are high, the impact of human activities is considerable. The new Flädierev marine nature reserve lies in the coastal area off Bjärred and overlaps with the marine spatial planning area (Ö297). The

overlapping part of the nature reserve is too small to be shown on the plan map, but concerns a smaller area by the inner limit of the plan.

East of Ystad an area of high nature values extends close to the coast, and is specified with particular consideration of high nature values (Ö280–Ö281). The area has valuable reefs for fish spawning and an important bird and mammal area. On Kriegers flak (Ö285), as well, consideration must be made of high nature values. These values comprise reef environments and a bird and mammal area.

Recreation

The marine spatial plan specifies recreation use around Ven (Ö292, Ö297), where there are national interest claims for outdoor life. Valuable coastal landscapes extend along western and southern Skåne. Öresund has extensive recreational and charter boat fishing. Outdoor life and leisure maritime activities are important throughout the marine area. There are several areas with national interest claims for outdoor life outside the marine spatial planning area, particularly along the south and west coasts of Skåne. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Sand extraction

In the Sandhammaren, south of Ystad (Ö267), there is a licence for sand extraction that is valid until 2021. The sand is used for beach replenishment, and extraction occurred in 2011 and 2014 (Ystad municipality, 2018). and outside Falsterbo (Ö284). Inspections carried out show that sedimentation covers earlier traces of extraction through the geological processes in the area (Swedish Geological Survey, 2018d).

Investigation area for sand extraction

Outside Falsterbo (Ö284) is an area for investigation area for sand extraction. Appropriateness for sand extraction has been assessed for parts of the area in question, as described in the report Conditions for extraction of marine sand and gravel in Sweden (Swedish Geological Survey, 2017a). The proposed sand extraction area by Falsterbo coincides with the westernmost parts of the Sydvästskånes Utsjövatten Natura 2000 area. This area was created in order to strengthen the protection of the Danish straits and Baltic Sea populations of porpoise. The considerable geographical mobility of the porpoise has led to a relatively large Natura 2000 area. The overall assessment in the marine spatial plan is that coexistence with sand extraction may be possible as extraction is proposed for the edge of the Natura 2000 area. The seasonal variations of the porpoise, and the assessment that sand extraction will occur in a limited area during a limited period of time, improves the prospects of coexistence of nature and sand extraction uses. Sand extraction needs to be adapted to the Natura 2000 protection scheme. An activity or intervention that may significantly affect an area which is protected under Chapter 4, Section 8 of the Environmental Code, i e Natura 2000, always requires a special licensing examination.

The area for investigation area for sand extraction lies within the exclusive economic zone. East of this area is the Falsterbohalvön-Foteviken Natura 2000 area, which is also a marine nature reserve and part of a national interest claim for nature conservation. In this area, which lies in territorial waters and beyond the area for investigation area for sand extraction, sand extraction is identified as an activity that constitutes a risk of harm (Skåne county administrative board, 2005). The assessment in the report Conditions for extraction of marine sand and gravel in Sweden (Swedish Geological Survey, 2017a) is that sand extraction may be possible in the exclusive economic zone outside of the Falsterbohalvön-Foteviken Natura 2000 area. The exclusive economic zone has ecologically valuable areas where sea bed vegetation and mussel banks occur, and with post-glacial sand and gravel. The assessment is that sand extraction may be possible west and southwest of these areas.

The sand extraction area by Falsterbo lies in an area with indicated traffic separation of maritime shipping, and coexistence is judged to be possible. The traffic generated by sand extraction is estimated to be low (Swedish Geological Survey, 2017a & 2018d). Existing maritime shipping volumes mean that sand extraction represents a negligible increase in noise impact.

For both sand extraction areas there is a potential impact on commercial fishing, which by Falsterbo is also reinforced by cumulative environmental effects of Danish extraction in Öresund. The assessment is that it will be possible to limit this impact if benign extraction methods are used and extraction is carried out during periods when fish are not spawning. (Swedish Geological Survey, 2017a).

Maritime shipping

Maritime shipping use is specified in shipping routes through the marine area (Ö267, Ö281, Ö284, Ö292, Ö294, Ö297). The busiest shipping route in the Baltic Sea runs across the Southwest Baltic Sea in a system with traffic separations along Sweden's south coast from Öresund via Falsterbo in Vellinge municipality or from Gedser, between Denmark and Germany, to the Bornholm Sound. The maritime traffic is destined for Swedish as well as foreign ports. Öresund is one the few access routes into the Baltic Sea for large vessels.

The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

Commercial fishing

Commercial fishing is widespread, and the marine spatial plan therefore specifies commercial fishing use in large parts of the marine area (Ö267, Ö280–Ö281, Ö284, Ö290, Ö294, Ö297). This use corresponds to national interest claims for commercial fishing. Commercial fishing for cod is mostly carried out by trawl in the open sea, but also with passive equipment, closer to the coast. Pelagic commercial fishing for herring and sprat occurs throughout the open sea area. Other fishing with passive equipment is carried out to a varying extent along the coast. Bottom trawling is not permitted

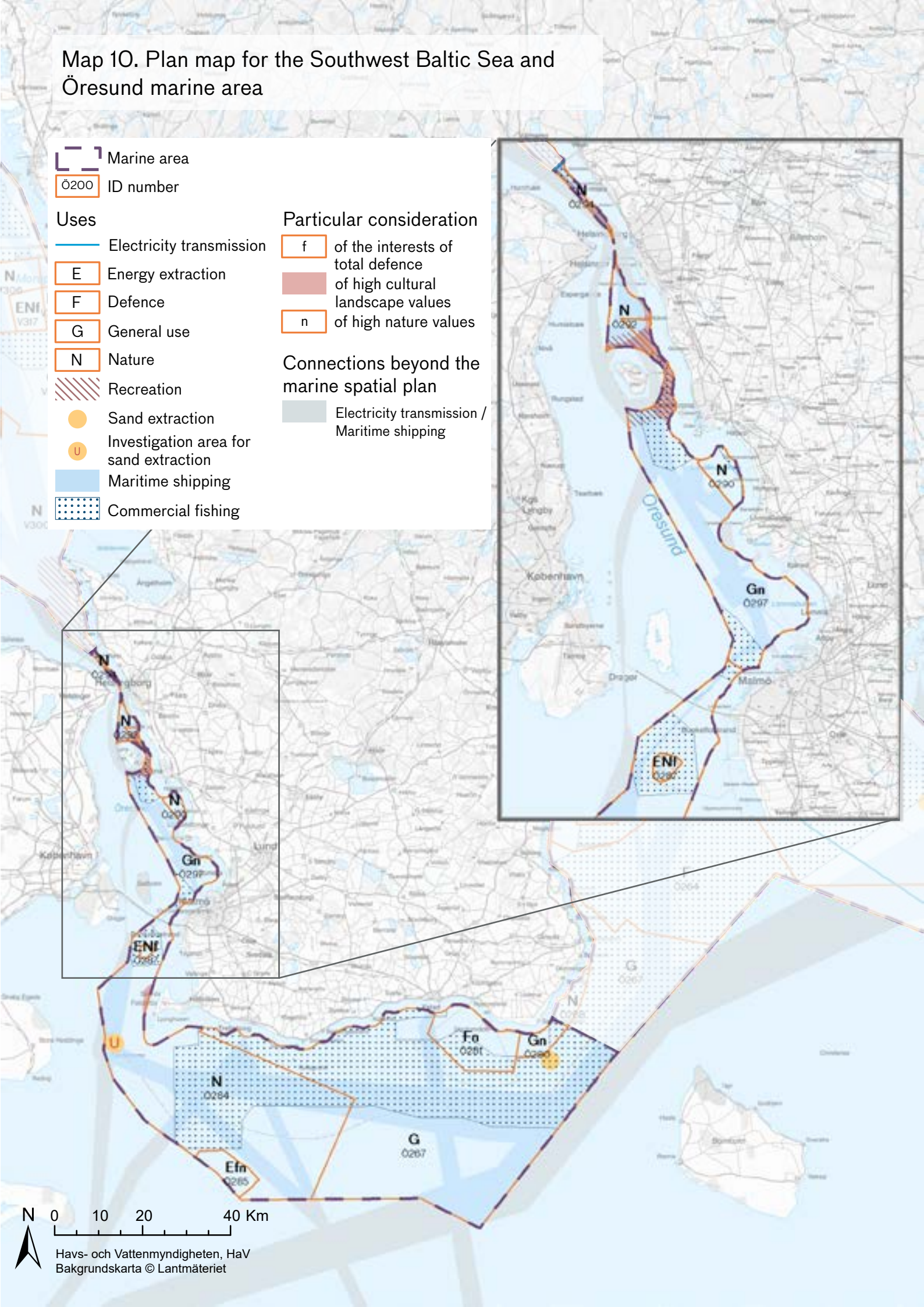
in Öresund; instead commercial fishing, for cod and other species, is done with passive equipment.

Table 9. Southwest Baltic Sea and Öresund marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö267	General use Sand extraction Maritime shipping Commercial fishing	High cultural landscape values.	Defence has precedence over energy extraction.	National interest claims for total defence have precedence, under Ch 3, Section 10 of the Environmental Code, over national interest claims for wind power stations and substantially significant public interests of wind power stations. The uses are deemed unable to coexist.
Ö280	General use Commercial fishing	High cultural landscape values. High nature values: Reef habitat and bird area.		
Ö281	Defence Maritime shipping Commercial fishing	landscape values. High nature values: Reef habitat and bird area.		
Ö284	Nature Investigation area for sand extraction Maritime shipping Commercial fishing	High cultural landscape values.	Sand extraction to be adapted to nature. E g regarding time period and location of extraction.	An activity or intervention which may significantly impact an area protected under Ch 7, Section 28 of the Environmental Code, i e Natura 2000, always requires a special licensing examination.
Ö285	Energy extraction	Interests of total defence. High nature values: Reef habitat and bird and mammal area.	Energy extraction to be adapted to nature.	An activity or intervention which may significantly impact an area protected under Ch 7, Section 28 of the Environmental Code, i e Natura 2000, always requires a special licensing examination.
Ö287	Energy extraction Nature	Interests of total defence.	Energy extraction had precedence over commercial fishing.	National interest claims for wind power stations have precedence over national interest claims for commercial fishing. There is a wind farm in the area. The needs of commercial fishing to be provided for in an adjacent area.
Ö290	Nature Commercial fishing			
Ö292	Nature Recreation Maritime shipping	High cultural landscape values.		
Ö294	Nature Recreation Maritime shipping Commercial fishing Electricity transmission	High cultural landscape values.		

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
Ö297	General use Recreation Maritime shipping Commercial fishing	High cultural landscape values. High nature values: Reef habitat, fish spawning, bird and mammal area with a particularly high environmental impact.		

Map 10. Plan map for the Southwest Baltic Sea and Öresund marine area



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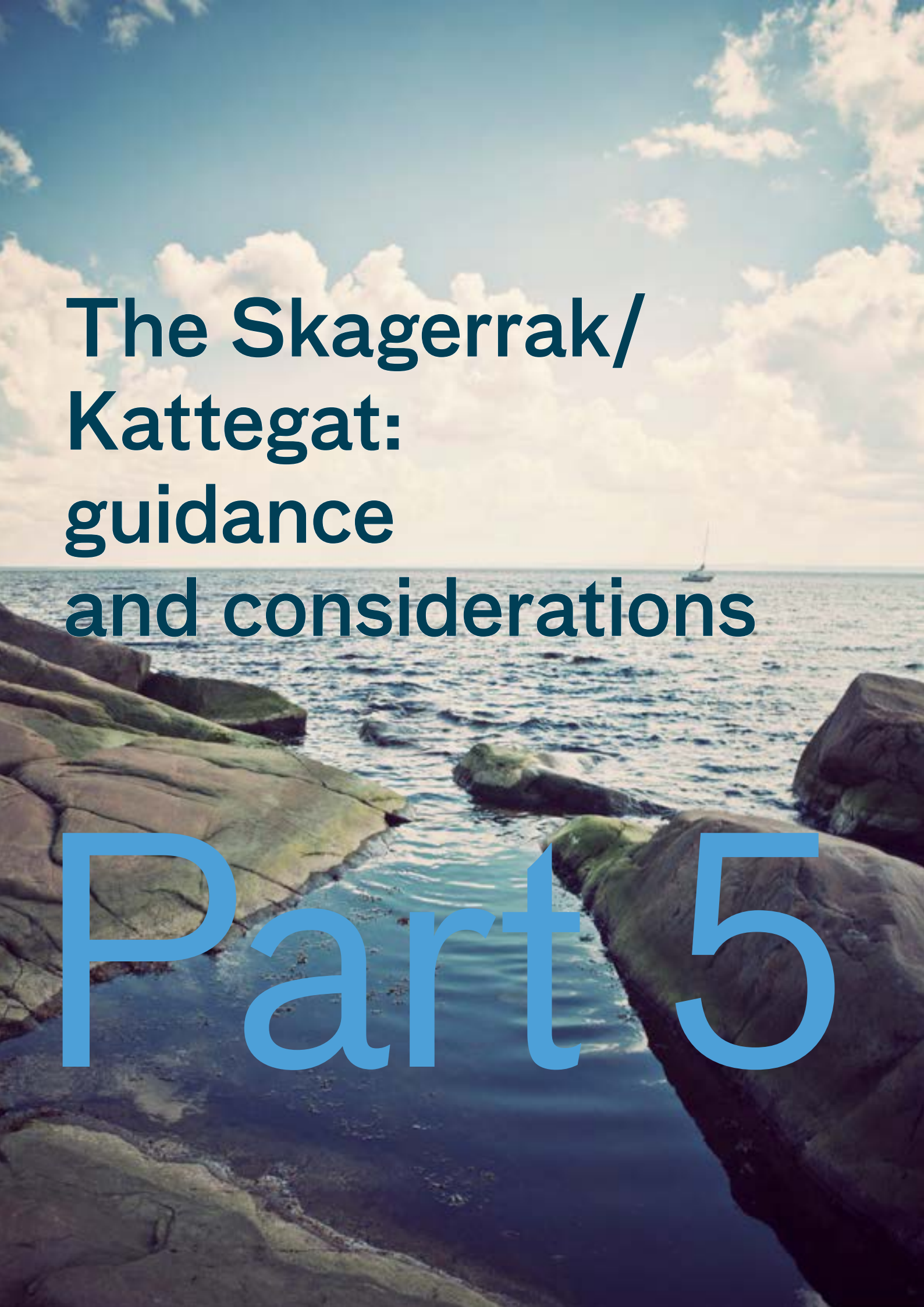
Bakgrundskarta © Lantmäteriet



The Skagerrak/ Kattegat: guidance and considerations

Part 5

11. Guidance and considerations for the marine areas in the Skagerrak/Kattegat

The chapter begins with a summary of the main features of the plan for the marine spatial planning area. The map of the marine spatial planning area is shown at a scale of 1:2,300,000 in full A4. This is followed by a presentation of the focus of use and considerations for the marine areas in the Skagerrak/Kattegat. Each marine area is represented by a section of the plan map at a scale of 1:1,000,000.

The plan map is to be interpreted at the approximate scale between 1:700,000 and 1:1,000,000. Boundaries and markings on the map are general, based on the strategic level of the marine spatial plans.

There are two marine areas in the Skagerrak/Kattegat:
- Skagerrak
- Kattegat.

Figure 18. The two marine areas in the Skagerrak/Kattegat. Numbering by map numbers.

Main features of planning

Business and people

There are many places within the Skagerrak/Kattegat marine spatial planning area with attractive living environments for people. Outdoor life activities and tourism are important along the entire coast. Commercial fishing is a big activity, for both fish and shellfish which are caught using various methods. Maritime traffic is considerable throughout the planning area, near the coast as well. A significant share of the traffic to and from the Baltic Sea makes its way through the Kattegat and Öresund, and there are several ports along the west coast that are very important for Sweden's foreign trade. Sweden's total defence has interests in the marine spatial planning area, including in the form of marine exercise areas. There are favourable conditions for renewable energy extraction by offshore wind power stations – suitable depths, good wind conditions and proximity to land.

While conditions for various activities are good, the state of the environment in the Skagerrak/Kattegat nonetheless needs to improve in order to achieve good environmental status.

Many of the activities function well together in the planning area, i e they coexist. This coexistence is regulated in many cases. It might be a matter of suspending areas during defence exercises, or of rules for how vessels, e g active fishing vessels, are allowed to navigate in channels that are part of traffic separation systems.

Commercial fishing, maritime shipping and wind power

Commercial fishing is geographically widespread and also changeable from year to year, as well as over the longer term. For that reason, the area specified for commercial fishing use in the marine spatial plan is extensive.

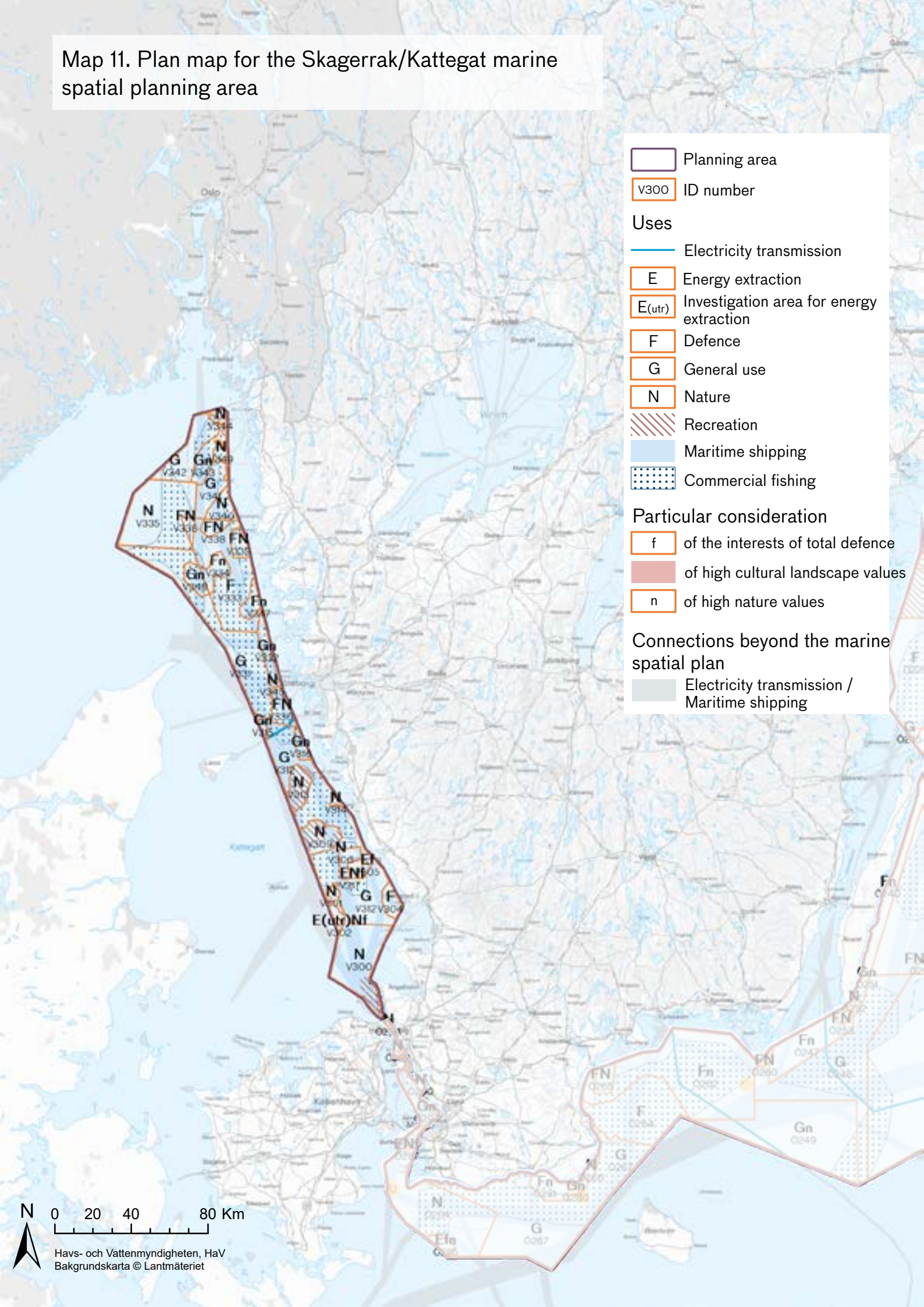
There are newly adopted traffic separations intended to make maritime traffic along the west coast safer; these are comprehended by the marine spatial plan's maritime shipping use.

Areas in the Skagerrak/Kattegat are proposed for energy extraction in order to contribute towards Sweden's goal of 100 per cent renewable electricity production by 2040. In the Skagerrak, the marine area's northern parts are comprehended by an inter-municipal coastal zone plan that identifies a development area for marine energy and food. This area is within the national marine spatial planning area (V341). The area is small in relation to the geographical scale of the plan map and therefore the use is not labelled on it.

High nature values and a subsea national park

There are large areas with high nature values in the marine spatial planning area, and many of these are nature reserves or Natura 2000 areas. In the Skagerrak there is also the Kosterhavet national park, where nature protection is mostly concerned with subaquatic environments. In addition to these, the marine spatial plan also specifies areas for particular consideration of high nature values.

Map 11. Plan map for the Skagerrak/Kattegat marine spatial planning area



The Kattegat

The Kattegat marine area (Södra Västerhavet in Swedish) comprises all of the Kattegat except for its northernmost part.

Electricity transmission

Electricity transmission use is made up of the two parallel transmission network cables Konti-Skan 1 and Konti-Skan 2, which extend from Lindome in Sweden to Vester Hassing on Jutland in Denmark. Two cable connections of 400 kV each running between Kristinelund in Sweden and Skibstrupsgård in Denmark – known as the Öresund cables – are on the boundary between the Kattegat and Baltic Sea marine spatial plans. They are presented in area Ö294 in the Öresund marine area in the Baltic Sea marine spatial plan.

Energy extraction and investigation area for energy extraction

There are favourable conditions for wind power in the marine area, with high wind speeds and offshore banks at a suitable depth. The national grid on land is well developed as the Ringhals nuclear power plant is located on the Halland coast.

The marine spatial plan specifies two areas for energy extraction use (V305, V317), and an area for investigation area for energy extraction (V302) in the Kattegat.

Most of an area west of Falkenberg (V305) is comprehended by an already licensed wind power project. There is a national interest claim for wind power stations here. In the part of area V305 not comprehended by the licensed project there is instead a public interest of substantial significance for wind power stations, and a small part of a larger national interest claim for commercial fishing. A possible future establishment of wind power is deemed capable of coexisting with the national interest claim for commercial fishing, provided the activities are adapted to each other. West of the area for the licensed project is an area where energy extraction is regarded as a public interest of substantial significance, which has been identified in the marine spatial planning process (V317). Area V317 also has a national interest claim for commercial fishing – spawning area. Nature use is specified in the area. Provided that the establishment of wind power does not markedly impair the fish spawning area national interest claim, coexistence is deemed possible in area V317.

Stora Middelgrund (V302) has a national interest claim for wind power stations as well as an ongoing project for energy extraction. It is also within a Natura 2000 area, which places special demands on energy extraction if coexistence is to be possible. A licence for a wind farm has been issued by the government, but the project does not have what is known as a Natura 2000 permit for establishment in the area. The area is therefore specified for investigation area for energy extraction.

In the event of energy extraction development in the Kattegat, particular consideration must be made of the interests of total defence. Having several wind farms constitutes a risk of total cumulative impacts on the interests of total

You can explore the areas on the Swedish Agency for Marine and Water Management's website, where you can search for more information about them. Search by name or ID number on the map. You can also view and compare various documentary evidence.

There is also information regarding the individual areas in the environmental impact report (Swedish Agency for Marine and Water Management, 2019c) and the sustainability report (Swedish Agency for Marine and Water Management, 2019b). The report *Natur i havsplaneringen* (Swedish Agency for Marine and Water Management, 2019d) presents information (in Swedish) about areas with particular consideration of high nature values.

Read more about uses in Part 2, Chapter 7 Guidance on most appropriate use and particular considerations, page 38

defence. This risk must be taken into consideration, which may imply limitations to the extent of development overall or in individual areas. In order for coexistence of different uses to be possible, installations of wind turbines need to be carried out in consideration of the Kattegat's high nature values and of local commercial fishing. Fishing that cannot be made compatible with energy extraction use can instead be carried out in surrounding areas. The offshore banks with the highest nature values according to an earlier inventory (Swedish Environmental Protection Agency, 2006) are exempt from energy extraction.

Defence

Outside Halmstad the marine spatial plan specifies defence use due to an influence area of the Ringenäs firing range (V304). The marine spatial plan also specifies particular consideration of the interests of total defence in three areas (V302, V305, V317).

Culture

The entire coastline is comprehended by the highly-developed coast national interest. There are areas with national interest claims for cultural landscape conservation along the coast outside of the marine spatial planning area. Core cultural heritage sites identified by the Swedish National Heritage Board are outside of the marine spatial planning area, which is why the plan map does not specify areas with particular consideration of high cultural landscape values. Consideration distances to the core sites need to be assessed from a local perspective, e g possible effects on cultural landscape values of energy extraction west of Falkenberg (V305, V317).

Nature

The marine spatial plan specifies nature use for a large area in the Kattegat (V300), which is comprehended by Natura 2000 and where creation of the Skånska Kattegatt nature reserve is in progress. Nature use is also specified for the offshore banks Röde bank (V301), Stora Middelgrund (V302), Morup bank (V306), Lilla Middelgrund (V309) and Fladen (V313), which all have high nature values and are Natura 2000 areas. The eastern parts of Lilla Middelgrund (V309) are comprehended by national interest claims for nature conservation, and the area around Morup bank has a national interest claim for commercial fishing – spawning area (V306, V317). Balgö outside Varberg (V314) is a Natura 2000 area.

On the offshore banks there are high values primarily for birds and porpoise, important spawning areas for fish, and valuable sea bed environments. The Swedish Environmental Protection Agency has identified the Fladen and Lilla Middelgrund offshore banks as particularly valuable (Swedish Environmental Protection Agency, 2006). The Swedish Agency for Marine and Water Management has been instructed by the government to engage with other affected EU member states in order to formulate a shared recommendation for preservation measures aimed at achieving the preservation goals in the Natura 2000 areas Fladen, Lilla Middelgrund, Stora Middelgrund, Röde bank and Morup bank.

The marine spatial plan specifies particular consideration of high nature values in two areas in the Kattegat (V315–V316). There are high nature values on the Danish side as well.

Recreation

The marine spatial plan specifies recreation use for some of the valuable offshore banks (V301–V302, V309, V312–V313) and an area in the south, towards Öresund (V300), which is comprehended by national interest claims for outdoor life. The offshore banks are also comprehended by Natura 2000, which may mean that certain limits have to be imposed for recreational fishing on the banks. With an adaptation of that kind, coexistence is judged to be possible. Outdoor life activities and recreational fishing are widespread, along the coast as well as on the offshore banks. There are important passages for leisure craft traffic between Sweden and Denmark, and across Läsö. Large parts of the coast, outside of the marine spatial planning area, are also comprehended by the mobile outdoor life national interest. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

The marine spatial plan specifies maritime shipping use for large parts of the Kattegat (V300–V302, V304–V306, V309, V312–V313, V315–V316), in lanes from north to south and in to the ports along the coasts, on both the Swedish and Danish sides. Maritime shipping use comprehends areas with national interest claims for maritime shipping, which includes areas with traffic separation systems required for safe shipping.

Maritime traffic is important and extensive since the route through the Kattegat is one of the few access routes into the Baltic Sea for large vessels. To the south, off Stora and Lilla Middelgrund, vessels choose between the route via Öresund or Stora Bält, both of which impose limits on the height and draught of the vessels. The Stora Bält Bridge limits their height.

The other route into the Baltic Sea is the Kiel Canal, which imposes limits on the width, length and draught of the vessels. In order to guarantee safe maritime shipping in the shallow waters of the Kattegat, traffic separation regulations were introduced from 1 July 2020. These new measures involve the creation of a traffic separation system for traffic north of Skagen as well as a new shipping route, closer to the Swedish coast, for the traffic between Skagen and Öresund.

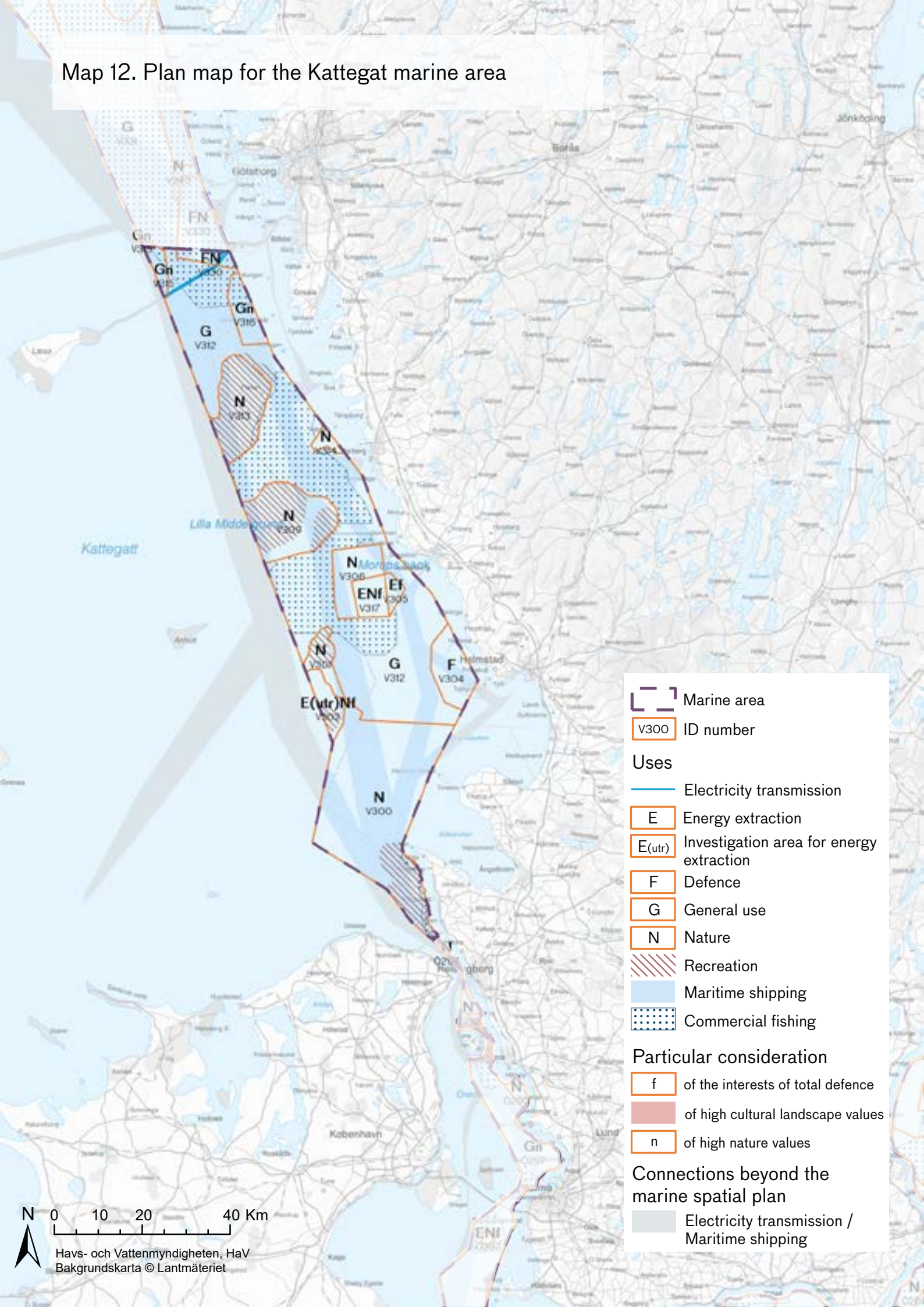
The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

Commercial fishing

The marine spatial plan specifies commercial fishing use in large parts of the Kattegat (V300, V305, V312–V313, V315–V316). Important spawning areas for cod in the central and southern Kattegat are comprehended by areas for which the marine spatial plan specifies nature use.

Commercial fishing is widespread in the Kattegat but also strictly regulated, which includes full and partial exclusion of both commercial and recreational

Map 12. Plan map for the Kattegat marine area



Havs- och Vattenmyndigheten, HaV
Bakgrundskarta © Lantmäteriet

fishing in an area in the south (large parts of V300). Fishing for Norway lobster and pelagic fishing are carried out in large parts of the marine area. Cages are used to a lesser extent to catch Norway lobster and lobster closer to the coast. Fishing with passive equipment is done to a varying degree throughout the marine area.

Table 10. Kattegat marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
V300	Nature Recreation Maritime shipping Commercial fishing	High cultural landscape values.		
V301	Nature Recreation Maritime shipping			
V302	Investigation area for energy extraction Nature Recreation Maritime shipping	Interests of total defence.	Energy extraction to be adapted to nature.	An activity or intervention which may significantly impact an area protected under Ch 7, Section 28 of the Environmental Code, i e Natura 2000, always requires a special licensing examination.
V304	Defence Maritime shipping			
V305	Energy extraction Maritime shipping Commercial fishing	Interests of total defence.		
V306	Nature Maritime shipping			
V309	Nature Recreation Maritime shipping			
V312	General use Recreation Maritime shipping Commercial fishing Electricity transmission			
V313	Nature Recreation Maritime shipping Commercial fishing			
V314	Nature			

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
V315	General use Maritime shipping Commercial fishing Electricity transmission	High nature values: Reef habitat, fish spawning and mammal area with a particularly high environmental impact		
V316	General use Maritime shipping Commercial fishing	High nature values: Fish spawning and mammal area.		
V317	Energy extraction Nature	Interests of total defence.	Energy extraction to be adapted to nature (fish spawning area).	

Area V330 is presented in the table the Skagerrak.

The Skagerrak

The Skagerrak marine area comprises the Skagerrak and the northernmost part of the Kattegat.

Defence

The marine spatial plan specifies defence use for the Skagen marine exercise area, which extends from Sotenäs in the north to Tjörn in the south, out across the entirety of the territorial waters and in the exclusive economic zone (V333–V334, V336, V338–V339, V347). Farther south, almost entirely within Gothenburg municipality, is the Känsö marine exercise area, where the marine spatial plan also specifies defence use (V330).

Culture

The coast along the southern Skagerrak is comprehended by the highly-developed coast national interest. The northern coastline is comprehended by the unbroken coastline national interest. There are areas with national interest claims for cultural landscape conservation along the coast outside of the marine spatial planning area, including a large area around the southern Gothenburg archipelago. Core cultural heritage sites identified by the Swedish National Heritage Board are outside of the marine spatial planning area, which is why the plan map does not specify areas with particular consideration of high cultural landscape values. Consideration distances to the core sites need to be assessed from a local perspective.

Nature

The marine spatial plan specifies nature use in many parts of the marine area. Bratten, in the west, is a large area comprehended by Natura 2000 (V335–V336).

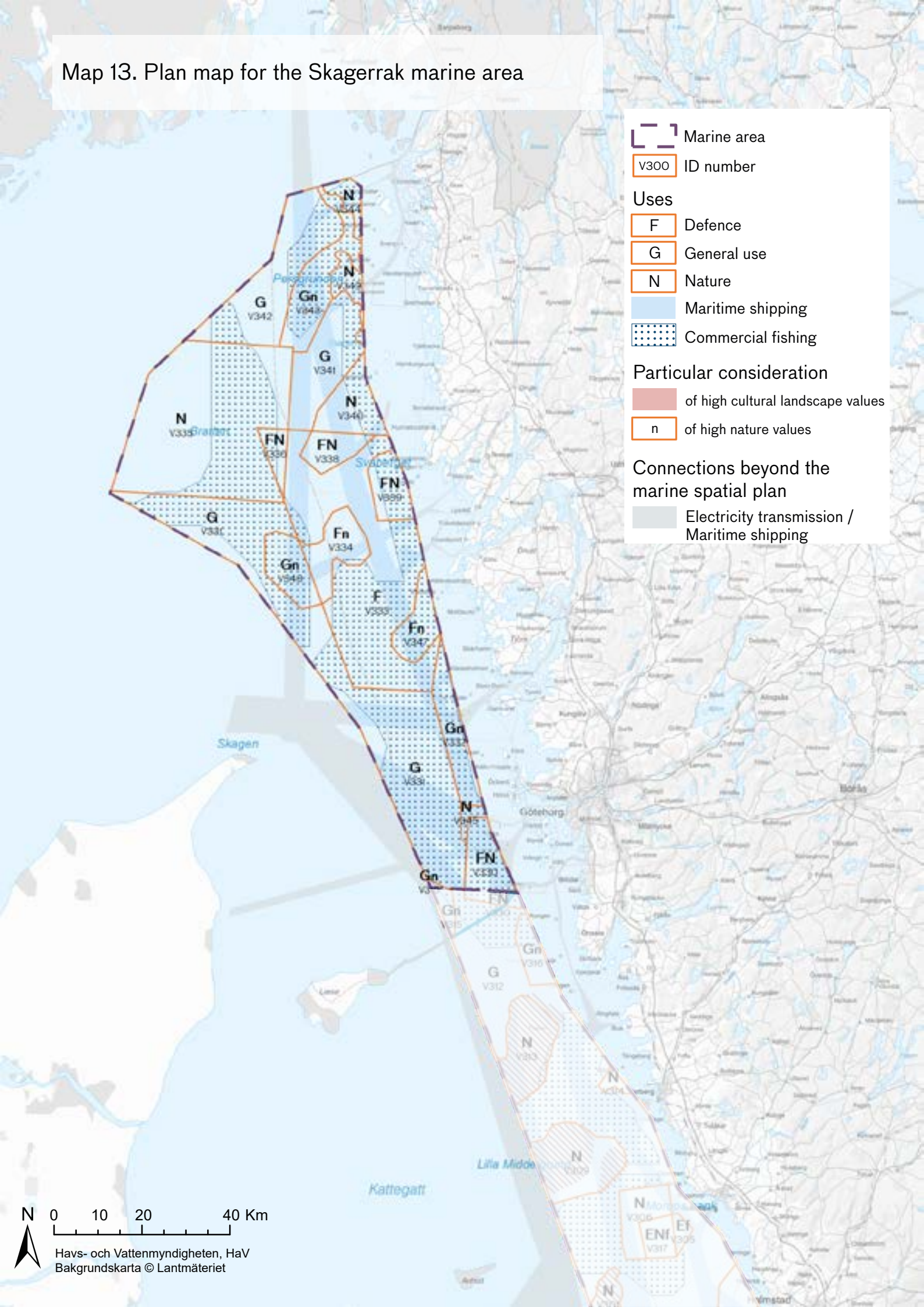
Around the Koster islands nature use is specified at Strömstad (V344) and Tanum (V349), where there is a national park, a nature reserve and Natura 2000. The marine spatial plan also specifies nature use for several areas where there is currently no area protection, but where such protection is planned. Around the Väder islands and Svaberg shallows (V338–V340), and outside the southern Gothenburg archipelago (V330, V345) preliminary studies for the establishment of marine nature reserves have been initiated due to the high values of rare sea bed environments.

In several areas particular consideration must be made of high nature values (V332, V334, V343, V347–V348).

Recreation

Outdoor life and leisure maritime activities are widespread throughout the marine area, and leisure craft traffic often goes to and from Norway and Denmark. The Bohus coast archipelago has many visitors and extensive tourism, and there are many natural harbours and marinas. The coast beyond the marine spatial planning area, in the northern Skagerrak to north of Lysekil, is comprehended by the mobile outdoor life national interest.

Map 13. Plan map for the Skagerrak marine area



The entire coastline outside of the marine spatial planning area is comprehended by national interest claims for outdoor life. Possibilities of coexistence with other uses, and consideration distances, need to be assessed from a local perspective.

Maritime shipping

The marine spatial plan specifies maritime shipping use for large parts of the marine area (V330–V334, V338–V345, V347–V349), with several shipping routes from Oslo to the Kattegat, as well as in towards the coast and out past Skagen towards the North Sea.

Routes from the Baltic Sea extend through the Skagerrak out into the North Sea and further into the oceans. Sweden also has routes to Denmark and Norway. Sweden's two biggest ports are in Gothenburg and Lysekil. To guarantee safe shipping, new traffic separation regulations are applied from Skagen.

Off North Bohuslän, a joint comprehensive plan specifies an area for activities between the two branches of a forked shipping route (V341). Consideration of maritime safety issues is important in any establishment of activities in the area. The area is specified for general use in the marine spatial plan.

The plan map presents the most important maritime shipping routes, not the total need for space of maritime shipping.

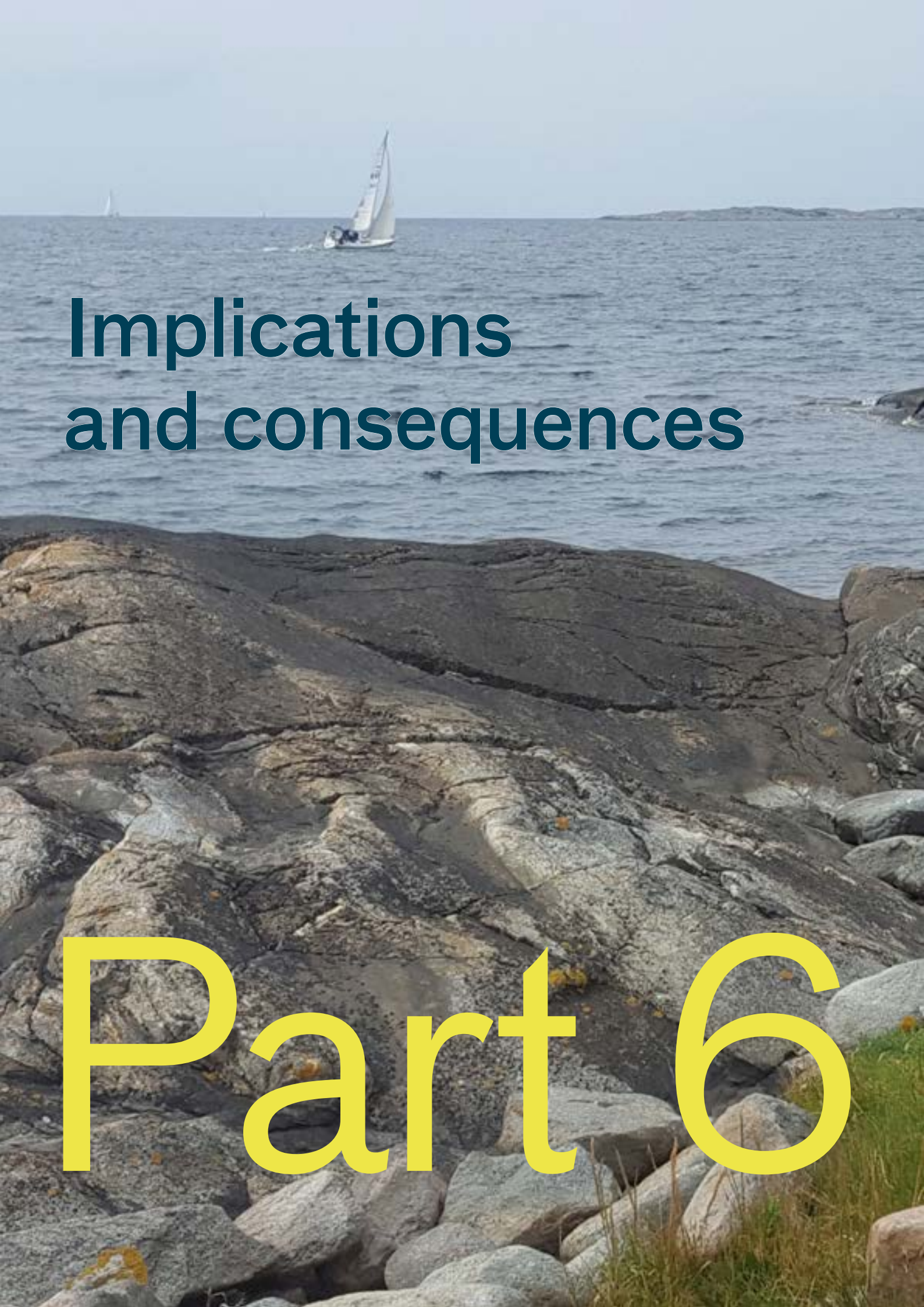
Commercial fishing

Commercial fishing is widespread in the Skagerrak, and is specified as a use in much of the marine area (V330–V336, V338–V345, V347–V349). Shrimp fishing is extensively practised in the northern part of the area. Fishing for Norway lobster occurs throughout the marine area, except in the westernmost part. Shellfish have relatively low geographical mobility, which makes the fishing areas more stable than for other types of fishing. Closer to the coast there is cage fishing for Norway lobster. Fishing with passive equipment occurs to a varying extent throughout the marine area, but somewhat more intensively in the south. Pelagic fishing is carried out from Sotenäs southwards.

To the west (23–38 nautical miles) of the island of Måseskär is a dumping site with 28 vessels containing chemical weapons of unknown extent. The marine spatial plan's guidance is that commercial fishing is not an appropriate use at this dumping site. Environmentally hazardous substances have leaked into the marine environment, while at the same time there is active trawling in the vicinity of the wrecks. Trawls and otter trawls that come into contact with the seabed rake up sediment and spread the substances over a large geographical area. Data from studies show that degradation products from chemical weapons can be found in fish for food and crustaceans in the area. Commercial fishing should therefore not be carried out in the immediate area. The area is geographically small in relation to the geographical scale of the plan map and is therefore not labelled on it.

Table 11. Skagerrak marine area

Area	Uses	Particular consideration	Precedence or special adaptation for coexistence	Reason for precedence
V330	Defence Nature Maritime shipping Commercial fishing Electricity transmission	High cultural landscape values.		
V331	General use Maritime shipping Commercial fishing			
V332	General use Maritime shipping Commercial fishing	High nature values: Reef habitat, fish spawning and mammal area.		
V333	Defence Maritime shipping Commercial fishing			
V334	Defence Maritime shipping Commercial fishing	High nature values: Fish spawning and mammal area.		
V335	Nature Commercial fishing			
V336	Defence Nature Commercial fishing			
V338	Defence Nature Maritime shipping Commercial fishing			
V339	Defence Nature Maritime shipping Commercial fishing			
V340	Nature Maritime shipping Commercial fishing	High cultural landscape values.		



Implications and consequences

Part 6

12. Implications of the marine spatial plans

New unified national planning

Spatial planning means that society's various goals have to be integrated into a sustainable whole, where the spatial context is made visible and determined in a planning document. A plan has to provide stability in the form of predictability about future use, at the same time as it has to allow for flexibility in managing changes to external factors and the development of new technology. National marine spatial planning is a new form of spatial planning in Sweden, in which a unified perspective has to take ongoing sector planning and management into account. Conflicts between aims are highlighted when different societal goals are given spatial expression. Marine spatial planning is a part of overall spatial planning, where activities in the sea can reduce competition over space and the use of resources on land.

Marine spatial planning differs in some ways from spatial planning on land, with respect to the flow and dynamics of use and in relation to claims and different planning levels – from the local perspective to the international. During this initial process of national marine spatial planning, the presentation has been conceived such that the marine spatial plans' guidance is provided at the appropriate level. The descriptions of designations for use and consideration in the marine spatial plans are an example of this. Marine spatial plans provide guidance about which functions and values need to be preserved and developed, so that guidance for government agencies and operators offers flexibility in relation to changed circumstances in the future. While marine spatial plans specify what use and which functions should take precedence in a given area, management and interventions can be adapted in the future.

Different planning levels

National marine spatial planning is comprehensive and operates at a synoptic level; municipal spatial planning provides more detailed planning near land and along the coast. Many activities take place precisely in the coastal zone that is included in municipal and regional planning but not in national marine spatial planning. Municipalities and regions have considerable possibilities in planning future local and regional development, including in the large areas that marine spatial plans specify for general use. There is also a potential for joint further development of planning between the municipal, regional and national levels in order to strengthen the land-sea perspective.

Sweden also cooperates with neighbouring countries in national marine spatial planning. This international cooperation will be further developed in future marine spatial planning cycles, e g in method development, joint evidence and documentation for planning, and in following up marine spatial plans.

Coexistence

In many respects, marine spatial plans give precedence to uses already going on in the sea. The coexistence of different activities in the same place may be regulated and already established, but more developed management is needed in order to give additional activities space and to ensure that the values that should be preserved are maintained and developed.

Use of the sea

Development of ongoing activities

Marine spatial plans provide good conditions for future development and growth in international trade, and increasing transportation of goods and people by sea, both between countries around the Baltic Sea and to and from ports beyond the Baltic. In this way marine spatial plans contribute to achieving the Baltic Sea Strategy goal of increasing prosperity and connecting the Baltic region, but also to transport policy goals for shifting transports from roads to maritime shipping and railways. Maritime shipping use has also been adapted to ongoing planning of maritime shipping and offshore wind power in Sweden's neighbouring countries. The marine spatial plan for the Baltic Sea implies that the maritime traffic and shipping routes around Gotland are analysed on the premise that the environmental impact of maritime shipping needs to be reduced, in particular adverse impacts on bird and porpoise populations, while at the same time providing an efficient, climate smart and safe traffic system.

Marine spatial plans address the societal goals for continued and developed commercial fishing by specifying precedence for commercial fishing in the most important fishing grounds. In general, commercial fishing coexists well with other activities, e g maritime shipping and the Swedish Armed Forces' exercise activity. If wind power becomes established in an area, commercial fishing may be affected in specific places, but commercial fishing as a whole will not be much affected. By specifying areas for nature use and for particular consideration of high nature values, marine spatial plans provide conditions for sustainable fish stocks that offer scope for future development of commercial fishing.

Both maritime shipping and commercial fishing are mobile activities that use large areas. For maritime shipping, the plan maps show shipping routes which are of particular importance for the maintenance of the transport function. In reality, maritime traffic can use all areas that do not have explicit restrictions, which is also a prerequisite of making the indicated lanes limited in terms of geographic space. Thus maritime vessel traffic of very considerable importance for Sweden both may and does occur outside of the lanes marked for maritime shipping on the plan maps.

For fishing, the plan maps show important fishing grounds. However, fishing can still continue in other areas as well under the current fisheries regulation. In the event of future claims from other activities, the exact location and use need to be analysed in a more detailed plan. Tradeoffs need to be made on the assumption that the fishing and maritime shipping functions are to be maintained.

Good conditions for defence and security are reflected in marine spatial plans partly through giving defence and security due weight in tradeoffs between interests, and partly through defence use which includes marine exercise areas as well as the influence areas required for facilities on land. Security is a prerequisite of the development of society, for the environment and business as well as social welfare.

Renewable energy

Energy extraction is a relatively new use of the sea that makes specific demands on marine spatial planning. There are good technical conditions for offshore wind power in Sweden's marine areas, and the southern part of the country has an electricity production deficit. However, opposing interests mean that the full potential of offshore wind power cannot be realised. In the Gulf of Bothnia, principally in the South Bothnian Sea, the national process has identified several new areas appropriate for energy extraction. There is also a small number of new energy areas in the other marine spatial planning areas. The fact that marine spatial plans specify particular consideration of the interests of total defence contributes to the possibility of proposing new energy areas.

Under current circumstances, establishment of wind power has been judged incompatible with the interests of total defence for a number of potential areas for offshore wind power, particularly in the Baltic Sea marine spatial planning area. The national scale of marine spatial planning has highlighted the conflict of aims between energy and defence interests. In continued marine spatial planning the goal should be for additional areas for offshore wind power to be identified, which would contribute to achieving the energy agreement's goal of 100 per cent renewable electricity production by 2040.

Since marine spatial plans are intended as guidance and are based on overall considerations, they do not amount to a guarantee that all the areas fort energy extraction in the plans will be possible to develop. The fact that the plans specify precedence provides the means for future decisions. In later licensing processes, energy projects will be examined against the functions and values to be maintained, including Natura 2000 areas. Adaptation requirements will then be imposed in relation to local circumstances and planned activities, among other things.

The areas specified for energy extraction in the marine spatial plans would allow for a total of between approximately 23 TWh and 31 TWh in annual electricity production, depending on how large a share of the areas it will be possible to use in consideration of nature conservation, defence, cultural landscapes, and other interests. Wind conditions, the technology installed, and the design of wind farms are also factors. Estimates have assumed 33 to 50 per cent utilisation of areas that currently lack licences, and have also considered existing wind farms as well as areas where licences have been granted for construction of wind power stations.

There are several cable links for electricity transmission between Sweden and neighbouring countries. The transmission network is labelled as electricity transmission use in the marine spatial plan. Further links are planned in order to increase the integration of Swedish and European networks.

Materials supply

The marine spatial plan provides guidance on sand extraction use in four areas, of which three have not previously had sand extraction. Extraction of marine sand contributes to meeting society's needs for sand for construction, as well as for beach replenishment as part of climate adaptation. Materials supply from Swedish marine areas is an alternative to imports from other countries. The areas identified are those that are judged to be most appropriate with

respect to nature values, biological and geological factors, technical characteristics and sediment dynamics. On the plan map the areas are marked with dots to indicate that the precise extent should be determined in a licensing examination. Planning evidence describes the precautions required in order for extraction operations to be carried out with minimised negative effects.

Cultural heritage and recreation values

The cultural heritage considered in marine spatial planning consists of cultural heritage remains in the sea and cultural landscapes along the coast. The marine spatial plans highlight the risk of direct as well as indirect effects. The marine spatial plans specify that particular consideration must be made of high cultural landscape values in the coastal zone, but precise areas cannot be specified at the overall scale of the plans. In the next round of marine spatial planning, both remains in the sea and cultural landscapes may occasion further guidance in the marine spatial plans based on improved evidence and documentation. Consolidated planning evidence is also needed for recreation, detailing how use of the sea interacts with local values and what the significance of these is in national marine spatial planning. From the land-sea perspective there is a need to highlight the social values that culture and recreation offer in the form of health and well-being.

Reinforcement of ecosystem services

A marine spatial plan is one of several components of marine and water management intended to contribute to the achievement of the goal of good environmental status in the sea. From an overall perspective this is about making tradeoffs between interests in order to ensure the conditions for ecosystem services from the sea that we humans need. Employment and development in various industries are dependent on the sea's ecosystem services, such as food and oxygen, to a considerable degree.

Marine spatial plans provide guidance on areas with nature use, bringing together existing and planned area protections, national interest claims for nature conservation, and national interest claims for commercial fishing (with respect to spawning and nursery areas).

The plans' guidance also includes a new way of promoting the development of valuable ecosystem services, as a supplement to established forms of nature protection, for the benefit of many interests. By means of guidance on particular consideration of high nature values, the plans highlight those nature values that all marine management and activities need to consider, not least in view of the need for resilience in ongoing climate change.

Guidance on particular consideration concerns planning and licensing examinations, but is also directed towards the development of marine management. The specified areas are intended as a basis for management, so that affected agencies together with affected sectors can work further on the indicated areas to see whether specific measures need to be taken in order for particular consideration to be made of the high nature values. The intention is also to guide stakeholders in planning operations and activities in time and space, and with the possibility of adapting to changed circumstances, so that they will be able to contribute to the sea's ecosystem services within their own remit .

13. Consequences of the marine spatial planning proposals

A description of the expected consequences of the marine spatial plans is a significant part of the decision guidance. The Environmental Code and the Maritime Spatial Planning Ordinance specify requirements for the contents and presentation of impact assessment. Chapter 4 in Part 1 describes the process of impact assessments, and this chapter gives a general description of the results of the impact assessment carried out. The chapter includes considerations and results of the Swedish Agency for Marine and Water Management's environmental impact report and sustainability analysis, as well as the agency's assessment of how the plans will contribute to achieving the planning goals, the environmental quality objectives, and the global sustainable development goals.

Considerations

Planning and impact assessment were carried out in tandem and systematically, based on extensive evidence and documentation. Assessment of the impacts of marine spatial plans developed in several stages during the planning process. Impact assessments assume that the plans' guidance is followed to the maximum level, i e that things turn out exactly as the plans specify. This is despite the fact that it is a relatively unrealistic prospect that all the uses as stated in the plans will become realised within the current time horizon.

Under the Environmental Code, the scope of environmental impact reports must be reasonable in view of assessment methods, current knowledge, the content and level of detail of the plan, as well as of where in the decision-making process the plan is. Marine spatial planning is a new national form of planning at an overall strategic level, and environmental assessment of the plans has been adapted accordingly. Each establishment of an activity will be preceded by an environmental examination, and in some cases a Natura 2000 examination, which will address specific circumstances and conditions. This means that more detailed, specific environmental assessments will be carried out at the local level.

Environmental assessment = the process in which the plan's environmental effects are assessed

Environmental impact report (MKB) = the document in which the results of the environmental assessment are compiled

Sustainability assessment = the process in which the plan's sustainability effects are assessed

Sustainability report = the document in which the results of the sustainability assessment are compiled

Sustainability assessment and environmental assessment

A detailed description of the results of the impact assessment process is available in the reports produced – sustainability and environmental impact reports. Socioeconomic impact analyses of the consultation proposals were carried out earlier for the Baltic Sea (the review stage), Gävle Bay in the Gulf of Bothnia (the consultation stage) and southern Kattegat in the Skagerrak/Kattegat (the consultation stage).

Impacts of the marine spatial planning proposals are assessed in relation to the zero alternative, which specifies the expected development within different sectors until 2030 and the expected future change to the current state of the environment if there were no marine spatial plans. The zero alternative is described in the separate impact reports.

Read more in the reports of the impact assessments on the Swedish Agency for Marine and Water Management website.

Consequences of the marine spatial planning proposals are assessed at the end of the chapter in relation to the planning goals, environmental quality objectives and the global sustainable development goals.

Conclusions of the environmental assessment

The environmental impact report produced by the Swedish Agency for Marine and Water Management assesses the effects on the environment, based on relevant environmental aspects laid down in the Environmental Code: population and health, natural and cultural landscapes, marine ecology and sea bed environments, climate and air, and management. The results are presented in *Environmental impact report of marine spatial plans for the Gulf of Bothnia, the Baltic Sea and Skagerrak/Kattegat* (Swedish Agency for Marine and Water Management, 2019c). Below is a general summary of the agency's assessments.

Geographical scale of effects

Local scale = within a marine area

Regional scale = within a marine spatial planning area

Duration of effects

Reversible in the short term = effects during a maximum of 2 years

Reversible in the medium term = effects during 2 to 5 years

Reversible in the long term = effects during a period of more than 5 years

Irreversible effects = effects of permanent duration

Environmental impact report

Population and health

The environmental impact report estimates that the marine spatial plans could imply some limitations to outdoor life in energy areas, and that the visual impact of wind turbines on the landscape could affect cultural ecosystem services. Preservation of nature values is significant for the population and health aspects. The assessment is that the marine spatial plans will contribute some positive effect through their guidance on consideration of high nature values and nature use. The overall assessment is that the marine spatial plans as a whole will not give rise to significant impacts for the population and health aspects.

Natural and cultural landscapes

The environmental impact report notes that guidance on particular consideration of cultural landscape values, as well as culture use (the Gulf of Bothnia) and recreation use, will have a positive environmental effect on the landscape aspect. Preservation of cultural landscapes can be promoted by improved nature management in marine protected areas. In this way, areas where the marine spatial plans provide guidance on nature use and particular consideration of high nature values can also bring positive effects for cultural landscapes, primarily on the basis of assumptions about reduced risks of disturbance of cultural heritage remains in the sea.

Cultural landscapes may be negatively impacted by energy extraction use and by other uses that imply physical disruption of the sea bed – sand extraction, trawling and netting near the bottom, and recreational activities primarily in shallower areas. However, for the areas where the marine spatial plans provide guidance for these uses, impacts and environmental effects are estimated to be low. In the South Bothnian Sea and the southern Skagerrak/Kattegat energy extraction is estimated to cause a moderately adverse effect on the landscape aspect.

Marine ecology and sea bed environments

The impacts identified for marine ecology and sea bed environments are principally connected, in relation to the zero alternative, with the energy

extraction and sand extraction uses. For marine ecology and sea bed environments, impacts and effects are related to a geographical scale in which "local" refers to effects within a marine area and "regional" refers to impacts within a marine spatial planning area. For the duration of temporary negative effects, "reversible in the short term" refers to a period of up to two years, "reversible in the medium term" to a period of two to five years, and "reversible in the long term" to a period of more than five years.

For the Gulf of Bothnia, the environmental impact report states that the marine spatial plan is estimated to have some negative effects on marine ecology, including sea bed environments, as a result of energy areas and the sand extraction area. For wind farms, this applies above all to local effects during the installation phase, with disruptions that are estimated to be reversible in the medium term. Water quality will also be affected in and close to the proposed sand extraction area, and in the installation of wind power, but that effect is estimated to be reversible in the short term. Development of wind power is estimated potentially to impact wintering birds and coastal birds adversely. The impact on birds is local, but also has international relevance due to possible effects on migratory birds. The effect is regarded as irreversible, and a number of wind farms in the same marine area could have a total cumulative effect. In the Bothnian Bay sand extraction is estimated to cause minor adverse effects on ringed seal and on sea bed environments. This impact is local but may have cross-border significance for the populations.

For the Baltic Sea, the environmental impact report states that the marine spatial plan's guidance on particular consideration of high nature values is estimated to lead to a reduced impact from fishing in particular, due to reduced sea bed disruption and smaller by-catches. This gives some positive effects for sea bed habitats, plants, fish, Baltic and Belt Sea populations of harbour porpoise, as well as for grey seal, coastal birds and wintering birds. An expected reduction in trawling may also have some positive effects on water quality due to local reductions in turbidity, but these effects are variable and relatively minor. However, sand extraction and installation of wind farms are estimated to have low to moderate local adverse effects for marine ecology and for sea bed environments. They are estimated to be reversible in the short to the long term, depending on the species and the type of sea bed environment. Planned energy extraction on the South Midsjö bank is estimated to cause some disruption during the installation phase, but no long term adverse changes to the sea bed characteristics for the area as a whole. Due to increased turbidity, negative effects for fish as a result of disruptions to sea bed environments affect pelagic species as well as benthic species. However, these effects are estimated to be relatively minor, of brief duration and reversible, and thus estimated not to impact stocks adversely. Sand extraction areas are also estimated potentially to impact spawning areas for species including cod in the southwest Baltic Sea. Some effects on marine ecology, positive as well as adverse, are relevant for the coastal zone and also of regional and international relevance in those cases where they affect populations that move across large areas. Wind power in the South Midsjö bank is estimated to impact birds adversely, with a local impact but an international effect on the wintering population in Swedish waters. That

Benthic species = species that live near the sea bed, e g cod

Pelagic species = species that live in open waters, e g herring

Table 12. Total environmental impacts

	Gulf of Bothnia	Baltic Sea	Skagerrak/ Kattegat
Environmental aspect	**Degree of impact**	**Degree of impact**	**Degree of impact**
Plankton	Marginally negative	No impact	Marginally positive
Fish, including spawning	Marginally negative	No impact	Somewhat positive
Mammals	Somewhat negative	Marginally positive	Marginally positive
Birds	Moderately negative	Moderately negative	Marginally negative
Sea bed environments	Marginally negative	No impact	Moderately positive
Water	Marginally negative	No impact	No impact
Cultural landscapes	Marginally negative	No impact	No impact
Landscapes	Somewhat negative	Somewhat positive	Somewhat negative
Air	Marginally negative	No impact	No impact
Climate	Moderately positive	Somewhat positive	Marginally positive
Population & health	No impact	No impact	Marginally positive

effect is expected to be irreversible. Establishment of offshore wind power by the South Midsjö bank risks disrupting, during the installation phase, the noise-sensitive and threatened Baltic population of harbour porpoise.

The marine spatial plan for the Baltic Sea includes areas for possible use by maritime traffic and shipping routes around Gotland. The environmental impact report presents an assessment of the differences in environmental effects of maritime traffic in the areas around the Hoburg bank and Salvorev, with current shipping routes and rerouted maritime traffic respectively. The analysed impacts here are underwater noise and oil discharges. For rerouted maritime traffic by the Hoburg bank, the analysis indicates some positive environmental effects for wintering seabirds and pelagic species. Underwater noise would be reduced if maritime traffic passed through a deeper area where a greater proportion of the sea bed is soft and thus reflects the noise less. A reduced adverse effect would also be achieved if maritime traffic plied areas with lower nature values. For Salvorev, the analysis indicates some positive local effects, primarily for fish and birds.

For the Skagerrak/Kattegat, the environmental impact report states that the marine spatial plan is estimated to have some positive effects on marine ecology, including for fish species, fish spawning areas and sea bed environments. In the Skagerrak this also applies to the North Sea population of harbour porpoise and

to harbour seal. The Kattegat is an important area for the Belt Sea population of harbour porpoise. The marine spatial plan is estimated to have a minor adverse impact during the construction of offshore wind turbines, but no lasting adverse effects for the porpoise population. One of the causes of positive effects is the assumption about reduced bottom trawling in areas with guidance on particular consideration of high nature values. Trawl fishing that causes less physical disturbance of the sea bed, may have a positive effect locally. Wind power installation in the Kattegat is estimated to have a minor negative effect on seabirds. This is a local impact which also relates to the coastal zone, but because of a possible adverse effect on migratory birds it has international relevance as well. There is a risk of cumulative effects if several wind farms are installed in the area. This effect is estimated to be irreversible, assuming that licences are renewed.

Climate and air

The additional production of renewable electricity that is an expected result of the marine spatial plans brings a climate benefit in the form of reduced emissions of greenhouse gases, if it replaces electricity from sources with higher emissions. In an international comparison, electricity production in Sweden is associated with very low emissions of greenhouse gases due to its large share of hydroelectric and nuclear power production. Wind power is nonetheless assumed to have the potential to contribute to a net effect for the reduction of carbon dioxide. A relatively large addition of renewable electricity is made possible by energy areas in the proposed marine spatial plans. Even a limited scenario, in which wind power only replaces electricity from the Nordic power market, indicates significant emissions reductions.

Maritime traffic for maintenance and transportation in energy and sand extraction may have a local adverse effect on air quality. These effects are marginal, however, and the environmental impact report therefore does not estimate any significant impact on air quality of the guidance in the marine spatial plans.

Management

The environmental impact report states that marine spatial plans are estimated to bring a cumulative positive impact on the management aspect, which comprises land, water and the physical environment as well as materials, raw materials and energy. This assessment is based partly on the fact that the marine spatial plans promote coexistence of different uses and administrative coordination. Sand extraction contributes a much-demanded material of high quality, meaning it can reduce the need for imports as well as for some extraction of the material from land-based sources. It will be possible to minimise the adverse effects of extraction operations by complying with the requirements imposed in the environmental examination. Marine energy extraction contributes energy from a renewable resource and reduces the need for making the same use of land areas.

Good environmental status

The environmental assessment includes a qualitative analysis of the marine spatial plans' contribution towards achieving good environmental status in

Swedish waters for relevant assessment criteria under the Marine Environment Directive, and those criteria in the Water Framework Directive which have a connection with the marine environment, as well as for environmental quality standards for the North Sea and the Baltic Sea. The overall assessment indicates low effects, adverse as well as positive, as a result of the marine spatial plans. Sand and energy extraction are estimated primarily to have local adverse effects, because the sea bed environments are geographically limited, and small in relation to the marine spatial planning areas as a whole. The installation of offshore wind power may have a moderately negative effect on wintering seabirds and Baltic Sea harbour porpoise, albeit with a potentially cross-border significance. Based on the current state of knowledge and most other influencing factors, it is not possible to predict, for all species, the effects at the population level of the changes brought by the marine spatial plans. More detailed analyses will be required in licensing examinations for offshore wind power operations. The marine spatial plans are estimated to make positive contributions to the goal of good environmental status by means of guidance for nature use and particular consideration of high nature values.

Conclusions of the sustainability assessment

The purpose of the sustainability assessment presented in the sustainability report is to assess to what extent the plans contribute to long-term sustainable development. The results are presented in *Sustainability report for marine spatial plans for the Gulf of Bothnia, the Baltic Sea and the Skagerrak/Kattegat* (Swedish Agency for Marine and Water Management, 2019b). Below is a general summary.

Sustainability report

The sustainability assessment is carried out using a multi-criteria analysis that sets out from three dimensions of sustainability – economic, ecological and social – with a number of selected criteria for each dimension. Potential effects on society and businesses are analysed, including their connections to impacts on ecosystem services. The sustainability assessment includes elements of socioeconomic analysis, in the form of analyses of different costs and benefits for the sectors/interests that the plans are estimated to impact. The socioeconomic impact analyses carried out before the consultation and review stages form the basis of these analyses. The assessment of impacts on ecosystem services was made jointly for the sustainability and environmental impact reports.

Read more in Part 7, Chapter 17
Ecosystem services, page 167.

Economic sustainability

Regarding economic aspects, the sustainability assessment shows that the marine spatial plans will primarily impact interests within energy extraction, sand extraction, marine recreation and commercial fishing. This is largely a result of the marine spatial plans' guidance on increased space for energy extraction and sand extraction. Positive economic effects are primarily connected with energy extraction use, which is extensive in the marine spatial plan for the Gulf of Bothnia. Guidance for sand extraction in the plans for the Baltic Sea and the Gulf of Bothnia is also expected to make

positive contributions from an economic perspective. For recreation and commercial fishing, both positive and adverse economic effects are noted. Areas for energy extraction may imply negative effects for permanent residents as well as visitors due to visual impacts on the landscape aspect and accessibility in the marine areas. This is most likely to impact the Gulf of Bothnia and the Skagerrak/Kattegat, where areas for energy extraction are located nearer land (Ek, Bäckström & Pettersson, 2017).

The marine spatial plans' guidance on particular consideration of high nature values is estimated overall to be able to strengthen supporting ecosystem services, and may in the longer term contribute to sustainable fishery as well as benefitting recreation and the tourism industry. When followed, however, guidance on particular consideration of high nature values in commercial fishing may initially imply certain cost increases related to adaptations. Such cost effects also risk impacting operations within processing of fish and shellfish, and in wholesale and retail trading.

The Gulf of Bothnia

The marine spatial plan's contribution is primarily positive regarding economic sustainability in the Gulf of Bothnia, due to its guidance on energy extraction in several areas and sand extraction in one area. Even if profitability in offshore energy extraction is low at present, the future potential is estimated to be high as the demand for renewable energy is expected to rise while non-renewable power production is to be phased out in accordance with policy objectives. The planning proposal's guidance on sand extraction at the Svalan and Falken shallows is estimated to create favourable conditions for extraction operations. However, energy and sand extraction use are estimated potentially to bring some adverse economic effects as a result of increased pressure on ecosystem services significant for recreation and commercial fishing.

The planning proposal is estimated to bring a positive effect for the environment, compared with the zero alternative. This result can be explained by a relatively large positive climate effect as a result of the plan's guidance on energy extraction. The plan's guidance on maritime shipping in the South Bothnian Sea will also make a positive contribution as maritime traffic will be led farther away from shallows with high nature values. However, sand extraction and wind power installations are estimated to lead to some negative environmental effects.

A positive effect in social sustainability is linked to expected employment effects in the wind power industry, as a result of the guidance on energy extraction. At the same time, this may cause negative effects with regard to social aspects such as accessibility and cultural landscapes, which weighs on the overall assessment.

The Baltic Sea

The marine spatial plan's guidance on particular consideration of high nature values is expected to strengthen supporting ecosystem services and contribute to economic sustainability. The sustainability report estimates that the economic sustainability of the planning proposal is good, which is also attributable to the guidance on energy extraction at the South Midsjö bank,

and on sand extraction. The future potential of wind power is judged to be high due to an expected increase in the demand for renewable electricity. The planning proposal's guidance on sand extraction off the coast of Skåne and in the Bight of Hanö is estimated to contribute to positive economic effects. However, guidance on energy and sand extraction is estimated potentially to bring negative economic effects as a result of increased pressure on ecosystem services significant for commercial fishing and recreation.

The plan's guidance on energy extraction is estimated to bring a relatively large positive climate effect. However, sand extraction and wind power installations are estimated to lead to some negative environmental effects, which affects the result for ecological sustainability at the overall level.

The effects on social sustainability of the planning proposal for the Baltic Sea are estimated to be minor on the whole. A positive effect is linked to expected employment effects in the wind power industry, as a result of the guidance on energy extraction on the South Midsjö bank.

The Skagerrak/Kattegat

The sustainability report indicates low overall effects of the planning proposal on the Skagerrak/Kattegat. The results of the analysis show a positive economic effect of the plan's guidance on energy extraction in the southern Skagerrak/Kattegat. Energy extraction is also estimated potentially to bring some negative economic effects as a result of increased pressure on ecosystem services significant for commercial fishing and recreation. However, it is difficult to estimate the extent of these effects and their trajectory over time. The planning proposal's guidance on particular consideration of high nature values is nonetheless estimated to strengthen supporting ecosystem services and to benefit, over the long term, the environmental conditions that commercial fishing is dependent on, which contributes to economic sustainability. The plan is also expected possibly to make a positive contribution as a result of its confirmation of a national interest for outdoor life, in its guidance on recreation use.

Ecological sustainability

The sustainability assessment includes two criteria for ecology: the marine environment and climate. The assessment of the impact on these criteria is based on the results of the environmental impact report – refer therefore to the preceding sections. Additionally, the plan's potential climate benefits – in the form of reduced environmental effects, with respect to climate of emissions, and potential greenhouse gas reductions – are assessed.

The Gulf of Bothnia

The plan's areas for energy extraction use, primarily in the South Bothnian Sea, contribute to positive effects with respect to climate, but also to potentially adverse effects on the marine environment, in particular impacts on birds.

The Baltic Sea

In addition to the plan's guidance on energy extraction, with a positive effect regarding climate benefits, the plan also indicates an area for investigation area for maritime shipping use. This involves analysing the impact of

maritime shipping on the natural environment, and what measures may be appropriate in order to reduce the negative impact of maritime shipping. One possible measure – should it be deemed appropriate – that involves re-routing maritime shipping from the shipping route across the Hoburg bank to the deep-water channel to the south-east, or to the west side of Gotland, would have a positive effect on the marine environment according to the assessment (see the section about marine ecology and sea bed environments above), but could also imply adverse effects in terms of climate impact and air pollution as a result of increased travelling distances.

The Skagerrak/Kattegat

In the Skagerrak/Kattegat, too, the planning proposal is judged to have some positive climate effects as a result of its guidance on energy extraction, albeit it not to the same extent as in the other planning areas. Establishment of wind power on Stora Middelgrund and west of Falkenberg are also judged potentially to have adverse environment effects locally. For the planning area as a whole, the estimate is that a reduced environmental impact may be expected on the basis of the planning proposal's guidance on particular consideration of high nature values.

Social sustainability

In general, the marine spatial plans are estimated to contribute to social sustainability primarily through potential employment effects related to the guidance on energy extraction use. This use may also potentially have adverse effects, however, in terms of reduced accessibility of marine areas and impacts on the landscape aspect and cultural landscapes. The extent of the impact on accessibility varies depending on how far from land wind farms are located. The same applies for impacts on cultural landscapes on land, where the distance to the coast as well as whether or not core cultural heritage sites are sensitive to visual impacts are factors. Potential adverse effects apply more to the Gulf of Bothnia and the Skagerrak/Kattegat, where proposed energy extraction areas are nearer land, than planning proposals for energy extraction in the Baltic Sea.

The plans are also estimated to have some potential of contributing to positive health effects as recreation, nature and culture use, as well as particular consideration of high natural or cultural landscape values, may lead to increased recreation values. These health effects are difficult to measure, but are estimated to be relatively small, albeit it not negligible.

The Gulf of Bothnia

The plan is estimated to bring potential employment effects within the wind power industry in the planning area, as a result of the guidance on energy extraction. At the same time, this may cause adverse effects on social aspects such as accessibility and cultural landscapes, which influences the overall assessment.

The Baltic Sea

For social sustainability, the assessment sees some positive outcome in areas with energy extraction, as a result of expected jobs growth. However, establishment of wind power can cause adverse effects related to assessments of

social aspects such as accessibility and cultural landscapes, as well as potentially some adverse effects in the tourism sector.

Västerhavet

Inom social hållbarhet ger områden med energiutvinning ett visst positivt utfall i bedömningen till följd av en förväntad ökning av arbetstillfällen. Vindkraftsetablering kan emellertid ge upphov till negativa effekter utifrån bedömning av sociala aspekter som tillgänglighet och kulturmiljö, samt potentiellt en viss negativ effekt inom turismsektorn.

Other sustainability aspects

The marine spatial plan will bring about clarity regarding prescribed use, which will be helpful in municipal comprehensive planning, for example. The process of marine spatial planning creates opportunities for more common understanding between municipalities, government agencies and other stakeholders regarding the tradeoffs needed between different interests. Marine spatial planning makes events and developments at sea more predictable. Decisions on future use, in licensing for example, will have a clearer framework to refer to, which will potentially have beneficial effects on processing times as well as business interests. It is difficult to predict in greater detail how the marine spatial plan will contribute to these types of benefits, and such subsequent benefits as follow from them are hard to quantify. One possible benefit has to do with cost savings in licensing processes and a more efficient marine planning process in Swedish coastal municipalities.

In the impact assessments of the marine spatial plans it has not been possible to fully apply a systems perspective, where comparisons are made of effects on uses in the sea of the plan and effects that would arise if the same need were met on land. This is a limitation which in practice may imply that the societal benefit of not localising a use on land is underestimated. As an example, we can see how using the sea to meet a considerable part of society's transportation needs causes impacts on the marine environment, while at the same time it reduces the pressure in terms of space needs, investments, and impacts on land. This reasoning can also be applied to other societal functions such as food production and sand extraction, and to the climate benefits of renewable energy.

Achievement of objectives of the marine spatial plans

Achievement of objectives: planning objectives

In summary, the marine spatial plans are estimated to contribute to the achievement of the planning objective for a good marine environment and sustainable growth. This is based on an overall assessment of each planning area and is connected to a large extent to areas for renewable energy and the strengthening of nature values and ecosystem services.

Achievement of objectives: Sweden's environmental quality objectives

The marine spatial plans are estimated potentially to have a certain positive effect on some of Sweden's environmental quality objectives. These are

Reduced Climate Impact, Clean Air, A Non-Toxic Environment, A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos, and A Rich Diversity of Plant and Animal Life. Those expected to be affected to a somewhat greater degree, and from an international perspective, are Reduced Climate Impact and A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos.

With their guidance on energy extraction use, the marine spatial plans create the conditions for a fairly extensive establishment of offshore wind power. This guidance is expected to facilitate licensing examination processes and thereby increase the pace of extraction of renewable energy. However, the guidance on establishment of offshore wind power and sand extraction also risks causing disruptions to valuable species and habitats.

At the same time, the marine spatial plans open up opportunities for increased protection of species and habitats in many more and much larger areas, through their guidance on particular consideration of high nature values. Assessments of high nature values were part of the tradeoffs about most appropriate use, with the result that disrupting activities are avoided in the most valuable nature areas. Guidance on consideration of high nature values is also a signal to operators and supervisory authorities about the need to apply sustainability principles, in particular, in future activities. The administration is made aware of the significance of these areas for biodiversity, ecosystem integrity, and resilience in a changed climate. In addition, nature use serves as a confirmation of existing and planned protected areas, fish spawning areas and areas with a national interest in nature conservation.

Achievement of objectives: global sustainable development goals

With respect to the global sustainable development goals focusing on renewable energy and reduced climate impacts, goals number 7 and 13, the planning proposals are estimated to make positive contributions in all three marine spatial planning areas. The significance of these positive contributions is grows with increased energy extraction, and is therefore greatest in the Gulf of Bothnia. Energy extraction may cause adverse effects locally for goal 14, Life Below Water, e g by impacting sea bed environments – which affects target 14.2 about protecting and restoring ecosystems – and target 11.4 about protecting the world's cultural and natural heritage. The planning proposals' guidance on particular consideration of high nature values and culture values is estimated to make a positive contribution to goals 14 and 15, Life on Land. This effect is estimated to be biggest in the Skagerrak/Kattegat, where guidance on consideration is estimated to make a general positive contribution to target 14.4 about promoting sustainable fishing.

As a result of strengthened culture and nature considerations, some positive effects may also occur in the hospitality industry and related sectors. Increased nature considerations in trawling and other fishing may imply some cost increases, also in the processing of fish and shellfish and in wholesale and retail trade. The estimated reduction in earnings in commercial fishing is relatively small however, and likely to be short-term.

The marine spatial plans for the Gulf of Bothnia and the Skagerrak/Kattegat include proposals for energy extraction areas located nearer land than in the analysed Baltic Sea plan and in relation to the zero alternative. The resulting impact on the aspect of the landscape could potentially have an effect on the tourism industry in areas with wind power close to the coast.

Overall, the analysis for the Baltic Sea indicates that compared to the zero alternative, the marine spatial plan will lead to socioeconomic cost benefit. There are uncertainties regarding the size of various cost and benefit items, but it can be noted that there are a number of potentially large benefits and fewer potential costs.

The conclusion of the ecosystem services analysis, when ecosystem services are divided into groups, is that cultural and supporting ecosystem services are expected to be positively affected in the main. Regulating and provisioning ecosystem services are affected both negatively and positively, and it is not possible to conclude whether the net effect will be positive or negative.

For economic activities it can be noted that a number of industries will be positively affected, while commercial fishing and the marketing of fish may experience some negative development of added value as a result of possible further requirements regarding e g fishing methods. Estimates of added value are very uncertain, which is due to the difficulty of predicting developments driven by the plan. These estimates nonetheless provide a picture of what added value might be created, and also an idea of the balance between positive and negative effects on economic activities.

Some effects on economic activities and ecosystem services show complementary benefits. This is the case for cultural ecosystem services such as landscape and recreation environments, and the industries associated with culture and recreation. The estimated benefit in terms of increased added value in these industries may thus be assumed to capture some of the benefit generated by cultural ecosystem services. However, non-use values (existence and bequest values) associated with strengthened ecosystem services cannot be assumed to be captured by market values in industries, which means that in addition to the development of economic activities there are other benefits in the form of cultural ecosystem services, e g the natural and cultural heritage.

The analysis also highlights further socioeconomic effects, in addition to impacts on ecosystem services and economic activities. Regarding defence this is the value of maintaining Sweden's total defence capacity (well-being effects and avoidance of events with major negative effects), and cost effects in those cases where an existing defence capacity needs to be fulfilled in a less cost-effective manner as a result of a marine spatial plan. Other impacts that accrue as socioeconomic benefits include improved efficiency in planning and licensing, and possible positive health effects as the marine spatial plan may lead to increased recreation values. These health effects can be regarded as relatively minor and difficult to measure, but due to the marine spatial plan's positive impact on recreation, through increased consideration of recreation values as well as culture and nature values, these effects are not negligible.

The socioeconomic impact analysis notes that the mechanism that will contribute to the development of the various interests in relation to the zero alternative is essentially the signals that a marine spatial plan sends to the market, the public and government agencies about how various activities are to be prioritised and/or coexist in different areas, and about the consideration that needs to be made of existing values, which will also affect licensing processes. The marine spatial plan will promote a clarity about prescribed uses that supports municipalities' comprehensive planning. The processes around marine spatial planning contribute to opportunities for more common understanding between municipalities, government agencies and other actors regarding what tradeoffs are needed between different interests. Marine spatial planning makes what will happen at sea more predictable, and the process is the basis of some support building processes. In this way, the prescribed use will contribute to pushing forward a development which otherwise would not have come about. Decisions on future use in e g licensing will have a clearer framework to refer to, which may benefit processing times as well as business interests. It is difficult to predict in greater detail how the marine spatial plan will contribute to this type of benefits, and the benefits at the subsequent level are difficult to quantify. One possible benefit is associated with cost savings in licensing processes and a more efficient marine planning process in Swedish coastal municipalities.

Global sustainable development goals

Regarding the sustainable development goals for sustainable energy and reduced climate impact, goals 7 and 13, the planning proposals are estimated to make a positive contribution in all three marine spatial planning areas. The significance of these positive contributions increases in tandem with increased energy extraction and is therefore greatest in the Gulf of Bothnia. Energy extraction may cause negative environmental effects locally, to marine seabed environments, which relates to target 14.2 about protecting and restoring ecosystems, and possibly some effect on cultural landscapes, target 11.4. The planning proposals' guidance on particular consideration of high nature values is estimated to make a positive contribution towards goals 14 and 15 though expected environmental measures in e g commercial fishing. The effect is expected to be greatest in the Skagerrak/Kattegat, where the guidance on consideration is estimated to lead to a generally positive contribution towards target 14.4 about promoting sustainable fishing.

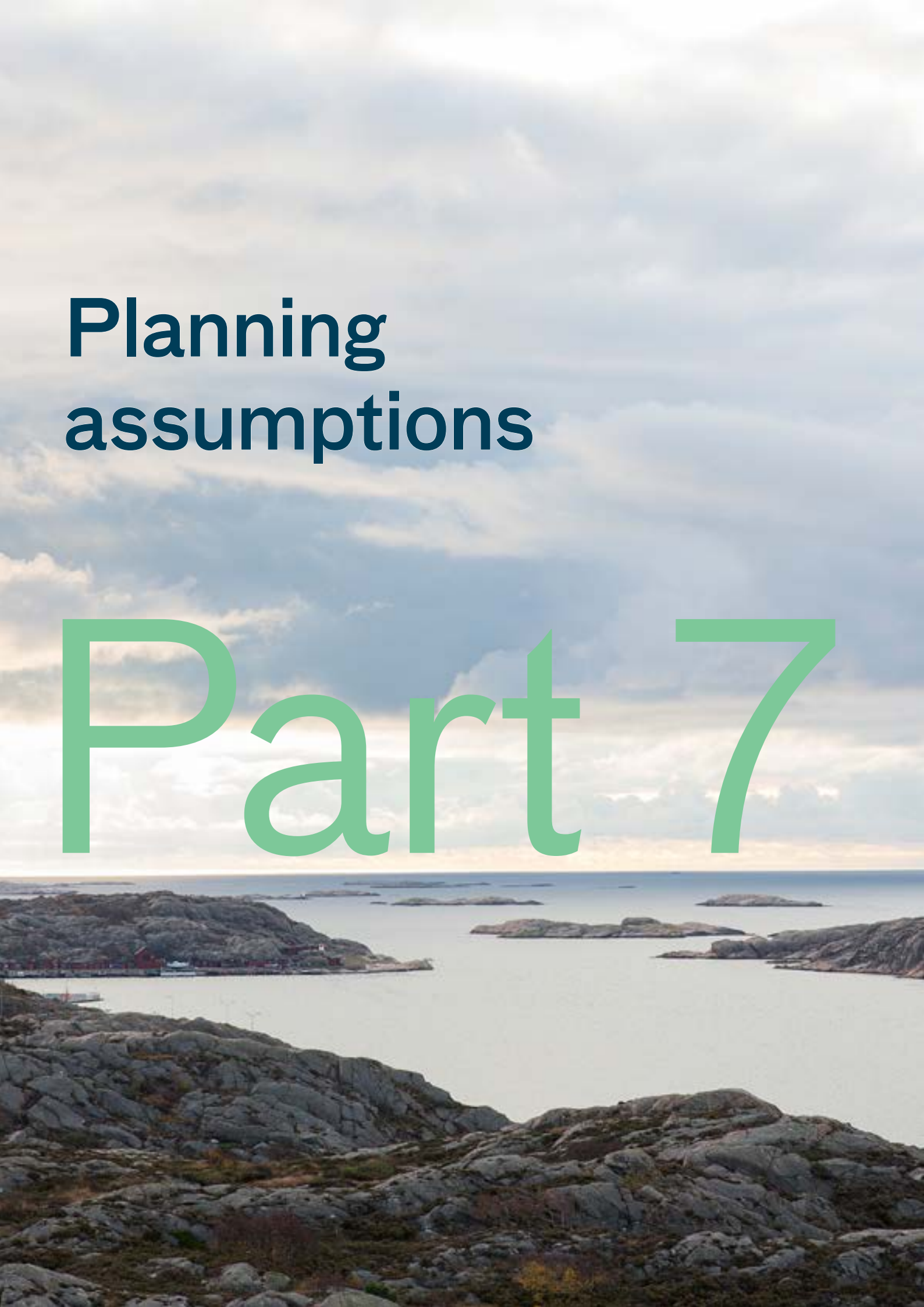
Sweden's environmental quality objectives

The marine spatial plans are estimated potentially to have some direct impact on Sweden's environmental quality objectives. This applies for *Reduced Climate Impact, Clean Air, A Non-Toxic Environment, A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos and A Rich Animal and Plant Life*. The environmental quality objectives expected to be impacted to a somewhat greater degree from an international perspective are *Reduced Climate Impact and A Balanced Marine Environment, and Flourishing Coastal Areas and Archipelagos*.

The marine spatial plans create the conditions for a relatively comprehensive installation of offshore wind power. The guidance provided is expected to facilitate licensing examination processes and thus increase the pace of extraction of renewable energy. However, with guidance on the installation of offshore wind power and sand extraction there is a risk that valuable species and habitats will be disrupted. At the same time, the marine spatial plans provide the possibility of increased protection of species and habitats in many more, and larger, areas through the guidance on particular consideration of high nature values. Assessments of high nature values have been part of the tradeoffs concerning most appropriate use, with the result that disruptive activities are avoided in the most valuable nature areas. The guidance on consideration of high nature values alerts operators and supervisory agencies to the need for applying sustainability principles in future activities. Additionally, nature use confirms all existing and planned protected areas, fish spawning areas and national interest areas for nature conservation. The guidance on particular consideration of high nature values highlights the significance of specific areas for biodiversity, for the integrity of ecosystems, and for resilience in a changed climate, which can constitute a basis for future protection of species and habitats.

Planning assumptions

Part 7



14. The attractiveness and social development of coastal areas

Sweden has one of Europe's longest coastlines, a concentration of the population to coastal areas, and a strong tradition of maritime activities. Attractive coastal areas are important for the development of maritime industries, and it is these industries that in many respects form the basis of a living coast and archipelagos. In order to provide opportunities for livelihoods, recreation, and nature and culture experiences, coastal areas need to be accessible, both physically and virtually, as well as have access to all necessary public services.

In 2015 the government adopted *A Swedish Maritime Strategy - for People, Jobs and the Environment*, which encompasses the three perspectives *A Balanced Marine Environment, Flourishing Coastal Areas and Competitive Industries*. In 2018 and in 2020 the Swedish Agency for Marine and Water Management presented detailed follow-ups of the strategy, some of which are elucidated in a selection of maps below.

En svensk maritim strategi – för människor, jobb och miljö (A Swedish Maritime Strategy – for People, Jobs and the Environment)

Population

The historic significance of the sea as a transport route or as a source of food is still reflected in the geographical concentration of the population along the coasts. In 2017 there were 5.3 million inhabitants living within 10 kilometres of the coastline in Sweden. That is just over half of Sweden's population, or 52 per cent (Statistics Sweden, 2019b). Sweden's three largest municipalities – Stockholm, Gothenburg and Malmö – are all located by the sea.

In recent years, areas within commuting distance of the three metropolitan regions – again, Stockholm, Gothenburg and Malmö – have grown. Part of this growth has been as a result of permanent residents moving into what were previously weekend or holiday homes. Many attractive coastal areas also draw tourists in the summer, which provides job opportunities in the tourism industry for permanent residents. Coastal areas farther away from the metropolitan regions have in many cases seen their populations decline, and some residential areas have seen permanent homes turned into weekend or holiday homes (Swedish Agency for Marine and Water Management, 2015b).

Growth and regional development

Access to labour is one of the most important localisation factors for businesses. Business specialisation leads companies to demand creative and skilled workers. Businesses tend to develop to a greater extent in places with a high population concentration, and more people are moving to these places for work (Swedish Agency for Marine and Water Management, 2015). Figure 19 on p 157 and Figure 20 on p 157 show population density and concentration of workplaces, respectively, within 10 kilometres of the coast.

Some types of business continue to have other location preferences, including the growing tourism industry and raw material intensive industries. Attractive living environments – e g near the coast or the sea – are important in order for these industries to be able to recruit and grow (Swedish Agency

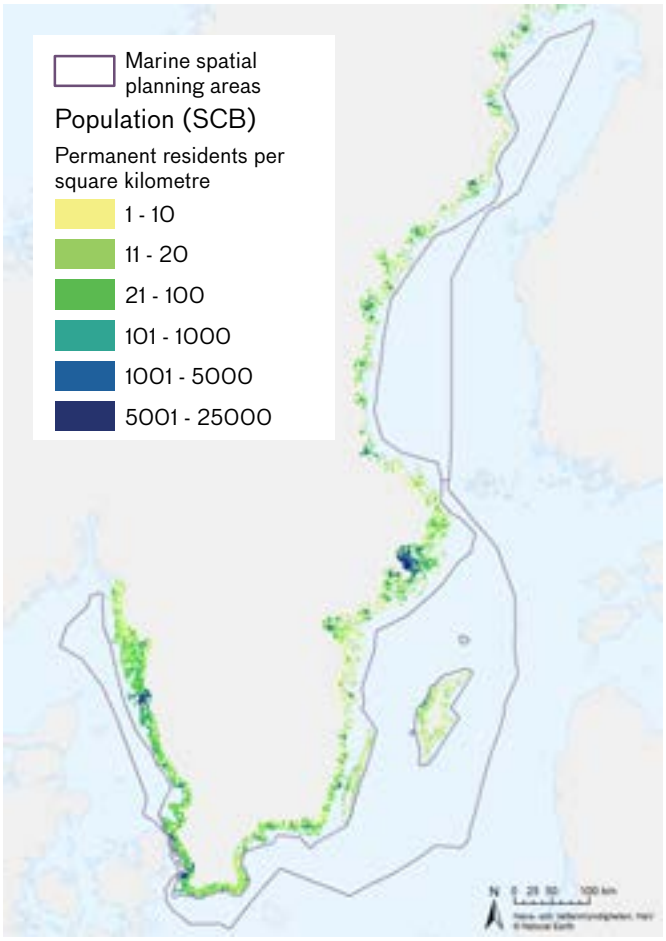


Figure 19. Map showing population densities in 2017.

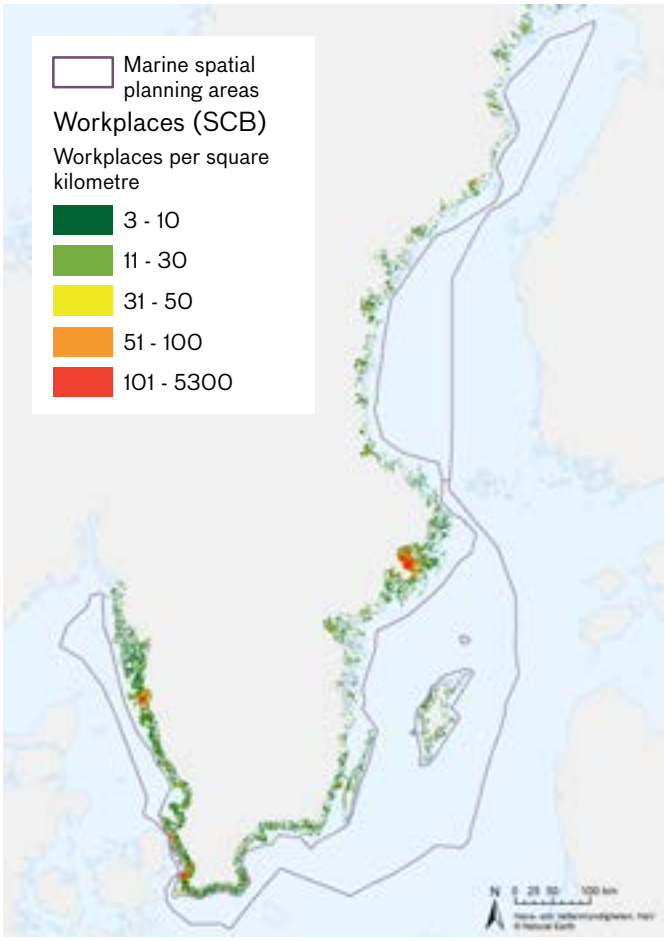


Figure 20. Map showing workplace density in 2016.

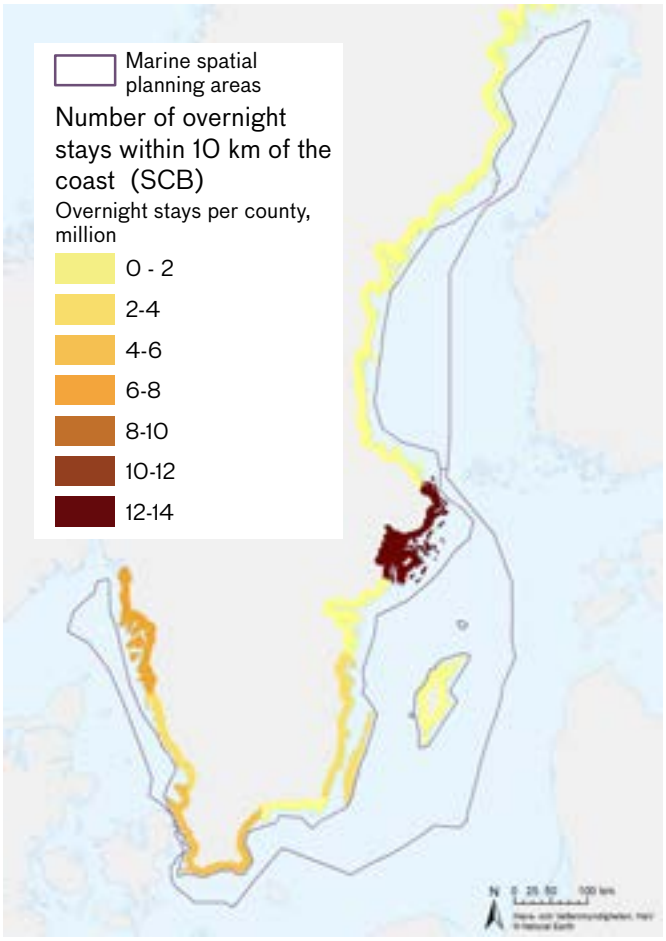


Figure 21. Map showing number of overnight stays in 2017.

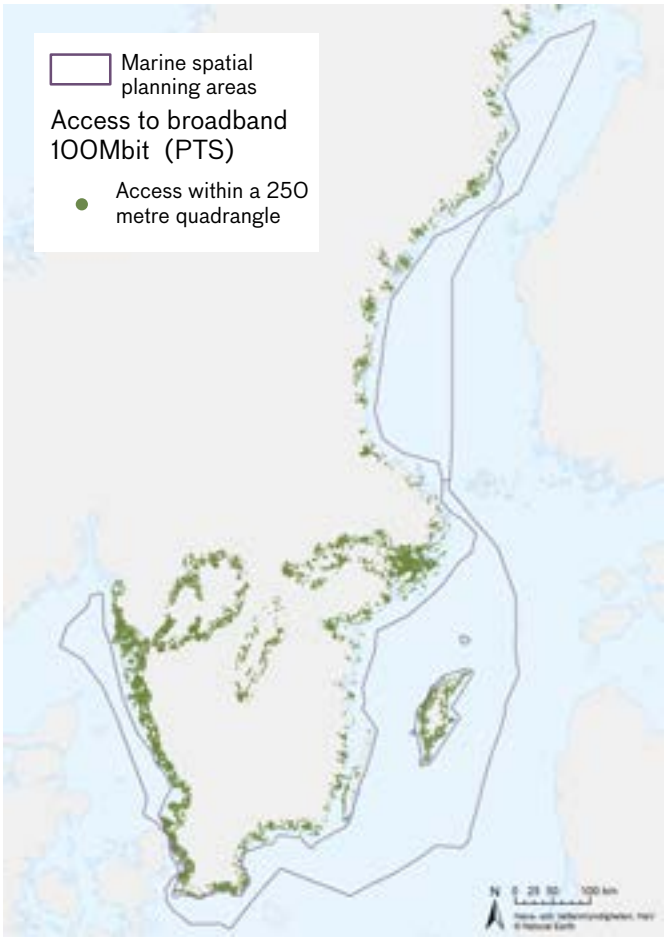


Figure 22. Map showing broadband access in 2017.

for Marine and Water Management, 2015). Workplaces in coastal areas also create local job opportunities for coastal populations.

Maritime industries

With their wealth of maritime activities, Swedish sea and coastal areas constitute an important asset for the Swedish economy. An initial follow-up of the maritime strategy in 2014 (Swedish Agency for Marine and Water Management, 2018l, and Statistics Sweden, 2018b), 7,157 businesses were identified as maritime. That corresponds to 0.7 percent of all Swedish businesses. The definition of maritime businesses is based on a combination of industry-related and geographical delimitations.

Net turnover in maritime industries made up 1.1 per cent of total net business turnover in 2014. The Transport category was the largest, with 51 per cent of the total turnover of maritime industries, followed by maritime technology and production with 19 per cent.

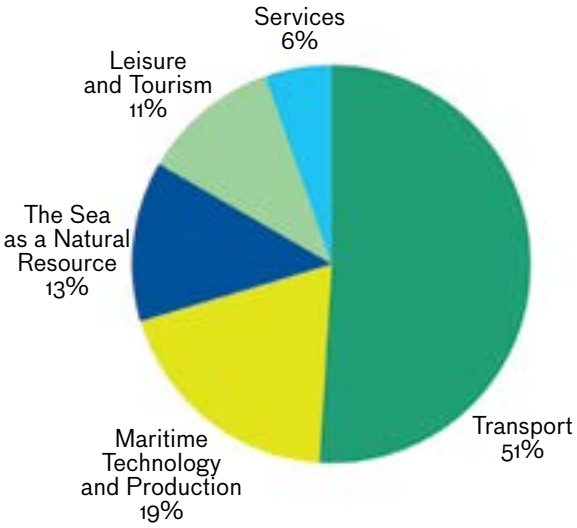


Figure 23. Distribution of net turnover in maritime industries, by area in 2014 (Statistics Sweden, 2018b).

Maritime industries employed approximately 33,000 people in 2014. The biggest employer was the Transport category, with 14,400 employees divided between around 850 workplaces.

A majority of those employed in maritime industries were men – 22,800 compared with 10,200 women in 2014. Gender distribution was most even in the Leisure and Tourism category: of 6,800 employees, half were men and half were women. In the Transport category, which was the biggest employer, around 4,000 employees were women and just over 10,000 were men.

The biggest number of companies was in the Seas as Natural Resource category: around 2,500, or 35 per cent of the total number of companies. The category only employed 4,800 people, however. Many companies in this category are small, with few employees.

Maritime industries

The strategy defines maritime industries as activities carried out on or in the sea, or which are dependent on resources from the sea, and activities that produce goods or services directly aimed at these maritime activities. Maritime industries also include activities in coastal areas that are dependent on the sea in other ways, e g tourism. Corresponding activities on and near the major lakes are also counted among maritime industries. The strategy uses the following categorisation of the industries in question:

- Transport – shipping, port and logistics companies
- Maritime Technology and Production – technology and systems suppliers, subcontractors, shipyards and the leisure craft industry
- The Sea as a Natural Resource – food, energy from waves, water and wind, substrates for biofuels, minerals etc
- Leisure and Tourism – ferry services, cruise companies, archipelago tourism, recreational fishing, sales and maintenance of leisure craft, and marinas
- Services – e g shipbrokers, insurance companies, commercial hydrography and investigation services.

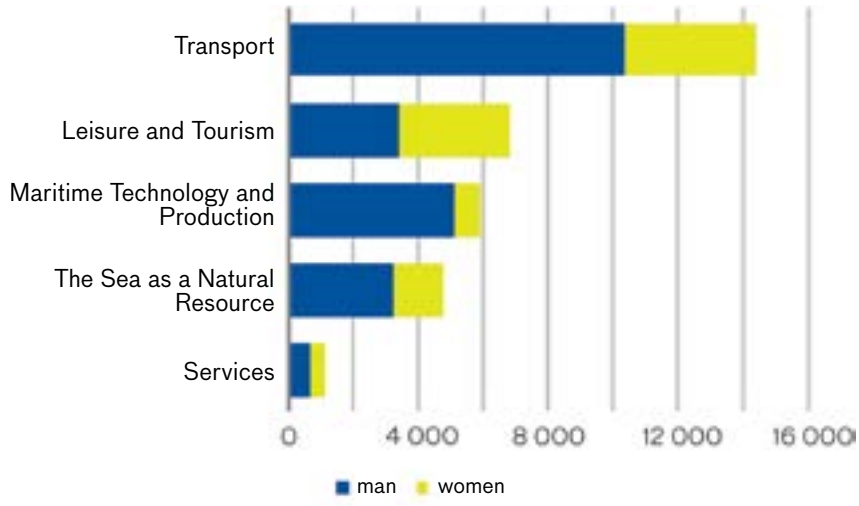


Figure 24. Number of employees in the maritime industries, by area and sex in 2014 (Statistics Sweden, 2018b).

Attractiveness to visitors

With their natural and cultural landscapes, coastal and archipelagic areas are important for Sweden's attractiveness as a tourist destination and for the longer-term competitiveness of the tourism industry. There were about 35 million overnight stays within 10 kilometres of the coast in 2017, which is 61 per cent of the total number of overnight stays in Sweden (Statistics Sweden, 2019c). Figure 21 on p 51 shows the number of overnight stays within 10 kilometres of the coast by county.

Broadband access in coastal areas

Access to broadband services is one of several prerequisites for making coastal areas attractive to residents as well as visitors, and for work. It also provides access to new services, as well as being a tool for bridging the geographical gap that sometimes exists between coastal areas and certain services. Under the government's broadband strategy, at least 90 per cent of all households should have access to broadband at least at 100 Mbit/s by 2020. Good broadband access in coastal areas is an indicator for accessibility in the follow-up of the attractive coastal areas perspective in the maritime strategy. Figure 22 on p 151 shows access to broadband at 100 Mbit/second within 10 kilometres of the coast (Swedish Post and Telecom Authority, 2018).

Further reading: Sverige helt uppkopplat 2025 - en bredbandsstrategi (Sweden Fully Connected 2025 – A Broadband Strategy)

Views of the sea from coastal areas

Sea views are one of many parameters for gauging the attractiveness of coastal areas. The Swedish Geological Survey (Sveriges geologiska undersökning, SGU) has carried out an analysis of sea views to gain an overall understanding of which land areas within the coastal zone may be affected by offshore wind power (Swedish Geological Survey, 2018a). The result of the analysis is shown in Figure 25 on p 160.

For areas with a large proportion of observation points on land, this means that erection of structures in the sea there would have a potentially greater impact on e g altered views from the coastal zone than it would in areas with a small proportion of observation points on land.

The result only provides an overall picture and describes potential risks, due to the limitations in the input data. For example, the analysis disregards the possibility of existing objects that already interfere with the view. The model is adapted for use in national maritime planning. A more accurate assessment at the detail level will require higher-resolution data and more local adaptation of estimates//calculations.

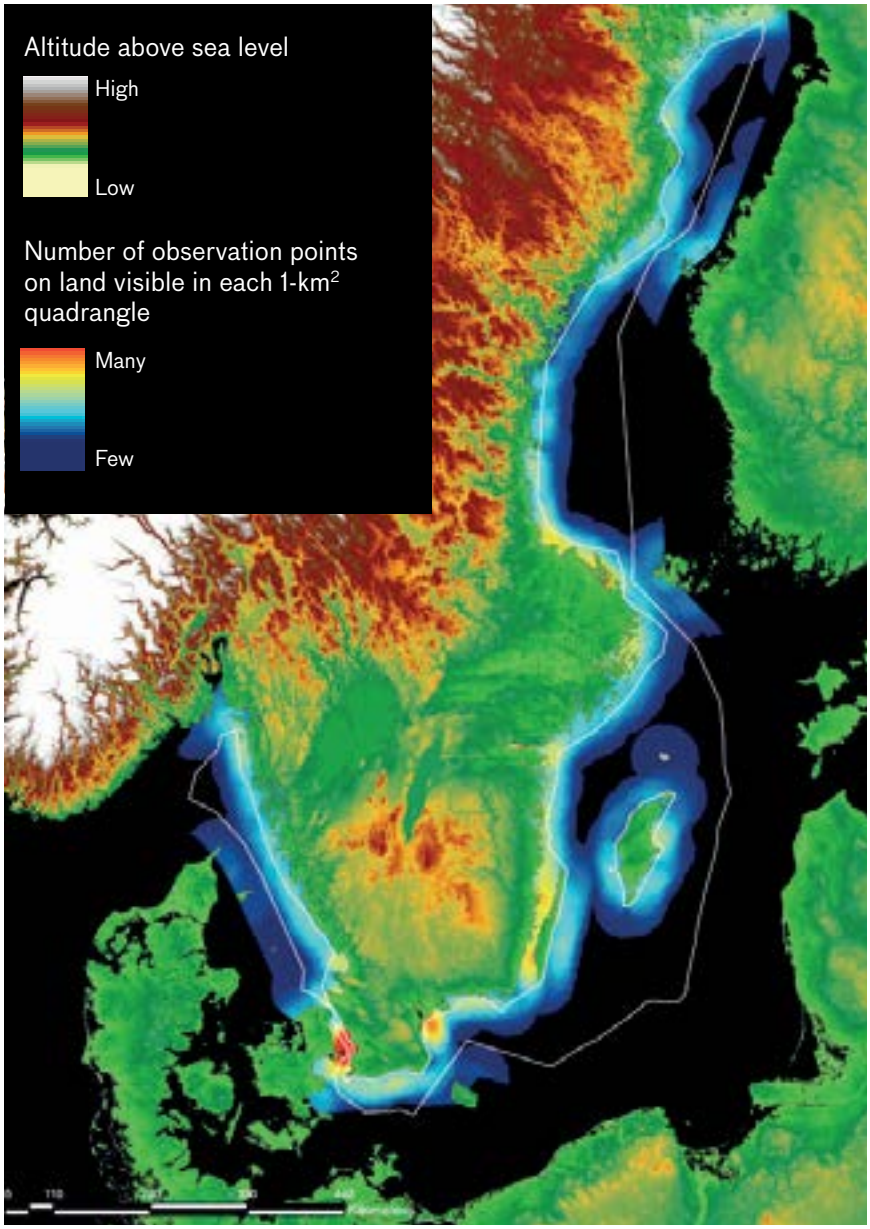


Figure 25. Visibility analysis (Geographical Survey of Sweden)

15. The state of the sea

Conditions for ecosystems

An ecosystem is a delimited area that is home to a number of plants, animals and microorganisms in a shared environment. Ecosystems are not limited by size: they can be as big as an entire sea or as small as individual tufts of seaweed.

Conditions that determine the limits of ecosystems and the distribution of species in the sea include salinity, temperature, ice sheet, currents, winds, waves, the water's turnover rate, depth, and type of bottom substrate. Each of these conditions is subject to considerable natural variation. Organisms that live on the sea bed have adapted to specific environmental conditions, such as a range of salinity or available sunlight, and will not survive when these change for natural or human-imposed reasons. The salinity of the bottom water in Sweden's marine areas varies from almost freshwater levels in the north Bothnian Bay to oceanic conditions in the outermost parts of the Skagerrak/Kattegat. These differences are reflected in the biological diversity and composition of the marine areas, with many species in the Gulf of Bothnia classified as freshwater species while the much higher-salinity Skagerrak/Kattegat has a greater diversity, and includes several nationally rare and unique species in relatively small habitats.

Conditions for marine ecosystems are impacted to varying degrees by human activities. Impacts may derive from activities that are going on today, on land as well as in the sea, of from traces of historical use of the seas or land. Maritime shipping, fishing and discharges from land-based sources such as industries, transportation, agriculture and sewage systems are all examples of human activities that impacts marine ecosystems.

In the Baltic Sea planning area, many of the deeper sea beds entirely or almost entirely lack oxygen. Low oxygen concentrations periodically occur in the southern Kattegat and in the eastern Skagerrak (primarily within the internal fjord system) but the same problem does not exist in the Gulf of Bothnia. Lack of oxygen leads to reduced biodiversity and altered species composition, and has a negative impact on ecosystems. It is in part a consequence of natural conditions, but has been exacerbated and spread to new areas as a consequence of eutrophication.

The needs of marine ecosystems and consequences of environmental impacts are assessed in the national application of the EU's Marine strategy framework directive, which has been incorporated into Swedish legislation through the Marine Environment Ordinance (2010:1341). Assessments of environmental status look at a number of categories of species and habitats, with underlying criteria which are assessed on the basis of various indicators. The latest assessment is presented in the report Marine Strategy for the North and Baltic Seas 2018–2023, and gives an overall picture of the state of the marine environment and its use. The following section contains a summary of the report's overall assessment of the state of marine species and

habitats. The report's use of the term "the Baltic Sea" encompasses the Gulf of Bothnia.

Assessment by the Swedish Agency for Marine and Water Management of the state of the marine environment

Plant and animal Life

The assessment in most cases is that good environmental status has not been achieved either in the Baltic or in the Skagerrak/Kattegat. However, there are signs of recovery, particularly in the Skagerrak/Kattegat and for some species and groups of species in the Baltic Sea (Swedish Agency for Marine and Water Management, 2018e).

The size of the porpoise population is fairly stable in the Skagerrak/Kattegat, but critically low in the Baltic Sea. The situation for seals is partly positive. Harbour seal in the Skagerrak/Kattegat and grey seal in the Baltic Sea are increasing in number and their distribution is stable, but the situation for ringed seal remains critical, as it does for harbour seal in the Kalmar Strait.

The trend for most bird species is generally positive. For fish-eating and foraging birds that feed near the bottom there are signs of recovery, but bottom-feeding species do not attain good environmental status in either the Skagerrak/Kattegat or the Baltic.

The situation for fish is difficult and serious, which is primarily manifested in size distributions for most species being tilted towards small individuals. For many populations in the Baltic, particularly of bottom-dwelling species, the situation remains critical. Good environmental status is not attained for commercially used fish and shellfish in either the Skagerrak/Kattegat or the Baltic. There are some signs of recovery, however, and good environmental status is attained for species including Baltic herring, sprat and plaice in the Baltic, and herring, plaice, hake and saithe in the Skagerrak/Kattegat.

Biodiversity

The assessment of good environmental status for biodiversity includes most species in the birds, marine mammals and fish categories, and the main habitat types (benthic and pelagic). The assessment was that good environmental status for biodiversity would not be achieved by 2020 in the Baltic Sea or the Skagerrak/Kattegat. There are signs of recovery, however, particularly in the Skagerrak/Kattegat, and for some species and categories of species in the Baltic, including harbour seal, grey seal, and fish-eating and grazing birds (Swedish Agency for Marine and Water Management, 2018e).

The description of the situation in the Skagerrak/Kattegat and the Baltic Sea in the national application of the Marine strategy framework directive also matches the most recent evaluation of the two sea-related environmental objectives *A Rich Diversity of Animal and Plant Life and A Balanced Marine Environment and Flourishing Coastal Areas and Archipelagos*. The

assessment was that these two environmental quality objectives would not be achieved by 2020 (Swedish Environmental Protection Agency, 2019).

Human influence

It is difficult to single out individual activities or impacts as the cause of the current state of species and habitats in Swedish seas. Eutrophication, increased levels of hazardous substances, noise, habitat loss, dredging and dumping, as well as fishing and the introduction of certain foreign species all have adverse effects on the status of many of the assessed species and habitats.

Good environmental status is not attained with respect to eutrophication. A positive trend is that Sweden's discharge of nutrients into the sea is decreasing overall. However, an extended history of large amounts of nutrients flowing into the sea means that they have become stored and continue to affect the marine environment adversely, particularly in the Baltic Sea. This means that improvements cannot yet be seen clearly in the environment. On the west coast it is only the open waters of the Skagerrak which are assessed as having good environmental status, and in the Baltic Sea only the coastal waters of the northern parts of the Bothnian Sea and in the Bothnian Bay (Swedish Agency for Marine and Water Management, 2018e).

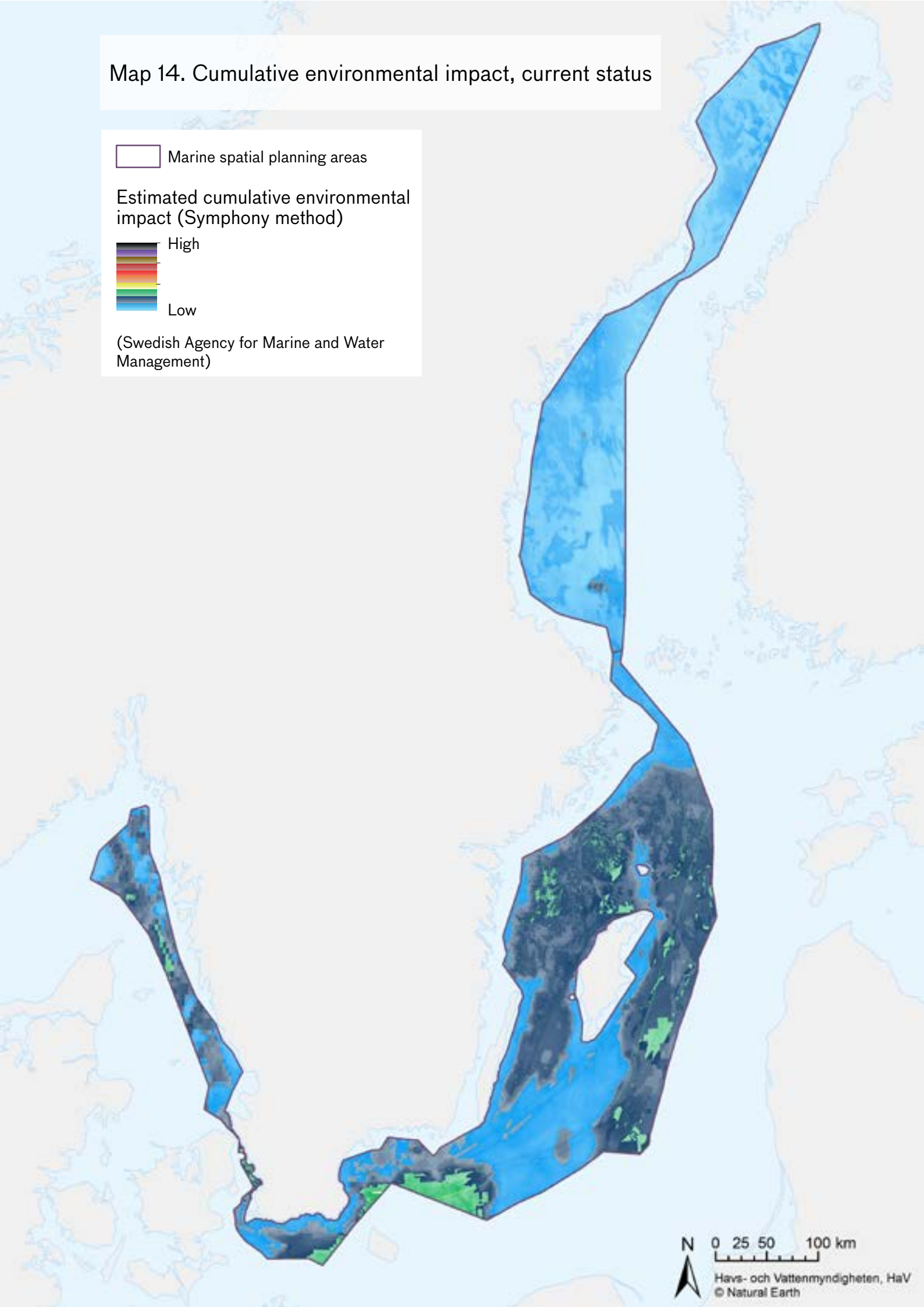
Good environmental status is not attained for discharges or existing levels of hazardous substances in the seas, either. This is due to excessive levels of several long-lived environmental toxins in the marine environment. The effects can be seen on molluscs, *monoporeia affinis* and white-tailed eagle, among other species. Positive signs include unchanged or decreasing trends for levels of many of the hazardous substances assessed in Swedish seas.

More direct exploitation of marine environments also constitutes a considerable impact. Catches of several species of fish and shellfish are deemed too high for the species to be sustainable in the long term (Swedish Agency for Marine and Water Management, 2018e). Additionally, there are the indirect effects on ecosystems of fishing, including by-catches and damage to the sea bed. Fish populations are also affected by other environmental problems, particularly eutrophication and the resulting low levels or lack of oxygen.

Physical interventions such as the construction of bridges and harbours are judged to be a problem for the entire food web. These effects occur particularly in coastal areas, where such infrastructure can cause physical loss or damage to plants and animals, in particular where they coincide with important spawning and feeding areas for marine species. As with the assessment for the Marine strategy framework directive, analyses in marine spatial planning provide a similar picture with regard to the human background impact on the marine environment. These analyses were carried out using the cumulative assessment tool *Symphony*.

In *Symphony*, the term "background impact" includes eutrophication and environmental toxins, albeit based partly on different datasets than the assessment for the Marine strategy framework directive. In this analysis the background impact dominates as a total cumulative environmental impact for the Gulf of Bothnia and Baltic Sea marine spatial planning areas. The relationship in the Skagerrak/Kattegat is more balanced, with the

Map 14. Cumulative environmental impact, current status



environmental impact of widespread, intensive and fairly varied commercial fishing equally as important as the background impact (Swedish Agency for Marine and Water Management, 2018h).

Monitoring and investigations at sea

Monitoring and investigations are ongoing in the marine areas, of oceanographic conditions as well as of marine geology, depth, the physical and chemical characteristics of the water, and biodiversity including fish populations. There are particular areas and localities in the marine spatial planning area where monitoring of sediments is carried out regarding the presence of metals and organic environmental toxins. This monitoring is done at a number of representative localities distributed throughout the sea basin either as single points or clusters of points.

16. Climate and societal adaptation

Climate change in our era will impact the sea and the ability of humans to use the sea and its ecosystem services in many different ways. The issues of how the climate affects the seas and humans, and of nature's capacity for adaptation to new conditions, are complex. Symbiosis between the seas and the plants and animals who live in them is regulated by factors such as access to food and spawning areas, healthy habitats and functioning ecosystems. There is a high likelihood that a changed climate will mean significant changes to ecosystems as winter ice patterns, water temperature, salinity, currents, oxygenation, and wind and wave patterns are affected (IPCC, 2019). The climate issue will also affect society's demands for how the sea should be used. For example, the urgent need to reduce emissions of greenhouse gases quickly will likely lead to increased use of the sea for the extraction of various forms of fossil-free energy such as offshore wind or wave power.

Climate change consequences for the marine environment

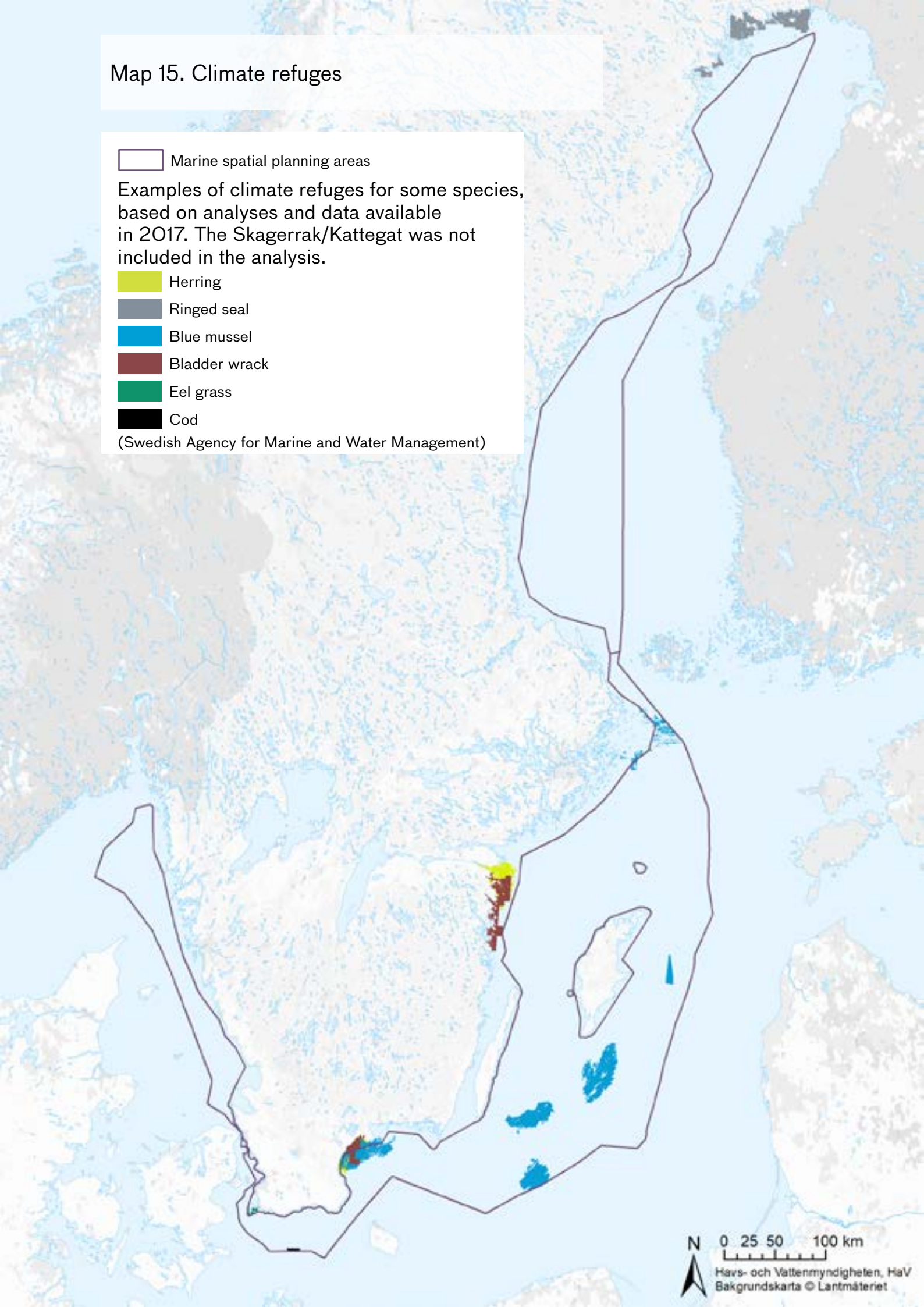
Carbon dioxide emissions from human activities lead to changes in the conditions for marine life. Increasing levels of carbon dioxide in the atmosphere result in acidification of the sea as carbon dioxide in the air dissolves in the seawater and lowers its pH level. Decreasing pH levels have been registered in the oceans as well as in Swedish marine areas. The acidification of the seas contributes to the depletion of calcium carbonate in the seawater, which will have consequences for plant and animal species as well as for marine ecosystems that use calcium in their shells and skeletons. Rising temperatures, retreating ice an changes in salinity are other expected consequences of climate change that may affect marine life, both locally and on a larger scale (Swedish Agency for Marine and Water Management, 2017b). Warmer seawater makes it easier for non-native species to become established in Swedish waters and makes species that don't thrive at higher temperatures migrate to colder waters or die out.

Climate adaptation

Effects of climate change on land may lead to an increased interest in marine activities. For example, higher sea levels and more extreme weather events may lead to increased beach erosion along our coasts, which in turn will increase the need for sand extraction at sea (Swedish Agency for Marine and Water Management, 2018f). More extreme weather in the form of stronger winds and heavier rain also imply a need for improved preparedness gases (Swedish Agency for Marine and Water Management, 2018e).

There is an increasing need in marine environment management to include climate aspects in the protection of high nature values and their distribution in order to guarantee important ecosystem services. In efforts for marine area protection, the new ordinance (2018:1428) on government agencies' climate adaptation will require climate perspective consideration of nature values warranting protection, where the distribution of nature values may be altered over time. The need for good monitoring of the representativeness and

Map 15. Climate refuges



functionality of marine area protection is expected to increase in a changed climate. Monitoring is important in order for the network of protected areas to contribute to a green infrastructure in the sea that promotes the production of ecosystem services and sustainable economic development.

Climate refuges in marine spatial planning

Two reports have been produced in the course of marine spatial planning in order to increase understanding of the challenges faced by marine ecosystems in a changed climate, and to open up possibilities for the management of these challenges. The first report (Swedish Agency for Marine and Water Management, 2017b) indicates the need to promote high biodiversity areas in the sea, as diversity in itself provides good conditions for resilience against the effects of climate change. Sustainable future management of these areas will allow guarantee continued production of ecosystem services. The report suggests that planning should designate what are known as climate refuges. Climate refuges are areas where the effects of climate change are small in relation to the surrounding habitat, which allows for higher survival rates of species.

A follow-up report (Swedish Agency for Marine and Water Management, 2017c) included modelling of hydrographic and ecological factors on the basis of two relatively divergent climate scenarios from the UN's Intergovernmental Panel on Climate Change (IPCC). The aim was to obtain a picture of likely changes in distribution of important marine species. Ringed seal, cod, herring, *Saduria entomon*, eel grass, blue mussel and a number of seaweed species were selected to represent major groups of species in the marine ecosystems of the Baltic Sea and the Gulf of Bothnia. Analyses were carried out of all three marine spatial planning areas, but in the case of Skagerrak/Kattegat limited access to data from the Swedish Meteorological and Hydrological Institute (SMHI), and a consequent reduction in the degree of reliability, meant that climate refuges for Skagerrak/Kattegat could not be designated.

This modelling indicates significant spatial changes in both the Baltic Sea and the Gulf of Bothnia in 2099, with most species shifting their distribution southwards due to reduced levels of salinity. Temperature changes will mean e g that ringed seal, which is dependent on ice cover, shifts northwards while *Saduria entomon* (a crustacean) expands its distribution throughout the Baltic Sea and the Gulf of Bothnia. This change will occur gradually, but is likely to lead to the potential loss of much of the marine vegetation in the Baltic Sea, and its possible replacement by sweet-water species more adapted to the new conditions (Swedish Agency for Marine and Water Management, 2017c). Climate refuges have been identified in the marine spatial planning areas as well as in coastal areas outside of them. See »Map 15. Climate refuges on p 167.

The Swedish Agency for Marine and Water Management is continuing to lead efforts to produce new and improved data on climate change and its impact on the sea. The collaboration project ClimeMarine, which the Swedish Agency for Marine and Water Management runs together with the Swedish Meteorological and Hydrological Institute (SMHI), the Swedish Geological Survey (SGU) and Gothenburg University, has been a forum for further developing work on climate refuges.

Climate refuges

A climate refuge is an area that may need special protection in order for important plants and animals to be preserved as the climate changes and their distribution diminishes.

These areas are often the more stable parts of a species' larger distribution range, which are expected to remain after salinity and temperature have changed.

A climate refuge is judged to be important in order for the species' continued existence in the marine area.

Read more in the report Underlag för klimatrefugier i havsplaneringen 2017.

17. Ecosystem services

The sea is an indispensable resource for humans and society. Viable ecosystems are the foundation for sustainable use of the sea's resources. Marine ecosystems provide a wealth of goods and services that humans depend on, also known as ecosystem services. The term "ecosystem services" describes the direct and indirect contributions of ecosystems to human well-being. This represents a way to describe ecosystems from a human perspective and to elucidate our dependence on the nature.

Biodiversity is a necessary prerequisite of ecosystems' capacity to deliver ecosystem services. A variety of ecosystems and habitats, different species and great genetic variation within those species are required for ecosystems to be viable and be able to adapt and recover despite disruptions, as when pollutants are discharged or a heatwave occurs. This ability to recover, or capacity to resist, is also known as resilience.

Certain ecosystem services are more evident and visible than others, such as the raw materials we use to make goods and food. Others are indirect, but provide conditions for the evident ones – an example is important biotopes and nursery areas for fish. Other ecosystem services are connected with human experiences and well-being, e g recreation in coastal and marine environments. By analysing what ecosystem services that we get from the sea, the importance of maintaining them becomes clearer.

Ecosystem services and interests in the sea

Biodiversity, food webs and habitats such as spawning and nursery areas for fish constitute fundamental structural and functional ecosystem services in the sea. These supporting services create conditions for direct services such as fish and shellfish for commercial fishing and recreational fishing, and nature environments for outdoor life and recreation which are significant for well-being and health. This in turn means that nature environments can contribute to regional development of a sustainable maritime tourism industry, for example.

Functions such as the regulation of environmental toxins, pollutants and nutritive salts also contribute to improved water quality. Guaranteeing these ecosystem services promotes both replenishment of commercial fish stocks and biodiversity. This in turn can contribute to improved resilience to climate change and disruptions such as pollution.

Ecosystems services are a prerequisite of long-term sustainable management of the sea, and of ensuring long-term sustainable use of marine resources (Swedish Agency for Marine and Water Management, 2015a).

Ecosystem services

Ecosystem services are products and services from nature that contribute to human welfare and well-being. Examples include the production of food and the purification of water.

Ecosystem services are often divided into four categories: supporting, regulating, provisioning and cultural:

- *Supporting ecosystem services* are fundamental functions in ecosystems on which all other ecosystem services depend, such as photosynthesis and biogeochemical cycles, and habitats for marine species such as fish.
- *Regulating ecosystem services* are the benefits humans draw from ecosystem functions that affect environmental factors, such as climate regulation (greenhouse gas capture), flooding and decomposition of e g nutrients (eutrophication in our waterways and seas).
- *Provisioning ecosystem services* are the vital resources that nature provides, such as food, clean water and raw materials.
- *Cultural ecosystem services* comprise spiritual and experience-based values that contribute to our well-being, such as environments for inspiration and recreation, e g diving, recreational fishing and other nature experiences.

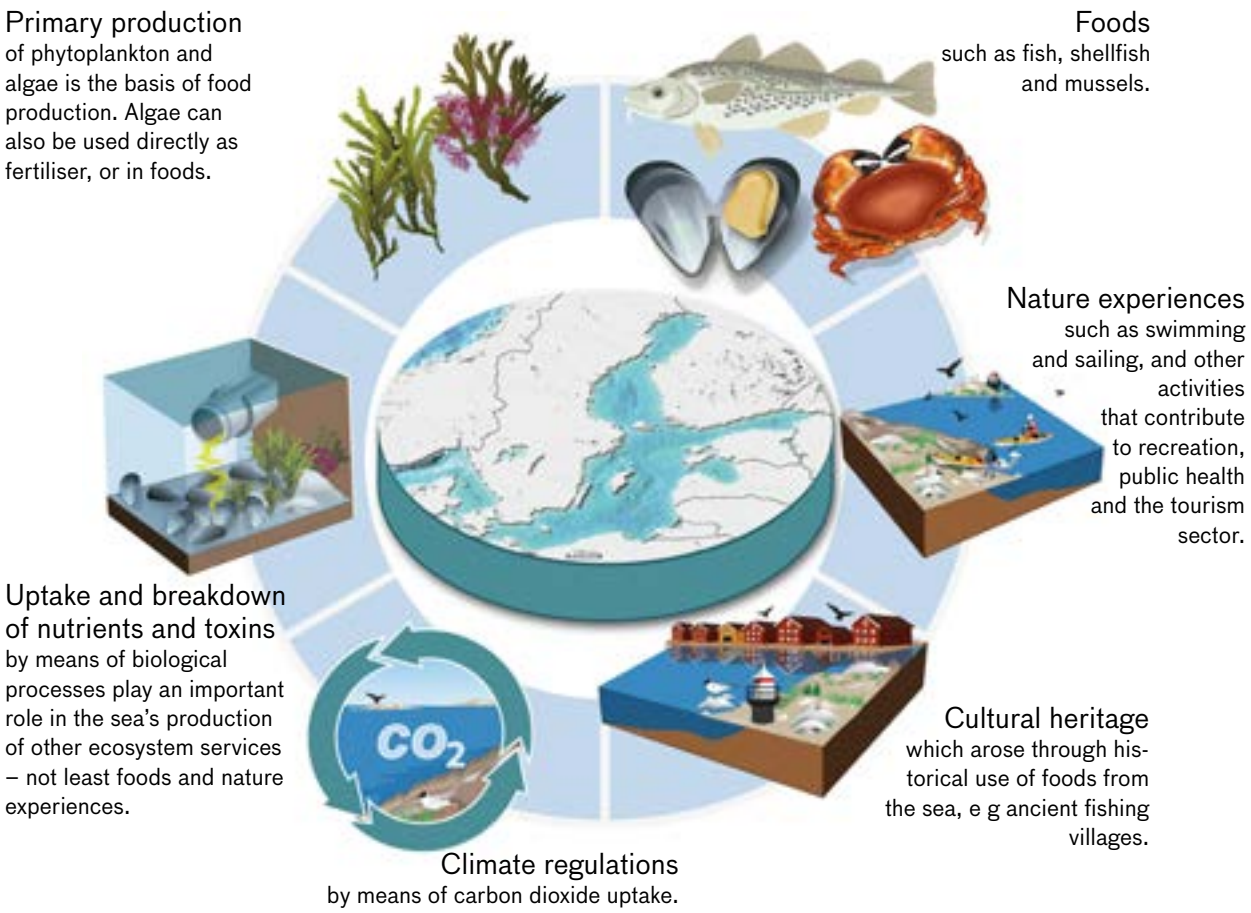


Figure 26. The sea's ecosystem contributes several critical societal functions, such as food production. The more visible ecosystem services affect and are dependent on other, indirect ones that are not so visible. Fish, for example, depend on viable habitats and spawning areas for their survival and for sustainable fish stocks. Another example is ecosystems that break down nutrients and toxins.

Energy extraction

Energy extraction in the marine spatial plans primarily comprises offshore wind power, which is not dependent on ecosystem services. However, wind power can indirectly reduce the pressure on climate regulating ecosystem services by replacing climate-impacting energy with renewable and fossil free energy.

Wind power stations' lines, cables and noise can damage habitats. The landscape aspect can also be affected, and thus cultural landscapes, outdoor life and tourism.

Potential advantages include reductions in the impact of greenhouse gases and the need for climate regulating services, as well as increased marine biodiversity resulting from artificial reefs.

Read more under each interest in Chapter 18 Interest and claims .

Defence

Military activities can lead to physical effects on habitats, noise and discharge of pollutants, which could increase the pressure on regulating ecosystem services. Military activities can also impact the opportunities for other interests of using ecosystem services, e g access to natural and sometimes cultural landscapes, outdoor life, tourism and fishing. In some cases there is a beneficial effect for ecosystem services, when defence activities prevent other types of development.

Infrastructure

The construction of bridges across bodies of water is often in shallow areas and largely near the coast or on offshore banks, i e in shallow areas of the open sea. This can have detrimental effect on marine habitats and cultural landscapes.

A potential advantage is that such infrastructure can give rise to artificial reefs, which contributes to biodiversity.

Culture

Cultural landscapes contribute to people's identity and well-being. Important ecosystem services include landscapes for living in and visiting and cultural heritage areas which have arisen through use of the sea, e g fishing villages.

Ecosystem services can also contribute to value-generating tourism and recreation.

Recreation

Ecosystem services in the form of nature experiences and recreation, e g recreational fishing or swimming, contribute to people's well-being, quality of life and health, as well as to regional development and employment.

Activities in outdoor life and tourism can affect various ecosystem services through noise, the discharge of hazardous substances from leisure craft, or waste and anchorage that affect sea bed environments and cultural landscapes.

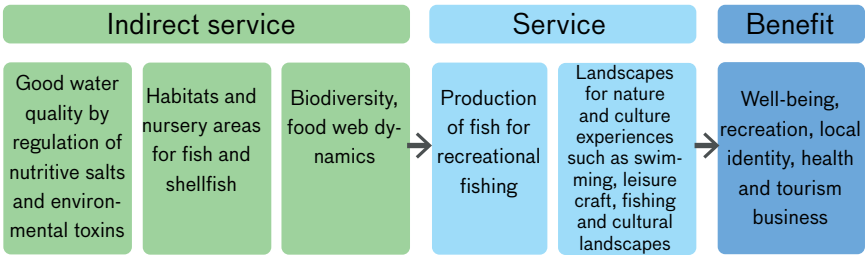


Figure 27. Important ecosystem services for recreation and cultural landscapes.

Extraction of materials

Sand extraction can adversely affect habitats and cultural landscapes. On the other hand, sand extraction for beach replenishment can serve to guarantee recreation and cultural landscapes.

Aquaculture

Aquaculture provides fish, shellfish and algae. Cultivation is dependent on the presence of ecosystem services in the form of biodiversity and good water quality. Aquaculture affects ecosystem services through the release of nutrients, eutrophication, genetic impacts and the discharge of hazardous substances. However, cultivation of algae and mussels, with their absorption of nutrients, can contribute to reducing eutrophication and thus have positive effects on ecosystems.

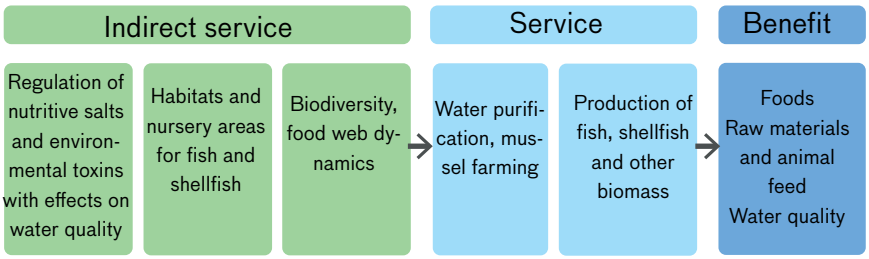


Figure 28. Important ecosystem services for aquaculture.

Commercial fishing

Commercial fishing provides access to the ecosystem service that fish and shellfish constitute as food and protein from the sea.

Fishing is dependent on a well-functioning food web and good habitats and nursing areas for fish and shellfish.

Fishing can have a negative impact on habitats and biodiversity through sea bed damage, attrition, waste and lost fishing equipment. At the same time fishing can also help salvage marine waste for recycling and reuse.

Fish and shellfish catches can cause changes to food webs. Fishing can damage cultural landscapes on the sea bed, e g wrecks.

Sustainable use of ecosystem services can create opportunities for regional business development. These opportunities are partly to do with food supply and raw materials, and partly with local identity and culture values. This in turn can imply other ecosystem services which are important to society and to industries such as tourism.

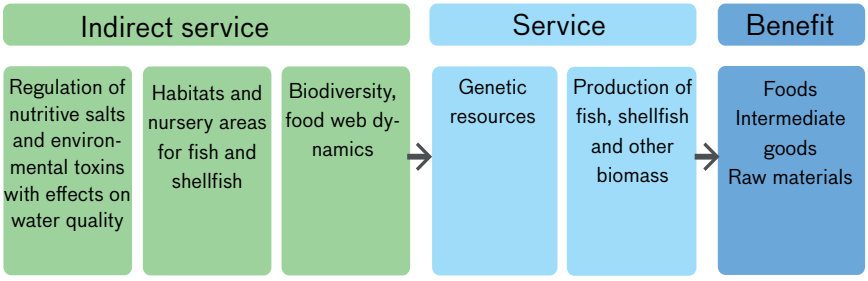
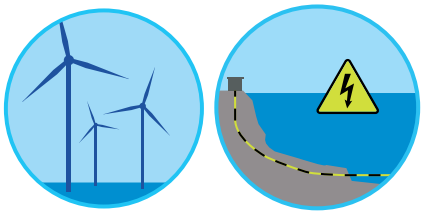


Figure 29. Important ecosystem services for commercial fishing.

18. Interests and claims

Energy



The energy sector's need for surface area in the sea is connected partly with production and partly with transmission of energy. Additionally, nuclear power plants use seawater for cooling. Offshore energy production in Sweden is in the form of wind power and as other marine energy in the form of wave power. In Swedish waters, energy transmission is through power lines and gas pipelines.

From an energy extraction perspective there are several advantages to offshore wind power. Winds at sea are often both stronger and more regular than on land, which allows for the building of bigger and more efficient wind farms. Offshore wind power allows for a wider geographic distribution of electricity production in Sweden, which is positive. The difficulty of achieving a financial return on projects has restricted offshore expansion. Improved technology can lead to greater profitability and increased energy production. The cost-effectiveness of offshore energy extraction is expected to increase by 2050 (Swedish Energy Agency, 2017).

"Marine energy system" is an umbrella term that currently includes primarily energy conversion from waves, tides (tidal currents and tidal barrage), temperature differences and salinity differences. Research and development into, and demonstrations of, wave power are being carried out in Sweden, as well as research into marine current energy. Current energy is primarily based on tidal currents and ocean currents. Sweden is in the vanguard of international development of wave power, but the technology is still new and under development. Social development implies a dependence on electricity, which requires a robust and dependable transmission grid and an increasingly integrated European electricity market. Good access to energy is of crucial importance to industry, above all to energy-intensive primary industries. Dependence on electricity means that extended power outages cannot be accepted.

The planning goal related to infrastructure is:

- Create conditions for good accessibility.

Existing use

The installed capacity of all wind power in Sweden was 6,611 MW at the end of 2017, of which 203 MW from offshore facilities. Swedish wind power stations produced a total of 17.6 TWh during 2017, of which 0.7 TWh was produced by offshore facilities (Swedish Energy Agency, 2018a). Sweden's total power production was 160 TWh. Net exports were 19 TWh (Statistics Sweden, 2018c). There are currently four offshore wind farms in Sweden: Lillgrund, Bockstigen, Utgrunden 1 and Kårehamn. Except for Lillgrund, which is in Öresund, they are all located near Öland and Gotland. All are located within Sweden's territorial waters.

There are also several planned wind farms which have licences but have not yet been built: Stora Middelgrund in Sweden's exclusive economic zone, and Storgrundet, Utgrunden II and Taggen in territorial waters. The licence holder for Taggen has announced that plans for the construction of a wind farm have been dropped. Stora Middelgrund does not have what is known as a Natura 2000 permit. The main reason these wind farms have not yet

been built is that the projected financial return is insufficient. Installation costs are decreasing, however, and profitability is expected to improve going forward. The Swedish energy policy agreement (Government of Sweden, 2016) also proposes that fees for connecting offshore wind power stations to the national grid should be abolished. In some cases licences that have not yet been utilised need to be changed or renewed, as the original licences are not suited to current circumstances, e g regarding the height of the turbines.

Uppsala University currently runs two different research facilities: Söderfors, where a marine current power station has been installed, and Lysekil, which comprises several wave power units. Wave power has also been installed off Sotenäs.

There are two direct current (DC) connections in the Skagerrak/Kattegat, between Sweden and Jutland. Southern Sweden and Zealand have six cable connections. A DC connection links southern Sweden with Germany, between Trelleborg and Lübeck. A new connection with eastern Germany is planned (Hansa Power Bridge). A DC connection links Karlshamn in Sweden with Slupsk in Poland (SwePolLink). There is also DC connection with Lithuania (NordBalt). There are currently two connections between Gotland and the mainland, and another one is planned for the future. There are two DC connections between Sweden and Finland in the Gulf of Bothnia at Forsmark (Fenno-Skan). One of these may be replaced with a new cable.

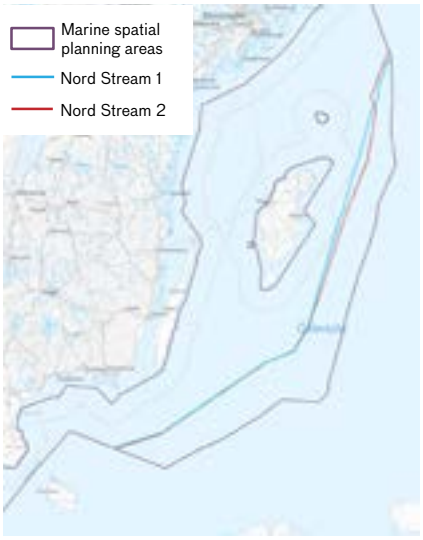


Figure 30. Nord Stream 1 and 2

In addition to overseas power cables there are regional and local network lines at sea. The Swedish Maritime Administration also has a network of lines in the archipelago which are not concession-bound and which provide lighthouses as well as private customers with electricity.

There is a natural gas pipeline between Malmö and Denmark which feeds the West Sweden natural gas system. Parallel pipelines run between Russia and Germany along the sea bed through the Gulf of Finland and the Baltic Sea. Another natural gas pipeline extends between Denmark and Sweden in Öresund, and a new one, Baltic Pipe, is planned between Poland and Denmark, possibly through Sweden's exclusive economic zone.

Claims

Under the energy agreement (Government of Sweden, 2016) Sweden is to transition to a completely renewable electricity system, with the goal of 100 per cent renewable electricity production by 2040. Nuclear power is not included in the definition of renewable energy. The agreement states that 100 per cent renewable electricity production by 2040 is a goal, not a stop date that forbids nuclear power; nor does it imply shutting down nuclear power by means of policy decisions.

The goals for renewable energy are general and not geared towards any particular form of power (Swedish Energy Agency, 2018a). However, the Riksdag adopted a planning framework for wind power as early as in 2009, for 30 TWh by 2020 – of which 10 TWh at sea. The planning framework is not a production target, but means that there should be capacity to allow for the development of 10 TWh of offshore wind power. There is currently no adopted planning framework or the equivalent for wave power in Sweden.

Figure 31. The transmission network for electricity in 2019 (Source: Svenska kraftnät, revised).

Sweden and Norway have an electricity certificate system which is market-based and aims to increase the amount of renewable electricity production by 28.4 TWh between 2012 and 2020. The expansion of wind power depends on its competitiveness compared with other certificate-entitled types of power. Sweden has decided to expand the system with an additional 18 TWh between 2020 and 2030, and to extend it until 2045. The development of the electricity certificate system points to a relatively robust expansion of onshore wind power over the next few years.

To achieve the goal of 100 per cent renewable electricity production, the Swedish Energy Agency estimates that around 80–100 TWh of new, renewable electricity production needs to be installed in Sweden by 2040–2045. The agency's assessment in 2018 was that the ambition in marine spatial plans should be to enable the installation of around 50 TWh of offshore wind power (Swedish Energy Agency, 2018b).

Read more about the electricity certificate system on the Swedish Energy Agency's website.

Technology development for offshore wind power has accelerated over the past ten years and continues apace. This includes bigger and therefore more cost-effective turbines, meaning they can produce electricity at a considerably lower cost than before. Projects built with 3 MW turbines in 2010 are currently being designed for turbine sizes corresponding to 15–20 MW, for construction in the near future.

The Swedish Environmental Protection Agency and the Swedish Energy Agency have drawn up a joint strategy for sustainable wind power expansion. The initiative to draw up a strategy is a measure within the policy remit of the Environmental Objectives Council. The goal is to produce an applicable planning framework for county administrative boards and municipalities, to facilitate municipal planning as well as local and regional licence processes, and to contribute to greater predictability for the affected interests. Improved guidance on how different interests should be taken into consideration will also lead to a more effective licensing process. These efforts also involve collaboration with several other government agencies. The planning framework principally concerns onshore wind power; a planning framework for offshore wind power is being drawn up as part of the marine spatial planning process.

Infrastructure

Use of the sea for energy transmission encompasses the installation, operation, maintenance and decommissioning of sea cable connections. The national grid is owned by the state and managed and operated by Svenska Kraftnät. Between the national grid and local networks are regional networks owned by private stakeholders. The Swedish electricity system is characterised by high production levels in the north and high consumption levels in the south. The national electricity system is onshore and based on overhead lines, with individual exceptions employing underground cables and in some cases subsea cables. The expansion of offshore wind power brings new demands for a flexible transmission system, capable of handling a large proportion of shifting energy. Electricity networks are being interconnected within the country as well as internationally, in order to become more robust. One condition for achieving national and European goals for energy and climate policy is increased possibilities of linking together different European countries' electrical systems.

Within the EU there is an ambition to increase European integration of electricity networks. The Swedish energy agreement states specifically that improved connections between the electricity networks of the countries around the Baltic Sea create better conditions for a socioeconomically efficient expansion of offshore wind parks.

Development zones and areas for test beds

Locations are needed at sea for the testing of new marine technologies or production. In Lysekil, Sotenäs and Tanum municipalities special development zones have been indicated in each municipality's comprehensive plan. These zones are intended for production and testing facilities for marine foods and marine energy. One of the zones is located in the Skagerrak/Kattegat planning area.

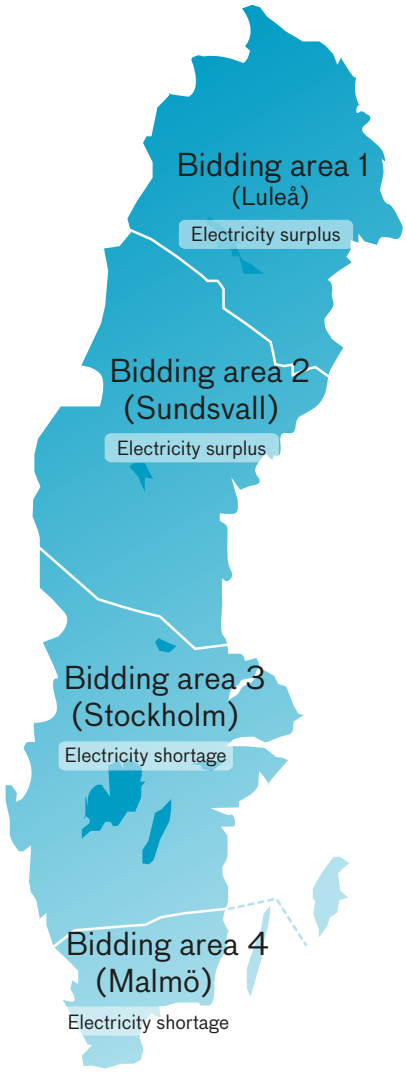


Figure 32. Locations are needed at sea for the testing of new marine technologies or production. In Lysekil, Sotenäs and Tanum municipalities special development zones have been indicated in each municipality's comprehensive plan. These zones are intended for production and testing facilities for marine foods and marine energy. One of the zones is located in the Skagerrak/Kattegat planning area).

National interest claims under Chapter 3 of the Environmental Code

The Swedish Energy Agency determines national interest claims for energy production and energy distribution facilities under Chapter 3, Section 8 of the Environmental Code.

Claims for energy production in the marine spatial planning area include wind power stations and are based on criteria regarding mean annual wind speed, depth and area size.

No national interest claims for energy distribution have been designated in the marine spatial planning areas.

Read more about the national interest claims on the Swedish Energy Agency's website.

Public interests

Projects

In addition to the national interest claims, various energy companies have shown an interest in installing offshore wind power in in specific parts of all three marine spatial planning areas. These claims are currently at various stages of individual licensing or planning processes.

Wind power stations in municipal comprehensive plans

Municipalities indicate areas for wind power stations in their comprehensive planning, under the Planning and Building Act (2010:900). Several municipalities are planning for offshore energy extraction near the coastline by specifying suitable areas in their comprehensive plans.

Other areas

The marine spatial planning process has identified other areas with favourable technical conditions for offshore wind power. These technical conditions are:

- depth (down to 40 m for fixed sea bed installations, in deeper waters for floating wind turbines)
- stable, flat and homogenous sea bed
- mean wind speed (a minimum of approx 9 m/s mean annual wind speed)
- distance from land, proximity to connection to electricity network on land, and proximity to areas of high consumption.

International coordination

Considerable coordination benefits can be achieved for different countries' areas for energy extraction, particularly if they are located reasonably close to each other. This applies to the project design phase as well as to the infrastructure. Several of Sweden's neighbouring countries are in the process of planning for areas for energy extraction. Energy extraction in other can also imply consequences in Sweden, e g in the form of environmental impacts.

South Midsjöbanken lies in the exclusive economic zones of both Sweden and Poland. In the Swedish zone there are plans for installation of a wind farm. Poland has issued location permits for energy extraction in its exclusive economic zone; these are issued at an early stage and enable further

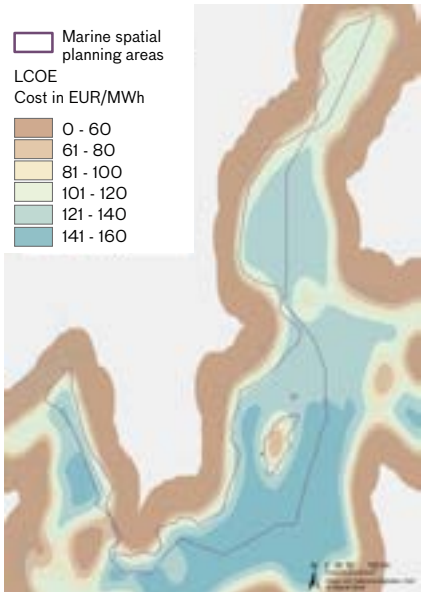
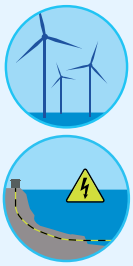


Figure 33. Production cost for offshore wind power (LCOE). Main scenario 2025 with a 6% weighted average cost of capita.

Map 16. Energy: National interest claims and other claims



Marine spatial planning areas

National interest claim for energy production, Ch 3, Section 8 Environmental Code

Wind power stations

(Swedish Energy Agency)

Other claims for wind power stations

Wind power stations in municipal comprehensive plans (2013)

Areas identified during the planning process

Interest areas for wind power stations

(Swedish Agency for Marine and Water Management, County Administrative Board)

Claims for electricity transmission

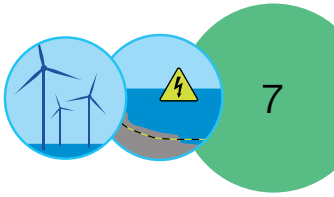
Transmission network cables

(Svenska kraftnät)

N

0 25 50 100 km

Havs- och Vattenmyndigheten, HaV
Bakgrundskarta © Lantmäteriet



study. Planning and project design in each country may affect different national interests, which is why cooperation is needed on cross-border issues. There has been a wind farm in the German exclusive economic zone by Kriegers Flak since 2015, and a wind farm is also being built in the Danish exclusive economic zone. These wind farms will coordinate networks, with networks in Zealand and Mecklenburg-Vorpommern to have an interconnection adjacent to the wind farms. The electricity can flow in either direction, as needs dictate. In the Swedish exclusive economic zone by Kriegers Flak an application has been made (May 2020) for extension and alteration of the earlier licence for a future wind farm. Coordination with Denmark may also be necessary regarding wind power in the Öresund region.

Svenska Kraftnät and a German system operator are planning a Swedish-German electricity link, Hansa Power Bridge, which is to extend over 300 kilometres from Güstrow in northeast Germany to Hurva in Skåne, and have a capacity of 700 MW.

Legal considerations

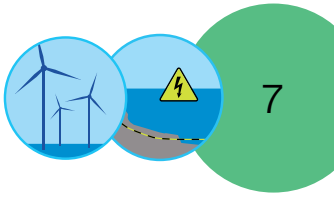
In order to install an offshore wind farm within territorial waters, a licence is required under Chapters 9 and 11 of Environmental Code, among other regulations. The application for such a licence is examined by the Land and Environment Court. Under the Act on Sweden's Exclusive Economic Zone (1992:1140) a licence is required in the exclusive economic zone, and the application is examined by the government. A licence is further required, under the Act on the Continental Shelf (1966:314), for carrying out studies of the sea bed and laying cables for wind power installation in the exclusive economic zone or territorial waters. If certain conditions are fulfilled, studies of the sea bed within territorial waters only require prior notification instead of a licence. When an activity or an intervention may significantly affect the environment in a Natura 2000 area, a special Natura 2000 permit is also required under Chapter 7, Section 28a of the Environmental Code. The requirement for such a permit applies in territorial waters as well as in the exclusive economic zone. Applications are examined by the Land and Environment Court if the other aspects of the licensing matter are to be determined by it as well, and by the county administrative board when the licensing matter concerns an installation in the exclusive economic zone.

If the building of a wind power installation also implies encroachment of ancient remains, a permit is also required under Chapter 2, Section 12 of the Cultural Landscape Act (1988:950). Any building of an installation should therefore be preceded by an analysis of whether it will affect any ancient remains, and by consultation with the county administrative board.

Environment and climate

Wind power

Offshore wind power affects the local marine environment in various ways in connection with installation, operation and decommissioning. Local circumstances play a significant role in what consequences occur. During the installation phase, pile-driving – in connection with monopile foundations



in particular – generate loud sounds that can travel long distances underwater, which may impact e g porpoises. Technical development is in progress to dampen the noise, e g by means of so-called bubble curtains. Foundations consisting of several smaller piles generate less loud sounds than those consisting of a large monopile. Foundations dug or drilled into the sea bed involve no pile-driving at all, meaning that this sound disruption does not occur. Turbidity during the construction phase can also impact marine animal and plant life, but how much sediment is spread depends on sediment type, water currents and which method is used. The effects are often transitory, as the dredging volume is small and the sea bed material usually coarse-grained. Some sounds are also generated during the operating phase, but any subtle effects of the sound given off via the foundation have not yet been elucidated. The risk that birds or bats will be killed due to wind power stations is estimated to be small compared with that of other human influence, provided that these risks are taken into consideration when selecting a location. Some bird species manifest avoidance behaviour near wind farms, which means they have to seek food elsewhere. This can lead to habitat loss, which in this case means that a species loses access to a habitat it previously had access to. A positive effect of wind power is that the foundations of wind power stations can function as artificial reefs, attracting invertebrates, fish and marine mammals (Swedish Environmental Protection Agency, 2012).

Cables

Laying subsea cables implies physical intervention in the sea bed environment. The cable can be laid up to a metre beneath the sea bed. Construction work causes turbidity in the water, changes to the structure of sea bed material, and a local impact on aquatic plants. Turbidity can affect fish and benthic fauna and flora. Benthic plants and animals can, however, re-establish themselves above the buried cable. During operation, impacts are estimated to be limited mainly to any repairs that need to be carried out on the cable. All electric cables generate electromagnetic fields that may affect marine organisms to varying degrees. These electromagnetic fields vary depending on the type of cable used and the amount of electricity being transmitted. The effects of the electromagnetic field on marine organisms can be minimised through various protective measures, such as burying the cable in the sea bed. This may be important where high-voltage cables cross the migration routes of eels (Swedish Environmental Protection Agency, 2012).

Climate

Wind and wave power are renewable energy sources that do not contribute to greenhouse gas emissions or other pollution during their operation, and they also have low life-cycle emissions of carbon dioxide. This is a positive factor for the marine environment as climate change – and ongoing marine acidification above all – constitute significant threats to marine ecosystems in the near future.

Defence

Sweden's total defence is made up of military activity (military defence) and civil activity (civil defence).

The main task of the Swedish Armed Forces is to defend Sweden against armed attack. The Armed Forces must promote Swedish security and uphold Sweden's territorial integrity. They must have the capacity to safeguard Sweden's sovereign rights and national interests, as well as to prevent and handle conflicts and wars nationally as well as internationally.

Civil defence is tasked with protecting the civilian population, guaranteeing the most important public services, and contributing to the Swedish Armed Forces' capability in the face of an armed attack or wars in nearby countries. Several government agencies and other stakeholders have responsibilities within civil defence. Civil defence planning has resumed in recent years.

The planning goal relating to defence is:

- Create conditions for defence and security.

Existing use

The Swedish Armed Forces' marine sector carries out marine exercises, surveillance and signals intelligence. The latter two have a technical function, but surveillance is also physical. In contrast with the army, marine activities are always on a war footing due to the surveillance function. This means that they always operate as if a state of crisis or war obtained.

Exercises

In order for the Swedish Armed Forces to be able to fulfil its main task of defending Sweden against armed attack, there are marine exercise areas and firing ranges along Sweden's coast. These marine exercise areas and firing ranges are crucial to the Armed Forces' activities. Naval units use marine firing ranges in conjunction with airplane and helicopter units. A number of military air bases near the sea are also used. Exercises and training in armed combat need to be conducted in a safe manner for the units involved but also in respect of the general public, maritime shipping and civil aviation, so that accidental shootings, incidents or accidents do not occur. The Armed Forces conduct exercises on the west, south, east and Norrland coasts with their varying coastal, sea, hydrological and meteorological conditions. Exercises are conducted under different light/darkness conditions, at all times of the day or night, and throughout the year. The naval units need to conduct exercises with live ammunition, close to their naval base as well as from temporary bases along the Swedish coast.

Signals intelligence

The National Defence Radio Establishment (Försvarets radioanstalt, FRA) monitors conflicts overseas and the actions and intentions of foreign powers with significance for Swedish foreign, security and defence policy. Signals intelligence is sensitive to disruption and requires protection to counteract interference from other activities. Railways, motorways, electrical power plants and radio masts are land-based facilities that can disrupt signals intelligence within approximately 10 km of the monitoring sector. Wind power, particularly offshore wind power, can disrupt signals intelligence from a considerably greater distance.

Civil defence

Military defence has a strong interest in the maintenance of society's functions. Society's overall ability to support the Armed Forces during periods of heightened preparedness is a part of total defence. Civil defence is dependent on individual interests such as transports etc being able to function in periods of heightened preparedness, as the flow of goods and services is important for safeguarding supply. Routes to strategic ports, as well as subsea cables for communications and electricity supply, i e the transmission network, are parts of civil defence which are included in marine spatial planning.

Claims

The Armed Forces depend on their exercise areas and firing ranges in order to be able to carry out exercises under different coastal and sea conditions, without disruptions from physical or technical obstacles that restrict air or sea operations. Signals intelligence needs protection in order to counteract interference from other activities which affect communications and radar systems, and which may also limit air and sea safety.

Impacts of fixed installations

In some areas the installation of wind power stations and other tall objects risks having a significantly adverse effect on military interests and designated national interests for the military part of total defence. In some cases these impacts cannot be described openly as the information is subject to military classification. In general terms, wind power stations may be said to hamper military interests e g by:

- affecting technical systems and the possibility of using them to patrol and guard Swedish territory
- causing limitations to the possibilities of training for and practising the capabilities that the Armed Forces need in order to be operationally effective
- causing limitations to the possibilities of protecting the country's territory in a possible future conflict in strategically important areas.

Installation of wind power stations and other tall objects may in some areas imply a conflict with national interests of the military part of total defence. Facilities for energy extraction may be compatible with military interests, but the exact extent of wind farms and location of individual wind power stations need to be assessed on a case by case basis in order to determine the precise effect on military interests.

The future

In December 2020 the Riksdag adopted the government bill Total Defence 2021–2025 (Govt bill 2020/21:30). The bill is based on an agreement between the government, the Centre Party and the Liberals.

Against the background of a continuing deterioration of the security situation, the government states in the bill that military defence needs to be further strengthened and its operative capability increase. Defending Sweden against armed attack is to be the main task of military defence. Achieving this objective requires the Swedish Armed Forces to carry out more exercises than they

have in the past. This will mean, among other things, that the Armed Forces increase their use of coastal designated national interest areas.

For reasons of geography, preparedness and training, the bill also proposes changes in order to strengthen the Armed Forces basic organisation, by re-establishing six regiments/flotillas. This expansion of the basic organisation, as well as the strengthening of the wartime organisation, will lead to a need for increased infrastructure investment. Additionally, access to appropriate exercise areas and firing ranges will be decisive for the Armed Forces' ability to achieve the stated goals during the period.

The Armed Forces' firing ranges and exercise areas, regarded collectively, are a limited resource. It is therefore important to ensure that it is possible to use the remaining dual-use airports, firing ranges and exercise areas without significant limitations. Today the Armed Forces have almost no ability to move activities which have become impossible to carry out in a given marine exercise area. There are simply not enough firing ranges and exercise areas. Furthermore, the tendency is for technical facilities to become mobile, meaning that it will become harder to predict where defence activities may be disrupted. The technology is becoming increasingly sensitive to disruption, and disruption caused by fixed installations at sea is expected to increase.

National interest claims under Chapter 3 of the Environmental Code

Under Chapter 3, Section 9 of the Environmental Code, land and water areas of significance for Sweden's total defence must, to the greatest extent possible, be protected against interventions that could manifestly run counter to defence interests.

Areas that are of national interest because they are needed for total defence installations must be protected against interventions that could manifestly make establishment or use of the installations more difficult.

Read more about the national interest claims on Försvarsmakten the Swedish Armed Forces website

The civil part of total defence

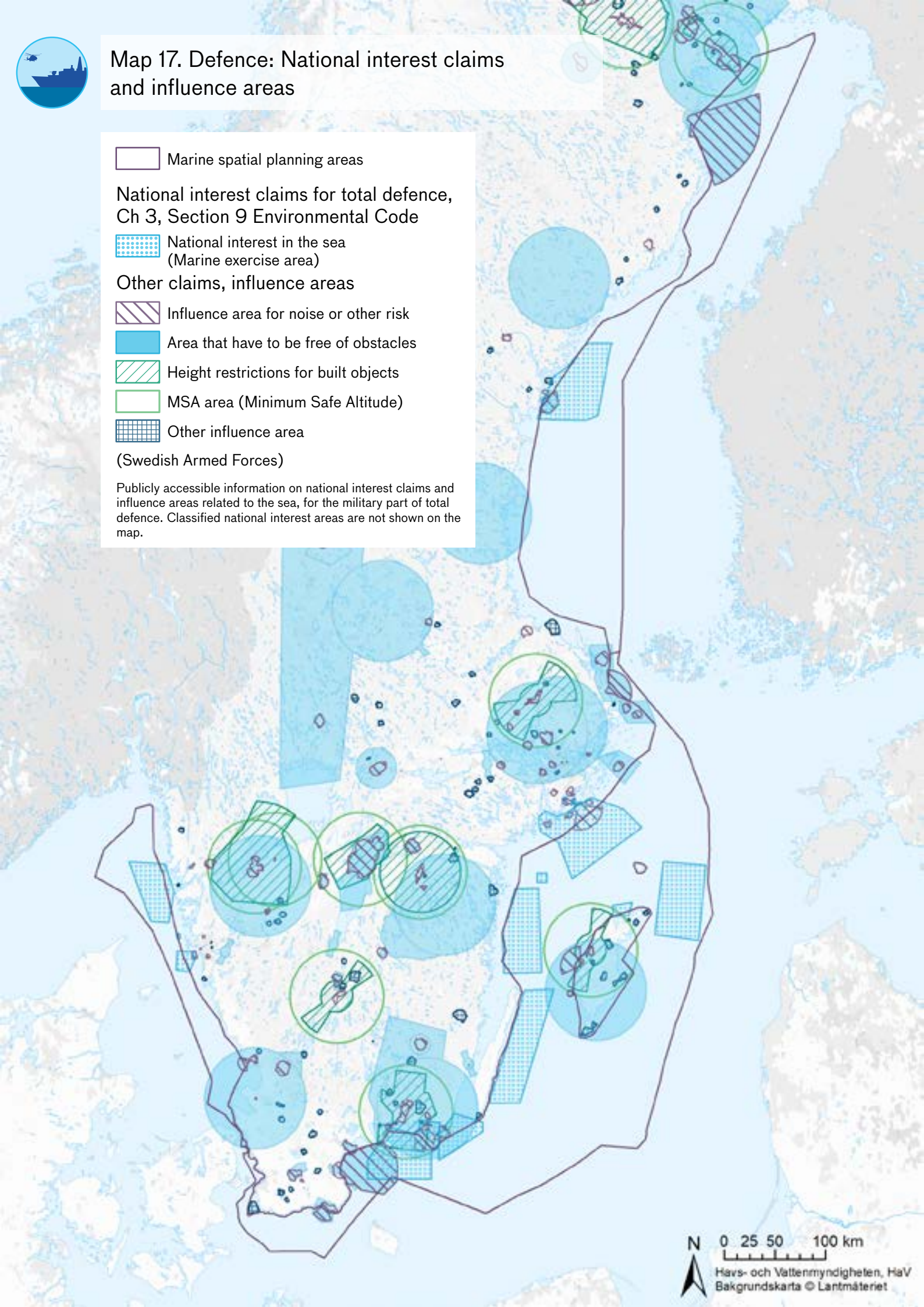
The Swedish Civil Contingencies Agency (Myndigheten för samhällsberedskap, MSB) is responsible for identifying national interests for the civil part of total defence. Work is in progress to prepare supporting documentation for this. It is not possible at the present time to predict whether areas of national interest will be identified within the geographical limits of the marine spatial plans.

The transmission network in the sea, subsea cables for communication and navigation channels that constitute public interests for civil defence may also constitute national interest claims for communications (Chapter 3, Section 8 of the Environmental Code), which the Swedish Energy Agency, the Swedish Post and Telecom Authority and the Swedish Transport Administration, respectively, are responsible for identifying.

The military part of total defence

The Swedish Armed Forces determine national interest claims, associated influence areas, and other areas significant for the military part of total defence. The areas designated as national interests for the Armed Forces include exercise areas and firing ranges, technical installations and military air bases. Value descriptions are available on the Swedish Armed Forces website.

Map 17. Defence: National interest claims and influence areas



The Armed Forces' national interests consist of interests that may be openly described and interests that are classified and therefore may not. Classified interests are also considered in marine spatial planning.

In addition to current national interest claims there are other areas the Armed Forces regard as being of considerable public interest. Such areas may also be classified.

Descriptions of national interest categories in the military part of total defence, and associated influence areas

Marine exercise area national interest

Marine exercise areas are the site of activities in the sea as well as in the air. Temporary suspension of areas may occur. Fixed installations risk harming the national interest.

Influence area for noise or other risk

National interest areas (exercise areas, firing ranges or air bases) which have an associated influence area in the form of a noise or risk area. Temporary suspension of areas may occur.

Areas that have to be free of obstacles (influence areas)

Influence areas of military firing ranges, where the actual military function (e g target aircraft and other joint ground-air exercises) constitutes the national interest. In such areas, tall objects may have a detrimental effect on the activities of the Armed Forces.

This type of influence area may also apply for weather radars close to the coast. Tall objects may be a disturbance within the influence area of the weather radar. Wind power stations may not be built in the immediate vicinity of the weather radar. For the surrounding area, an assessment of effects may be made in individual cases.

Height restrictions for built objects (influence area)

Influence areas of military air bases, where the actual military flight activity constitutes the national interest. No new tall objects may be built in these areas, in consideration of applicable rules regarding activity safety and the Armed Forces' tactical manoeuvres in the airspace. This influences marine spatial planning because fixed installations taller than 20 m above sea level are banned in the area.

MSA area (influence area)

An MSA (Minimum Safe Altitude) area is an influence area for airspace and implies protection of all air traffic on take-off and landing. Such an area is the space within which there are established height restrictions for objects that may be added to the area around an airport. Military MSA spaces have a radius of 46 kilometres, while civilian MSA spaces have a radius of 55 kilometres. Fixed installations taller than the established MSA height are banned in the area.

Other influence areas

Influence areas of national interests that cannot be openly described. Individual examinations will be made in each case, for tall objects as well as other installations, to assess whether there is a risk of conflict of interests. Fixed installations should be avoided.

International coordination

Other countries may carry out military exercises outside of a given country's territorial waters, which is something NATO and neighbouring countries do in Sweden's exclusive economic zone. For that reason, the possibility of carrying out defence exercises within Sweden's exclusive economic zone is an international interest in marine spatial planning. When Sweden carries out exercise activities with international coordination, normal Swedish marine exercise areas are used. Fixed installations such as subsea cables may be part of other countries' total defence, which can influence Swedish marine spatial planning in respect of use and decisions on installations in Sweden's marine spatial planning areas.

Legal considerations

Under the Environmental Code, land and water areas of significance for Sweden's total defence must, to the greatest extent possible, be protected against interventions that could manifestly run counter to total defence interests. Under Chapter 3, Section 10 of the Environmental Code the tradeoff between two ircompatible national interests must prioritise the defence interest if an area or part of an area is needed for a total defence facility.

Defence activities must follow the general rules of consideration in Chapter 2 of the Environmental Code. Usually the activity also needs to undergo a licensing examination under the Environmental Code. An example is a firing range which has a licensing or notification obligation as an environmentally hazardous activity. Blasting in aquatic areas can also be regarded as an aquatic activity with a notification or licensing obligation.

According to the Public Access to Information and Secrecy Act (2009:400), secrecy applies to information concerning Sweden's total defence, if it can be assumed that disclosure of the information would harm the country's defence or compromise national security. This applies, for example, to maps and aerial photographs depicting military geographic conditions, permanent defence installations for use in warfare, and locations from which signals intelligence is conducted.

The Protection Act (2010:305) regulates reinforced protection of buildings, areas and other objects against sabotage, espionage and the disclosure of classified information concerning Sweden's total defence. Unauthorised persons may not enter aquatic areas of special significance for defence which have been classified as protected objects. This prohibition may be associated with a prohibition against depictions, descriptions or measurements. Exploration under the Minerals Act (1991:45) may not be carried out within 200 metres of a protected object, or at such distance as determined by the government, without a permit from the county administrative board. Under the Act on Protection of Landscape Information (2016:319), which regulates location-specific data regarding conditions on or beneath the ground and on or under the bottoms of lakes and sea beds, permission is required for hydrographic surveys, photography from aircraft in certain areas, and for the dissemination of aerial photographs.

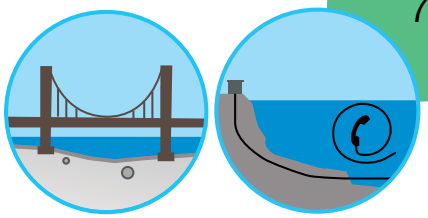
Environment and climate

The use of ammunition in firing exercises leads to the release of metals into the aquatic environment, which contributes to pollution in the sea even if relatively small amounts of metals are dissolved in the water. Over time, this can amount to a considerable addition of metals in specific locations. Firing, explosions, and air and sea exercises create loud noises which can disrupt animal life under the surface of the sea as well as above it. Noise disruptions are often more serious at certain times of the year, when biological activity is high. Such times include fish spawning periods, the periods when seals have their young, and bird breeding and brooding periods. In order to be able to consider when the risk of detrimental impacts is greatest, the Swedish Armed Forces have developed a marine biological calendar. It contains information on which areas are sensitive to underwater noise at different times of the year.

In 2016 the Armed Forces formulated targets for energy efficiency, reductions in unsorted waste, and environmental considerations in connection with exercises and operations (Swedish Armed Forces, 2019b).

Climate

Extreme weather events can change the living conditions in different locations and reinforce pre-existing factors that drive conflict. Climate changes also mean changes in the Arctic, which increases the interest in and strategic significance of Sweden's immediate surroundings and the Baltic Sea.



Infrastructure

Infrastructure is defined as facilities for the transportation of goods, persons and services, as well as for the transmission of energy and information. This section addresses the transport infrastructure for roads, railways and aviation. Infrastructure for energy and maritime shipping are addressed in the sections Energy and Maritime Shipping, respectively. There are also communication cables in the sea. The transport infrastructure enables connection and communication within and between regions and countries. There are currently two longer fixed connections from the Swedish mainland across the sea: the Öland Bridge and the Öresund Link. The latter serves both road and rail traffic. There are ten civil aviation airports with commercial air services located near the sea. Aviation has claims on the airspace above parts of the sea, as no buildings taller than 300 m may be built in approach areas (MSA or Minimum Sector Altitude areas, civil definition).

The planning goal relating to culture is:

- Create conditions for regional development, recreation and preservation of culture values.

Existing use

Roads and railways

The Öland Bridge across Kalmarsund connects Kalmar on the Swedish mainland with Färjestaden on Öland. The bridge is 6.1 km long with a vertical clearance of 36 metres and a width clearance of 13 metres.

The Öresund Link is a 15.9 km long connection above and below Öresund, between Malmö at Limhamn and Copenhagen at Amager. The upper level of the bridge has a vertical clearance of 57 metres above Flintrännan. The link consists of a motorway and a double-track railway. In 2017 approximately 7.5 million vehicles crossed the Öresund Link, which corresponded to almost 21,000 vehicles per day (Øresundsinstituttet, 2018).

Airports

The ten largest civil aviation airports in Sweden which are located near the sea are Luleå (Kallax), Umeå, Skellefteå, Visby, Örnsköldsvik, Kramfors-Sollefteå, Sundsvall-Timrå (Höga Kusten Airport), Ronneby (Kallinge), Halmstad, and Kalmar. Several of these airports are also military air bases, including Luleå, Visby and Ronneby. For air traffic to function safely, there are zones around all airports that must be kept free of obstacles. Military air bases have specific requirements for obstacle free zones, as low-level flying exercises may also be necessary.

Cables for data and telecommunications

Society's dependence on the internet grows all the time, as does the need for communications between Sweden and other countries. Most of this communication with other countries is done via cables in the sea. Examples of such communications include the radio links between Sweden and Denmark across Öresund, and between the mainland and Gotland.

Even if the transmission capacity of the cables constantly increases, more cables are needed in order to create space and security in the networks.

Claims

Transport policy goals

The overall goal of transport policy is to ensure a socioeconomically efficient transport system, sustainable over the long term, for private citizens and businesses throughout Sweden. The functionality goal for accessibility means that the design, function and use of the transport system is to help provide everyone with basic access to a system of good quality and usability, and to contribute to development potential throughout the country. There are two functionality goal specifications of particular significance for the need for roads or tunnels connecting Sweden with other countries. The first states that industry is to be given access to better quality transportation to strengthen international competitiveness. The second states that accessibility is to be improved within and between regions, and between Sweden and other countries. The consideration goal for safety, the environment and health means that the design, function and use of the transport system are to contribute to the achievement of the overall generational goal for the environment and of the environmental quality objectives.

Development and trends

A fixed connection between Helsingborg and Helsingør has been studied for its potential to increase integration within the Öresund region, create possibilities for bigger labour and housing markets, and to relieve the pressure on the Öresund Bridge and the E6 motorway. A new connection between Helsingborg and Helsingør is regarded as important primarily for goods traffic between Sweden and the continent, which is expected to increase, and for increased passenger traffic.

The municipalities of Malmö and Copenhagen are working together on a preliminary study of how a subway connection between the cities could create additional capacity through Öresund and thus strengthen integration and growth in the region. The justification for the connection is that daily commuting between Malmö and Copenhagen is increasing faster than the rest of the traffic across Öresund. When the planned tunnel under the Fehmarn Belt is completed in 2028, it will put more pressure on the capacity of the Öresund Bridge.

The city of Landskrona has studied the possibility of what is known as the "Europe track", a proposed railway link between Landskrona and Copenhagen. The Europe track could relieve pressure on the Öresund Bridge, where traffic pressure is expected to grow in the future. The Landskrona–Copenhagen link would serve all types of rail transport: freight trains, highspeed trains and regional trains. The project led to a study by the city of Landskrona in 2015 and a follow-up report in 2017 (City of Landskrona, 2017).

Conditions for a fixed connection between Sweden and Finland across Kvarken in the Gulf of Bothnia, in the form of a bridge/tunnel combination, were studied in 2000 and the project has been designated in Umeå's comprehensive plan as a vision for the future. The connection would extend between Replot on the Finnish side and Holmsund on the Swedish side, with a total length of 51.7 km. Various possibilities have been suggested in this context, including coordination of wind power development and adding a cable for power transmission to the road link.

National interest claims under Chapter 3 of the Environmental Code

The Swedish Transport Administration determines national interests for communications installations for maritime shipping, roads, railways and aviation, under Chapter 3, Section 8 of the Environmental Code. National interest claims are for existing, planned and future installations.

The Swedish Post and Telecom Authority determines national interests for electronic communication installations under Chapter 3, Section 8 of the Environmental Code. No national interests have been designated for offshore electronic communication in the marine spatial planning areas. At the current time there is no overall national planning for telecommunications cables.

Both the Öresund Link and the Öland Bridge have been designated as national interests. The Öland Bridge – Route 137 – is of particular importance for regional and interregional traffic between Öland and the mainland. The Swedish Transport Administration has also indicated future fixed connections between Helsingborg and Helsingør as being of national interest. The future road is of particular importance for regional or interregional traffic. All ten airports near the sea have been indicated by the Swedish Transport Administration as national interests for aviation.

Read more about the national interest claims on the websites of the Swedish Transport Administration's and the Swedish Post and Telecom Authority.

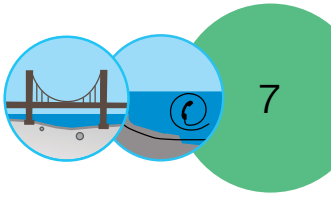
Legal considerations

Development of buildings and installations must be preceded by planning and building licences under the Planning and Building Act (2010:900). Municipalities are responsible for comprehensive plans, detailed plans and building licences, which are significant principally for land areas and coastal waters, but extend out to the border of territorial waters. For infrastructure such as road or railway bridges and tunnels in the sea, which connect to land areas, planning is normally preceded by a road or railway plan under the Roads Act (1971:948) or the Railway Construction Act (1995:1649). If construction or laying of cables implies encroachment of ancient remains, a permit is also required under Chapter 2, Section 12 of the Cultural Landscape Act (1988:950). Any building of an installation or laying of cables should therefore be preceded by an analysis of whether it will affect any ancient remains, and by consultation with the county administrative board.

Environment and climate

Environmental impact

The construction of bridges and tunnels in the sea is often in shallow areas, and largely near the coast or on offshore banks. The construction of tunnels, foundations and piers cause changes to the conditions for currents, which in turn affects the bottom sediment around them over time. During the construction phase, sediment is stirred up from the sea bed and dredging may be required, with consequences for the natural environment. During the operational phase, new installations may constitute an obstacle to migrating species, both below and above the water. New installations may, individually or in combination with adjacent installations, lead to fragmentation of the landscape. Special protective measures may need to be implemented in

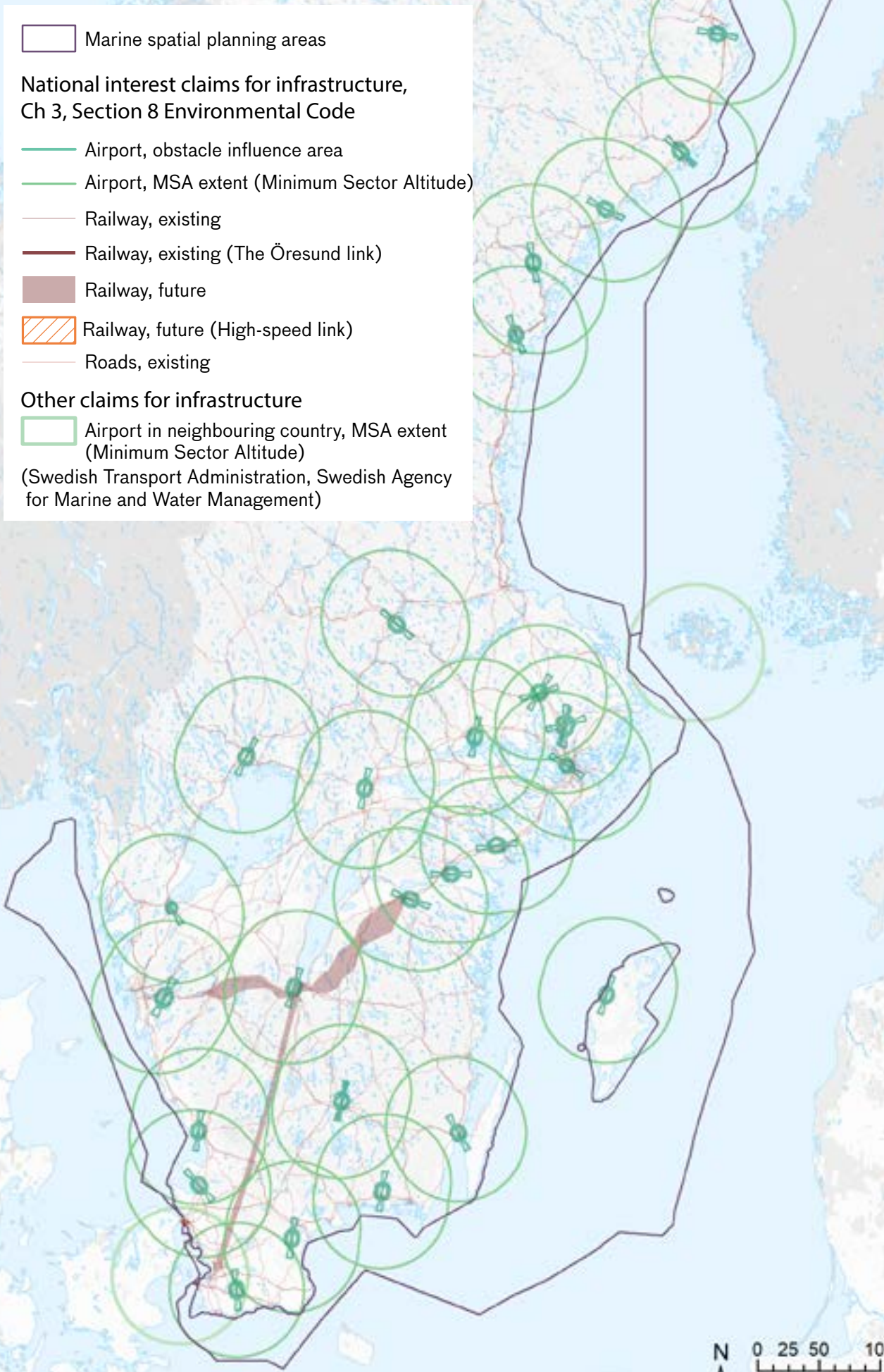


order to reduce the occurrence of disrupting noise and light barriers. Once the installations begin operating, earlier transport patterns become altered.

Climate

The combined effects of altered transport patterns on emissions of greenhouse gases and on the climate need to be analysed for each infrastructure project.

Map 18. Infrastructure: National interest claims and other claims



Culture

Cultural heritage values are significant for people's well-being and identity, and provide context in their lives. The cultural landscape is also important for local and regional economic development. Coastal and archipelagic landscapes have been shaped to a great extent by traditional livelihoods such as fishing, shipping, agriculture, industry and tourism, which in turn developed there because of the connection with the sea. Valuable environments, landscapes and buildings here are associated with archipelagic agriculture, fishing villages and seaside resorts, ports, fortifications, lighthouses and pilot stations, as well as with coastal industries. Cultural heritage values related to the sea can often be interpreted and given context by remains or locales on land.

The planning goal relating to culture is:

- Create conditions for regional development, recreation and preservation of culture values.

The cultural heritage in and by the sea

Swedish waters contain an extensive cultural heritage made up of vessel remains, settlements from the Paleolithic, palings, harbours etc. Maritime shipping has been very intensive over the centuries, which has left a large number of shipwrecks in Swedish waters. There are also submarine landscapes with submerged settlements from the Stone Age, vessel barricades from the Viking Age and the Middle Ages, and the remains of harbours, anchorages and industries. The exact location of many of these remains is unknown, however, due mainly to a lack of systematic inventories. The true number of vessels and other remains of cultural heritage value may be many times greater than the number we know about today.

Of Sweden's 1.8 million registered ancient remains, approximately 20,000 are maritime objects. The majority of these are vessel remains. Approximately 3,400 vessel remains of cultural heritage value have been located and registered (Swedish Agency for Marine and Water Management, 2015b). See Figure 34 on p 194. More recent wrecks may also be of great cultural heritage value as well as scientific value, e g vessels sunk during the two world wars. Cultural heritage remains in the Baltic Sea and the Gulf of Bothnia are often well preserved due to the unique conditions. The low salinity and low temperature of the water mean that there are no organisms that break down wood.

In the south Baltic Sea, Stone Age remains can be found down to a depth of about 30 metres. There are finds here of Paleolithic settlements from the period when there was a permanent land connection between what are now Sweden and the European continent – settlements that were subsequently submerged as the land subsided. There are also traces of flooded landscapes that show the development of landscapes after the Ice Age. These remains, preserved under water, offer great opportunities for increasing our knowledge about the Stone Age. Due to post-glacial rebound in the northern parts of Sweden, however, remains associated with the sea can be found on land there, and the great post-glacial rebound shaped the Höga Kusten landscape in Ångermanland, for example. The cultural heritage in and adjacent to the sea is multi-faceted, and coastal areas and archipelagos are characterised by an abundance of variation, where different stretches of coastline have their unique conditions and their own specific history and identity.

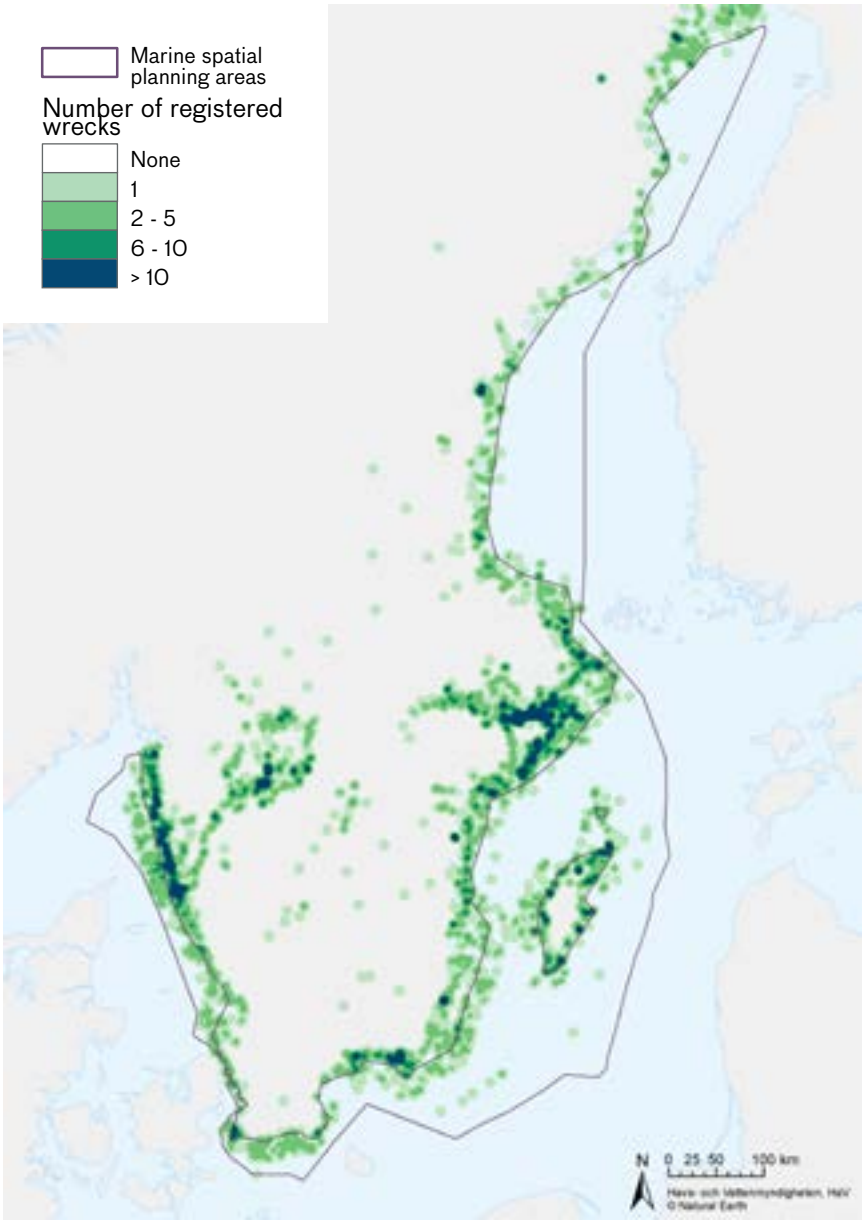


Figure 34. Concentration of ship and boat remains.
(Cultural landscape register, Swedish National Heritage Board. 2019-10-03.)

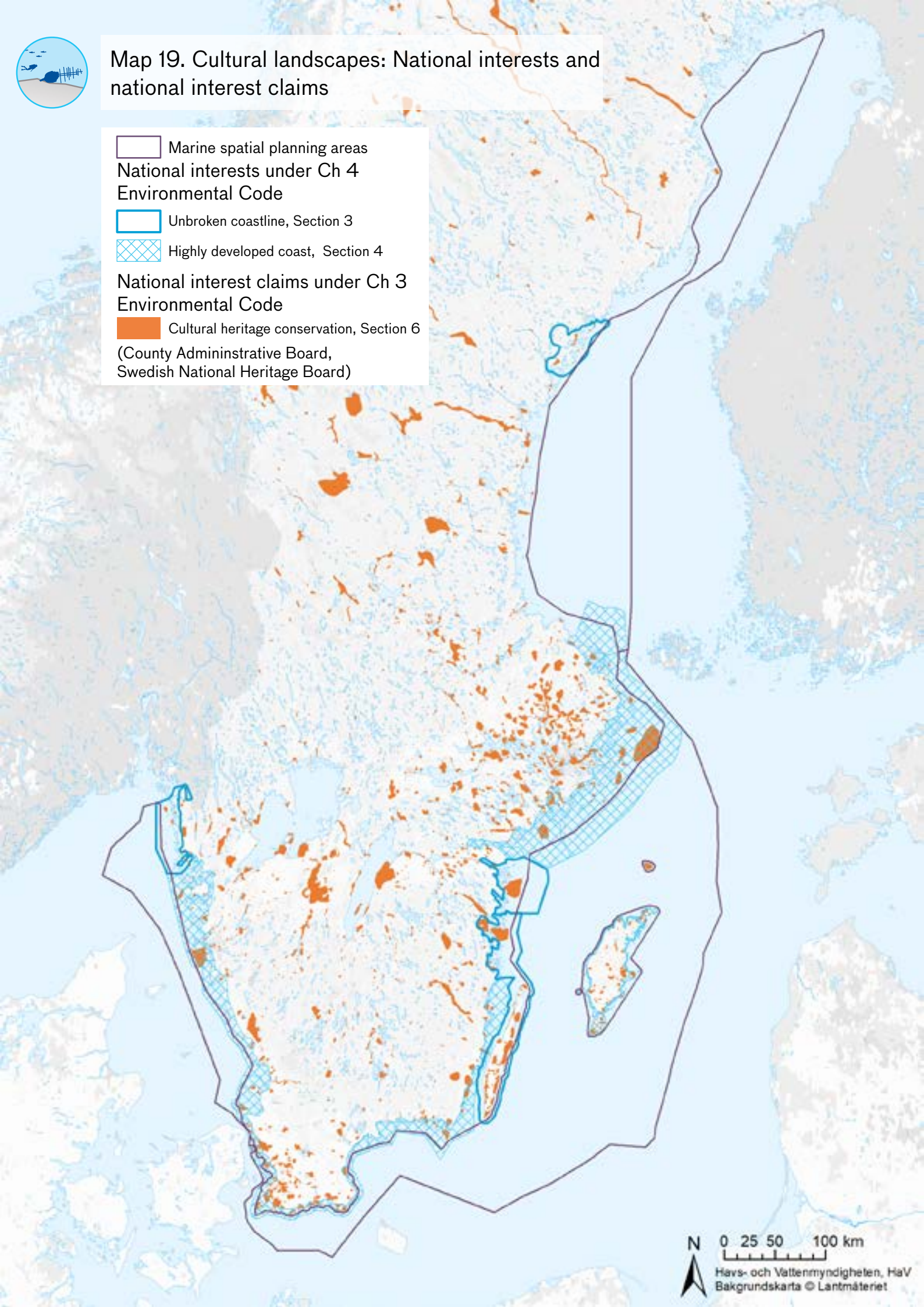
Claims

National cultural landscape goals

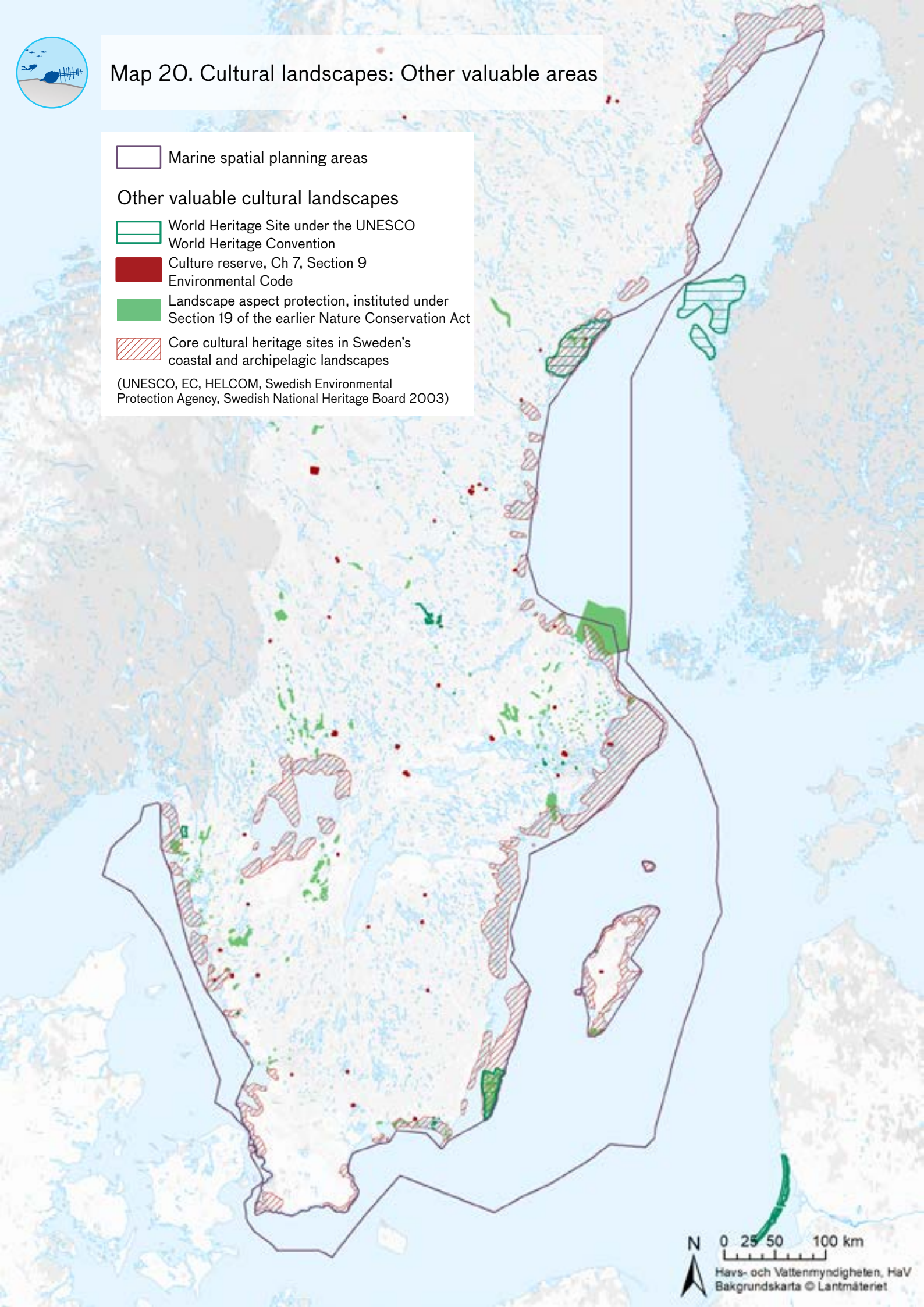
The national cultural landscape goals laid down by the Riksdag state that cultural landscape policy and practice must promote:

- a sustainable society with a multitude of cultural landscapes to be preserved, used and developed
- people's participation in cultural landscape policy efforts and their opportunities to understand and take responsibility for the cultural landscape
- an inclusive society where cultural landscapes are a shared source of knowledge, education and experiences
- a unified view of landscape management, meaning that cultural landscapes are considered and safeguarded in societal development.

Map 19. Cultural landscapes: National interests and national interest claims



Map 20. Cultural landscapes: Other valuable areas



Environmental quality objectives

Realisation of the objective of a good living environment that is sustainable in the long term also includes cultural landscapes. For cultural landscapes, sustainable development means that society and individual citizens, through care and economy, preserve and use the cultural landscape in such a way that historical diversity is safeguarded and that no damage is done to it. The environmental quality objective *Balanced Marine Environment with Flourishing Coastal Areas and Archipelagos* and three of its specifications concern cultural landscapes. Achieving this objective requires that no non-native species and genotypes threaten the cultural heritage, that culture values are preserved and that there are conditions for continued preservation and development of these values. The objective also concerns the archaeological heritage in the form of prehistoric settlements, vessel and other underwater remains, and the maintenance of unchanged conditions for these cultural heritage remains.

National interest claims under Chapter 3 of the Environmental Code

The National Heritage Board determines national interests for cultural landscape conservation under Chapter 3, Section 6 of the Environmental Code.

There are currently no designated areas of national interest for cultural landscape conservation in the area comprehended by the marine spatial plans. Along the coast, however, there are designated national interests which may be affected indirectly by marine activities.

Read more about the national interest claims on Swedish Heritage Board's website.

National interests under Chapter 4 of the Environmental Code

There are geographically delimited areas of national interest specified in the Environmental Code, as determined by the Riksdag. These are the Unbroken coastline national interest under Chapter 4, Section 3 of the Environmental Code and the Highly developed coast national interest under Chapter 4, Section 4 of the Environmental Code.

Considering their nature and culture values, these areas are a national interest in their entirety, and any use of them may not substantially damage their nature and culture values.

The delimitations specified in the Environmental Code are general, and more detailed delimitations may be made in municipal comprehensive planning following consultation with the county administrative board.

Read more about the national interest claims on the website of the Swedish National Board of Housing, Building and Planning.

Other planning assumptions

World cultural and natural heritage sites are judged to be of such value from a cultural or natural landscape perspective that they are a concern for all humanity. They are selected in accordance with the UNESCO World Heritage Convention (National Heritage Board, 2018). The marine spatial planning area includes one world heritage site, Höga Kusten, which also encompasses the Finnish Kvarken archipelago. The world heritage sites of Visby (Hanseatic town), Karlskrona (naval port city), and the agricultural landscape of southern Öland are all adjacent to the marine spatial planning area.

To enable conservation and protection of valuable cultural landscapes, county administrative boards and municipalities can establish culture reserves.

There are some culture reserves along Sweden's coast that border the sea, but none of them are in the marine spatial planning area.

Protection of the aspect of the landscape is an older form of protection from earlier nature conservation legislation, intended to protect large areas from major impacts or changes. The marine spatial planning area includes one area where the aspect of the landscape is protected, near Öregrund and Östhammar.

Core cultural heritage sites are described in a report by the National Heritage Board. These core sites largely coincide with the areas comprehended by the geographical management provisions in the Environmental Code. The report is the National Heritage Board's presentation of a government commission to describe the interests of cultural landscape conservation in relation to wind power expansion in various areas, including coastal and marine areas (Nordström, 2003). The views over the sea are judged to be very important, and the specified core cultural heritage sites include a general consideration distance. To examine how an installation or other activity in the sea could affect a cultural landscape, however, more in-depth studies are needed on the basis of the nature and extent of the activity, and on local conditions.

The European Landscape Convention (Council of Europe, 2000) is intended to improve protection, management and planning of landscapes in Europe. A landscape is defined as an area as it is perceived by people, and whose character is the result of influences by and interaction between natural and /or human factors. The landscape convention also comprehends marine areas.

Biosphere reserves designated by UNESCO are model areas of sustainable development with the intention of using as well as preserving nature in a sustainable way. They are a complement to culture and nature reserves, for example, but do not imply any formal protection. The biosphere reserves of Blekinge Archipelago and Kristianstad Vattenrike are adjacent to the marine spatial planning area.

Development of planning evidence

There is a considerable shortage of knowledge about the marine cultural heritage, in terms of details as well as overviews and compilations. The National Heritage Board's Archaeological Sites and Monuments database has information about all known and registered ancient remains and other cultural heritage sites in Sweden. However, information regarding the sea is incomplete due to a lack of maps, and much information is needed about the location of underwater remains. Marine activities could lead to finds of previously unknown ancient remains in areas that have not been studied. This means that areas without registered ancient remains may contain objects under statutory protection, and particular consideration may be required of activities that affect the sea bed. Areas that have diving schools and clubs are generally those where most vessel remains have been discovered.

National marine spatial planning needs planning evidence which is coordinated between counties, as the cultural heritage in and near the sea is very varied, and differs between Sweden's different landscapes and marine areas. This planning evidence must be possible to use in a strategic plan at the overall level. Both national and local marine spatial planning require planning evidence that specifies the significance of cultural landscape values in planning.

International coordination

The countries around the Baltic Sea collaborate in BalticRIM (2017–2020), an EU project aimed at integrating the marine cultural heritage into marine spatial planning.

Read more about the EU project for integrating the cultural heritage, BalticRIM, online

Legal considerations

The Heritage Conservation Act (1988:950) regulates licensing processes for activities that could affect ancient remains. Ancient remains are protected under the Heritage Conservation Act whether they are known or not. The act states that vessel remains must be regarded as ancient remains if they are from before 1850. However, the county administrative board can determine that vessel remains younger than that are to be regarded as ancient remains, if they have sufficient cultural heritage value. Sweden is entitled to protect archaeological and historical objects on the sea bed in the zone bordering its territorial waters as well. The bordering zone is shown in Figure 3. Borders in the Sea on p 10 in Part 1.

The Environmental Code must be applied in such a way that valuable cultural landscapes are also protected and preserved. Cultural landscapes are included in what are known as the management provisions and in the provisions on environmental impact studies and protection of areas. Municipalities are responsible for cultural landscape matters under the provisions of the Planning and Building Act (2010:900) as well.

Studies and consultation under the Heritage Conservation Act

The Cultural Landscape Act (1988:950) regulates licensing processes for activities that could impact ancient remains.

Marine activities may require an archaeological study under the Heritage Conservation Act. The county administrative board determines the need for archaeological studies, and any alteration to ancient remains requires permission from the county administrative board. The outcome of an archaeological study may indicate that further archaeological study is needed, or that permission to remove an ancient remain is not granted. Early consultations should be held with the county administrative board so that cultural landscape issues are included at an early stage of planning. Information about local planning conditions can serve to reduce the risk of impacts on cultural landscapes. It may be more difficult, for example, to change the location of a subsea cable's land connection at a late stage. When an aquatic area is developed, the influence area on the bottom can be considerably larger than the development area itself.

Environment and climate

Many vessel remains constitute a potential threat to the environment due to the presence of lead, copper and other environmentally hazardous substances.

Climate

Climate change can affect the speed of natural processes such as shoreline displacement and sea bed movements, which in the long term can affect archaeological material on the sea bed. A changed climate can also affect the living conditions in the Baltic Sea for invasive species, i e species introduced to areas beyond their original areas of distribution. Higher water temperatures and altered salinity could allow various wood-eating organisms to become established, which would damage vessel remains of cultural heritage value.

Carbon dioxide capture and storage

The planning goal relating to carbon capture and storage is:

- Prepare for possible future extraction of minerals and for carbon dioxide capture and storage.

Existing use

Carbon dioxide capture and storage means that carbon dioxide from emissions into the air are separated and stored in geological formations deep beneath the sea bed. No carbon dioxide capture and storage is currently being carried out in Sweden, and there are no proposals for such installations.

Local geological characteristics provide the conditions for carbon dioxide storage. Much of Sweden's bedrock cannot be used for carbon dioxide storage because its porosity and storage capacity are too low, but some parts of Sweden have porous bedrock that could be suitable for carbon dioxide storage.

The technique is referred to as CCS, Carbon Capture and Storage. The process comprises capturing and separating carbon dioxide in industry or combustion processes and transporting it to the storage site, where it is then stored in the form of a liquid that is almost as heavy as water. Transportation is either by pipeline to a well installation on the sea bed, or by ship to an injection platform that pumps the liquid into the well. The wells on the sea bed, and the associated pipelines, take up a maximum of around 100 square meters of the sea bed. The platform is like a small oil platform, either on legs anchored to the sea bed or floating on pontoons.

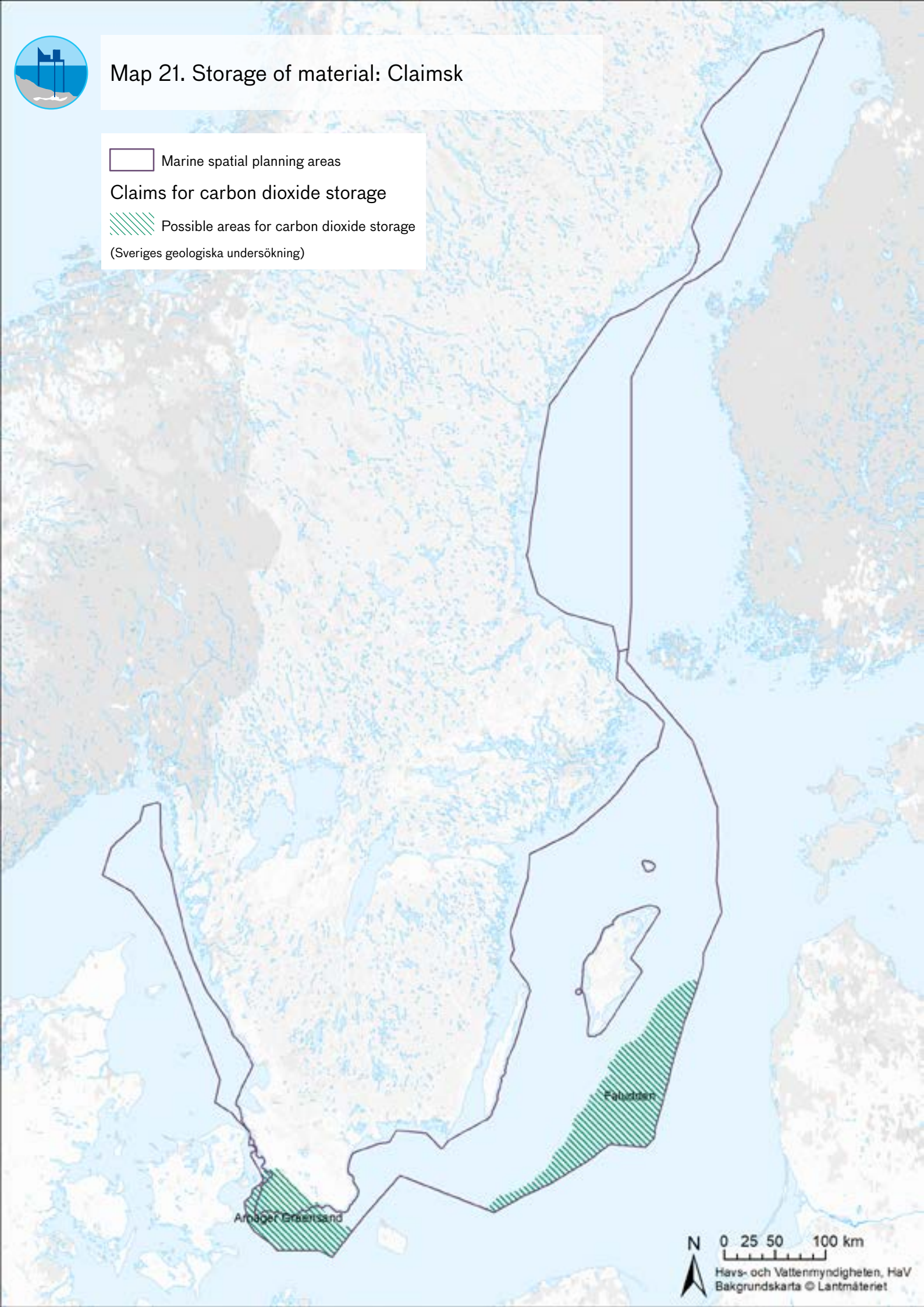
In Sweden the most suitable form of storage is in deep geological formations (known as aquifers) with elevated levels of porosity and permeability. The technique in question is well known and has been tested e g in Norway, where carbon dioxide has been stored since 1996 deep beneath the sea bed in Norwegian parts of the North Sea, and more recently also in the Norwegian Sea and the Barents Sea. A study by the Swedish Geological Survey indicates that more knowledge is necessary regarding aquifers, in order to examine storage capacity. The agency's view is that a cost-effective strategy today would be to carry out new studies of existing collected cores from drilling. (Swedish Geological Survey, 2017b).

Claims

Carbon dioxide capture and storage can be a way of reducing the large-scale emissions of carbon dioxide into the atmosphere by separating it and storing it in bedrock. Sweden has committed itself, through international agreements, to reducing emissions of greenhouse gases and has also adopted its own climate objectives, which include the goal that by 2045 Sweden will not have any net emissions of greenhouse gases into the atmosphere. Environmentally safe geological storage of carbon dioxide is therefore regarded as a key contribution towards meeting set climate goals.

Initial geological assessments indicate that two marine areas in Sweden have good potential for geological storage of carbon dioxide: The Faludden storage facility within parts of the Borgholm formation in the southeast Baltic Sea and the Arnager storage facility within parts of the Arnagergrönsanden aquifer off southwestern Skåne. The most suitable storage facilities need to be identified before more precise planning can proceed. More detailed analysis and mapping data need to include environmental conditions, the bedrock of the sea bed, and geotechnical characteristics.

Map 21. Storage of material: Claimsk



Development and trends

Technological development will be decisive for the role carbon dioxide capture and storage plays in the future.

International coordination

Together, the Nordic countries have a high theoretical storage capacity for carbon dioxide, corresponding to storage of more than 500 years of emissions at current levels (Swedish Geological Survey, 2016b). Much research and data collection on carbon dioxide capture and storage is carried out through international collaboration. Most storage locations for carbon dioxide are in Norway, but Sweden and Denmark also have potential in and near the Skagerrak/Kattegat.

Legal considerations

Under the Ordinance on Geological Storage of Carbon Dioxide (2014:21), geological storage of more than 100,000 tons of carbon dioxide may only occur in Sweden's exclusive economic zone and in areas which are not part of private property in Swedish territorial waters and which lie one nautical mile or more outside of the baseline. This is the same geographical delimitation as for marine spatial planning. Licences are only issued following a licensing examination under the Environmental Code, by the Land and Environment Court, and permission from the government under the Act on the Continental Shelf. This legislation is based on the EU Directive on the geological storage of carbon dioxide, and ultimately on the UN Convention on the Law of the Sea.

The Swedish Agency for Marine and Water Management notes, however, that there are come uncertainties in the Swedish legislation relating to Sweden's commitments under the Helsinki Convention (HELCOM), which may have feasibility implications.

Environment and climate

Safe management and assessment of environmental and health risks are key issues in the introduction of large-scale carbon dioxide capture and storage. The greatest environmental and health impact in connection with this is carbon dioxide leaks, which can lead to acidification of the sea. Under the EU Directive on the geological storage of carbon dioxide, a geological formation may only be selected as a storage location if there is no significant risk of leakage, and if there are no significant environmental or health risks present.

Carbon dioxide storage has a positive effect on the climate since a reduced concentration of carbon dioxide in the atmosphere can counteract ongoing global warming.

Nature protection

Protection of marine environments is one of the tools for achieving good environmental status in the sea. Effective and connected nature protection areas create the conditions for achieving milestone targets within the environmental objective *A Rich Diversity of Plant and Animal Life*. It is important to apply a network perspective in nature protection, so that corridors for animals and plants are strengthened. This serves to underpin a more comprehensive marine green infrastructure aimed at maintaining and reinforcing ecosystems and the services they deliver.

Under Chapter 3, Section 3 of the Environmental Code, land and water areas which are particularly sensitive from an ecological standpoint must be protected wherever possible against interventions that could damage the natural environment. Different forms of protection are specified in Chapter 7 of the Environmental Code and include nature reserves, national parks, and animal and plant protection areas. Chapter 7 also covers other types of protection which do not occur within the marine spatial planning areas, such as beach protection areas.

The planning goal relating to nature protection is:

- Create conditions for a marine green infrastructure and promotion of ecosystem services.

Different types of area protection

Natura 2000 areas

Natura 2000 is a network of valuable nature areas with species or habitats that warrant particular protection from a European perspective. In Natura 2000 areas, habitats must be allowed to develop in a satisfactory way and species allowed to grow into viable populations. Activities or interventions that could significantly affect the environment are not allowed in Natura 2000 areas without a licence.

Natura 2000 areas are designated on the basis of two EU directives, the Species and Habitats Directive and the Birds Directive.

National parks

The Kosterhavet National Park in the Skagerrak/Kattegat is so far the only example of a purely marine national park. The aim is to maintain a distinctive, species-rich marine and archipelago area, as well as adjacent land areas, in an essentially unchanged condition. There are another six national parks by the sea with marine areas of varying size: the Haparanda archipelago, Skuleskogen near Höga Kusten, Ängsö in the Stockholm archipelago, Gotska Sandön, Blå Jungfrun in Kalmarsund, and Stenshuvud on the east coast of Skåne.

Nature reserves

The most common form of protection under Chapter 7 of the Environmental Code is nature reserves established by county administrative boards or municipalities. Marine nature reserves have a marine aim, with a description of how that aim is to be achieved and what marine values are comprehended by the protection. Reserves are also subject to special regulations. Most nature reserves include sea areas as well as beaches and islands, meaning that only parts of them are within the national marine spatial planning area. Nature reserves may only be established on Swedish territory, i e not in Sweden's exclusive economic zone.

Animal and plant protection areas

A county administrative board or a municipality can establish animal and plant protection areas if special protection is needed beyond the provisions of the Species Protection Ordinance or fishing legislation, which protects species e g by means of closed seasons. Animal and plant protection areas in the sea are mainly bird and seal protection areas with restricted access at certain times of the year.

Nature protection and marine protected areas

The term "nature protection" in the marine spatial plans refers to all forms of protection with claims in the sea.

The term "marine protected areas" refers to marine national parks, marine nature reserves and Natura 2000 areas where the existence of nature values corresponding to marine Natura 2000 habitats has been reported. Marine area protection thus does not comprehend all of the protection forms in the Environmental Code.

Marine protected areas are established and managed as part of the national area protection programme.

Existing use

The Swedish Agency for Marine and Water Management and the Swedish Environmental Protection Agency share national responsibility for marine protection areas. The agencies produce general recommendations, manuals, guidelines and other instructional material within their areas of responsibility. They are also entitled to appeal certain decisions under Chapter 7 of the Environmental Code.

County administrative boards and coastal municipalities are entitled to establish marine protection areas in territorial waters. With the Riksdag's consent, the government can declare an area a national park. Following drafting by county administrative boards and the Environmental Protection Agency, the government can designate Natura 2000 areas in territorial waters as well as the exclusive economic zone.

Management of designated marine protection areas is done by county administrative boards regardless of the form of protection and of whether it is in territorial waters or the exclusive economic zone. The exception is municipal marine protection areas, where municipalities themselves are responsible for long term management of the areas. Usually conservation or maintenance plans are drawn up, with the associated regulations, depending on the form of protection in question.

In respect of fishing in marine protected areas, the managing entity (municipality or county administrative board) notifies the Swedish Agency for Marine and Water Management of the need for any fishing regulations to achieve the aims of area protection, in the form of a special request. Depending on the location of the area, a special request about the need for fishing regulations can lead to international negotiations on regulations within the framework of the EU Common Fisheries Policy.

In respect of activities that require a licence, e g energy or sand extraction, operators need to apply for a special Natura 2000 permit in addition to the other licences required for the activity. Applications for Natura 2000 permits are examined by the Land and Environment Court if the other parts of the licensing application are also to be examined by it, or by the county administrative board when the licensing application is for an installation in the exclusive economic zone.

Claims

National and international goals for area protection

In 2010 an international strategic plan for biodiversity for the period 2011–2020 was adopted within the framework of the UN Convention on Biological Diversity, CBD. The plan's goals are known as the Aichi Biodiversity targets. Sweden's undertaking has been linked to the national environmental objective A Rich Diversity of Plant and Animal Life through milestone targets for a proportion of at least ten per cent marine protection in an ecologically representative, connected and functional network.

The target of ten per cent marine protected areas has been met since December 2016. This is mainly due to new and extended Natura 2000 areas that were adopted in December 2016, primarily for the protection of porpoises.

One of these areas, the Hoburg Bank and the Midsjö Banks, is also one of Europe's biggest protected areas.

In 2017 Sweden's marine area protection comprised approximately 13.6 per cent of Sweden's internal waters, territorial waters and exclusive economic zone. The total includes national parks, nature reserves and Natura 2000 areas. The share varies between the marine spatial planning areas, with the biggest share being in the Skagerrak/Kattegat and the smallest in the Gulf of Bothnia. Going forward, efforts in marine area protection are focused on securing its characteristics as an ecologically representative, connected and functional network for the protection of core sites within green infrastructure.

National interest claims under Chapter 3 of the Environmental Code

The Swedish Agency for Marine and Water Management determines national interests for nature conservation under Chapter 3, Section 6 of the Environmental Code, when claims concern marine areas. National interest claims for nature conservation at sea have been drawn up on the basis of criteria such as undisturbedness and number of unique, endangered or vulnerable habitats or species.

Areas designated as being of national interest for nature conservation are ones that have few equivalents in the region, the country or internationally, due to particularly high nature values. Taken together, the designated areas are intended to amount to a good representation of the main characteristics of nature in Sweden. The areas must be protected from interventions that could significantly harm their nature values.

National interests under Chapter 4 of the Environmental Code

Areas specified in Chapter 4, Section 2–8 of the Environmental Code are all national interests with regard to the nature and culture values that exist in them. This means that all Natura 2000 areas are classified as national interests.

International coordination

Protection areas through regional marine environment conventions

Sweden has committed itself to protecting the marine areas indicated within the framework of the Helsinki Convention (HELCOM), referred to as HELCOM MPA, for the Baltic Sea including the Kattegat. In parts of the Kattegat, HELCOM's area overlaps with the Oslo-Paris Convention (OSPAR) and its management area in the Northeast Atlantic. Within OSPAR are area protections known as OSPAR MPAs.

These areas have no statutory protection as such, but in most cases Sweden has chosen areas that are protected as Natura 2000 areas. By being incorporated into HELCOM or OSPAR, they also obtain recognised protection status outside of the EU. Area protection under HELCOM and OSPAR is based on each convention's agreed listing of endangered marine habitats and species.

Sweden's biggest HELCOM MPA is at Höga Kusten, and only a very small part of it is a Natura 2000 area. In 2008–2011 the Swedish Environmental Protection Agency drew up management plans, also known as cooperation plans, with broad-based local support for areas including HELCOM MPA Höga Kusten.

The geographical distribution of marine protected areas is greatest near the coast. Only a a few protected areas, mainly Natura 2000 areas, are located beyond the trawling limit, which lies 3–4 nautical miles from the baseline.

In addition to geographical distribution, the size of the protected area is also significant. Maintenance of viable populations requires a certain area size.

Read more about the national interest claims on the Swedish Agency for Marine and Water Management website.

Read more about national interests on the website of the Swedish National Board of Housing, Building and Planning.

In its presentation of a government commission in the autumn of 2018, the Swedish Agency for Marine and Water Management included a proposal for additions and adjustments in the network of protected areas under HELCOM and OSPAR. The government's instructions were to focus on areas which are currently fully or partly protected by other area protection schemes (Swedish Agency for Marine and Water Management, 2018c). In another government commission during the autumn of 2018, the agency presented possible marine protected areas without local human influence. The approach was to supplement protection under Natura 2000 with protection under HELCOM and OSPAR (Swedish Agency for Marine and Water Management, 2018k).

Ecologically and biologically significant areas

The UN Convention on Biological Diversity (CBD) has identified areas deemed to be ecologically or biologically significant on the basis of scientific criteria. These areas, abbreviated EBSAs (Ecologically or Biologically Significant Marine Areas), do not have any statutory protection as such; instead the identification draws attention to their ecological or biological significance, which is to be taken into consideration in various contexts.

In 2018 nine EBSAs were approved within the framework of the convention. Five of these areas are within the marine spatial planning areas:

- the Northern Bothnian Bay
- the Kvarken Archipelago
- the Åland Sea, Åland Islands and the Archipelago Sea of Finland
- the Southern Gotland Harbour Porpoise Area
- Fladen and Stora and Lilla Middelgrund.

Three of these are transboundary areas shared with Finland.

Coordinated marine spatial planning

Under the EU's Maritime Spatial Planning Directive, member states have to cooperate with each other to coordinate their planning processes. Planning that concerns the sea's ecosystems is a central element of coordinated marine spatial planning, and must apply an ecosystems approach.

Sweden has led two international coordination projects in which several of the countries around the Baltic Sea participated, and has also participated in several others. Baltic SCOPE was carried out in 2015–2017, with six member states around the Baltic Sea cooperating on information exchange and joint recommendations regarding planning issues around commercial fishing, nature, energy and maritime shipping. One recommendation concerned the need to work together on defining, mapping and analysing shortages regarding marine nature values (Baltic SCOPE, 2017).

In 2018–2019 an international follow-up project, PanBaltic SCOPE, increased participation to eight countries and continued to build on conclusions from Baltic SCOPE. Within the *Green Infrastructure and Essential Fish Habitat* activity the goal was to show examples of application of the green marine infrastructure concept. This was done by jointly mapping of transboundary marine nature values and ecosystem services. The participating countries have a shared responsibility for promoting this issue in their respective national marine spatial plans.

Map 22. Nature conservation: National interests and national interest claims, and national nature protection schemes

Marine spatial planning areas

National interests under Ch 4 Environmental Code

Natura 2000, Section 8

National interest claims under Ch 3 Environmental Code

Nature conservation, Section 6

Other nature protection schemes under Ch 7 Environmental Code

National parks, Section 2

Nature reserves, Sections, 4–6

Animal and plant protection areas, Section 12

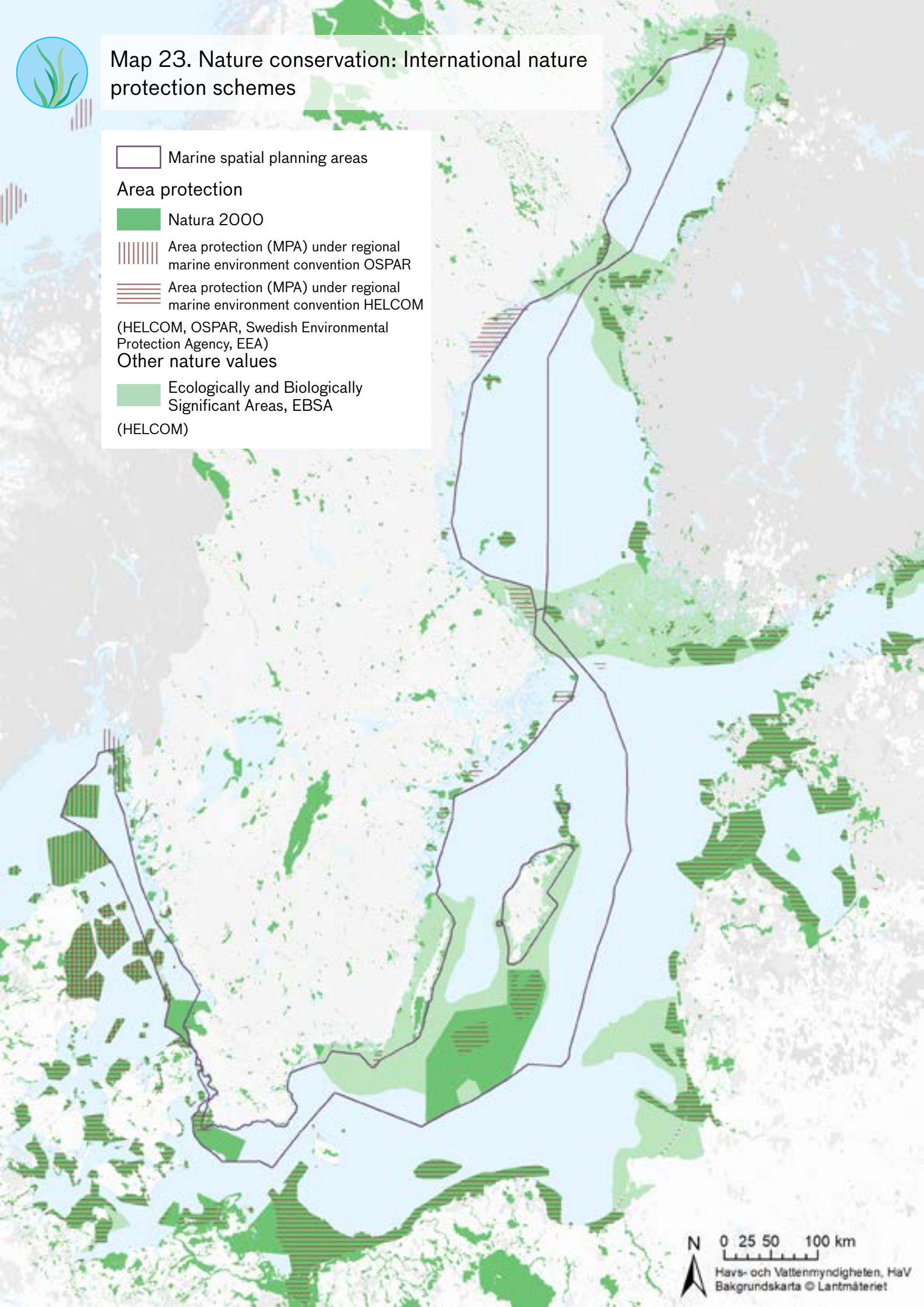
(Naturvårdsverket)

N

0 25 50 100 km

Havs- och Vattenmyndigheten, HaV
Bakgrundskarta © Lantmäteriet

Map 23. Nature conservation: International nature protection schemes



Through the regional HELCOM and OSPAR conventions Sweden also co-operates broadly on the marine environment, including with Russia and Norway – countries that are not comprehended by the joint EU cooperation forum. Within HELCOM there is a special working group for marine spatial planning has been set up in collaboration with the organisation Vision and Strategies around the Baltic Sea (VASAB).

Improvements

Despite earlier and ongoing efforts in marine mapping there is currently considerable uncertainty about marine nature values. Some areas can easily be identified as valuable or sensitive, but a transparent and uniform process is required in order for identification of such areas to be comprehensive and correct. The following mapping projects are relevant for current and future marine spatial planning.

Offshore banks inventories

In 2004 the Swedish Environmental Protection Agency was commissioned by the government to carry out an inventory of marine habitats on offshore banks, i e shallow areas in the open sea. The commission included elucidating the value of the offshore banks from a nature conservation perspective, and also assessing the possibilities of coordinating the interests of nature conservation with those of wind power installation. Two reports (Swedish Environmental Protection Agency, 2006 & 2010) presented several-year mappings of Sweden's offshore banks and a status assessment of marine values by species group and habitat as well as a total, combined value.

In 2016 the Swedish Geological Survey (SGU) was commissioned by the Swedish Agency for Marine and Water Management to undertake further studies of the Hoburg Bank in order to gain a more detailed understanding of and reliable spatial information about the distribution of different species and habitats on the sea bed. The results were presented in a study (SGU report 2020:34) that describes how comprehensive mapping with modern methods is used to produce high-resolution maps of benthic biotopes and habitats, and provide a better picture of the spatial extent of different habitat types as well as the distribution of smaller, rarer habitats.

Symphony – planning evidence

Symphony is an assessment tool for quantitatively calculating the cumulative effect of a variety of environmental impacts – such as trawling, turbidity, noise, and discharges from maritime shipping and land-based activities – on different ecosystem components in the sea. The method was developed by the Swedish Agency for Marine and Water Management for use in marine spatial planning and other marine environment management. The method is based on Halpern et al (2008). With Symphony it is possible to demonstrate the total cumulative environmental effect of different impacts under current circumstances, in a future scenario or as affected through planning. "Total cumulative environmental impact" refers to the total impact of different human activities on marine plant and animal life.

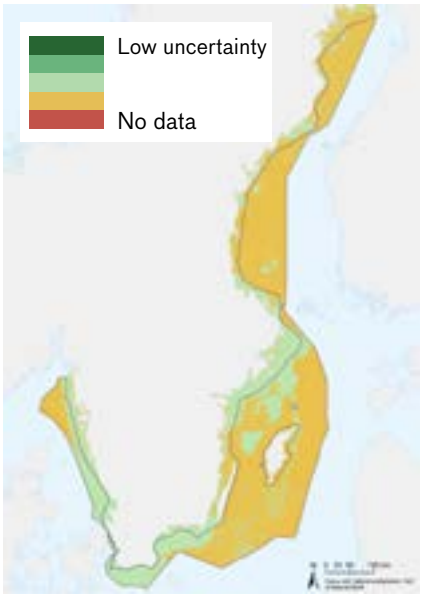


Figure 35. Symphony uncertainty map. Average degree of uncertainty.

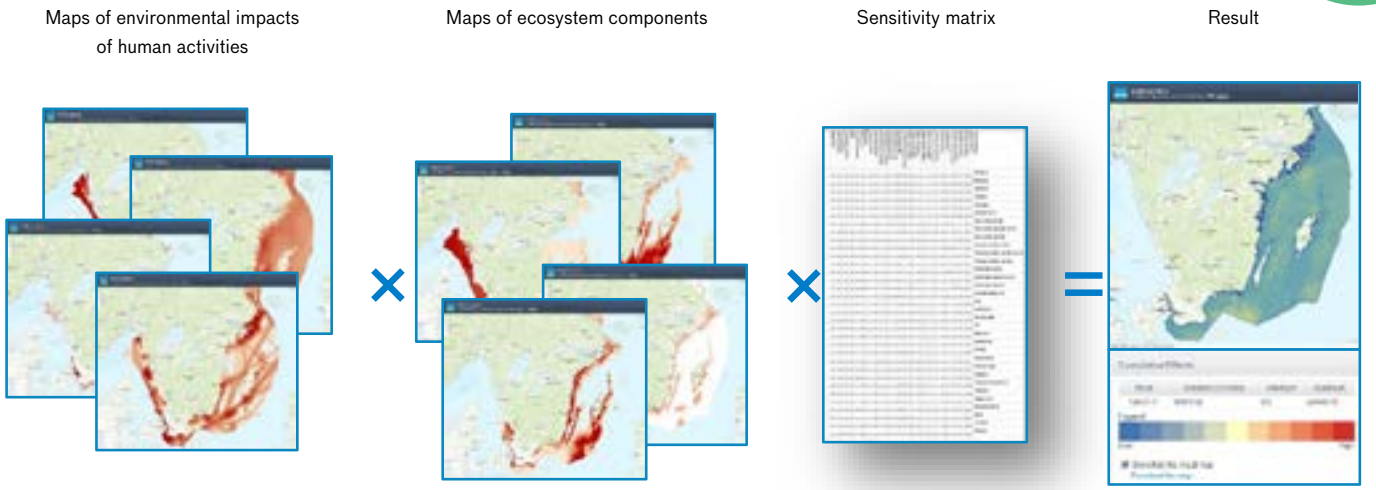


Figure 36. Method in Symphony, cumulative environmental impact. Symphor sum of all activities' impact on all nature values with different sensitivities. The calculation is made for every part of the sea, divided into a grid with quadrangles of 250 x 250 metres.

The calculated cumulative impact is based on mapping of 32 nature values such as reef environments, different species of fish or bird, and mussel colonies. The data is collected from e g the Swedish Geological Survey (SGU), the Swedish Meteorological and Hydrological Institute (SMHI), and the Swedish University of Agricultural Sciences (SLU). The sensitivity of nature values to various impacts is assessed by scientific experts, with an associated assessment of uncertainties relating to the level of knowledge regarding different components. Symphony calculates the sum total effect of all impacts on all nature values with different sensitivities at every location in the sea as divided into a grid of 250 m x 250 m cells. This sum is expressed using a colour scale that makes it easier to see areas of high and low impacts respectively.

In addition to calculating cumulative impacts related to the uses in marine spatial planning, Symphony provides an overall, large-scale picture of the sea's nature values. This has been used as planning evidence in the planning process, and is referred to as the Symphony Green Map (or the Green Map 3). See Figure 37.

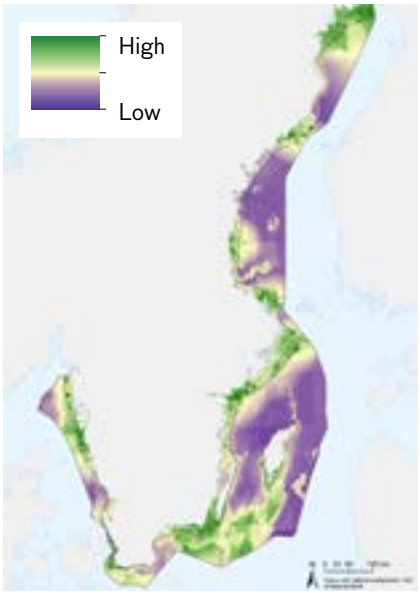


Figure 37. Symphony Green Map. Aggregated nature values. Average per planning area of Symphony's total nature values. Based on combined categories of sea bed environment, fish, mammals and birds.

National marine mapping

The national marine mapping (Nationell marin kartering) project is run by the Swedish Agency for Marine and Water Management and aimed at producing comprehensive biological maps of the sea bed and the surrounding habitats in all of Sweden's marine areas. It is an ongoing, several-year project supported by coastal county administrative boards, intended to produce uniform and comparable mappings for use in marine management.

National and regional action plans for marine area protection

Management of marine protected areas is currently in an active phase. A national action plan for marine area protection (Swedish Agency for Marine

Read the report on the Symphony tool in Symphony – Integrerat planeringsstöd för statlig havsplanering utifrån en ekosystemansats (Symphony – Integrated Planning evidence for National Marine Spatial Planning with an Ecosystem Approach) and view clickable maps in the report's annexe

and Water Management, 2016b) has been drawn up, and three regional action plans for area protection are being developed. One of the purposes of the regional action plans is to identify shared conservation goals for existing and future marine area protection schemes in three regional areas that coincide geographically with the three marine spatial planning areas.

Regional action plans for green infrastructure

In 2015 all of Sweden's county administrative boards were instructed by the government to draw up regional action plans for green infrastructure. The Swedish Environmental Protection Agency has the overall coordinating responsibility for this, with the Swedish Agency for Marine and Water Management providing coordination and knowledge regarding marine green infrastructure. An important element of the knowledge support provided by the Swedish Agency for Marine and Water Management has been a proposal for a framework for nature value assessments in marine environments, called Mosaic. The framework can be used by coastal county administrative boards to develop methods and supporting evidence that promote the preservation of nature values and ecosystem services in a uniform manner for their respective management areas, and create a basis for a well-functioning green infrastructure that takes the entire landscape into account.

The county administrative boards' action plans were circulated for comment in 2018. This material was analysed with the help of the Swedish Geological Survey (SGU), and proposals have been made for revised areas within the marine spatial planning area. The overall picture from SGU is that the marine parts of the green infrastructure that extends into the marine spatial planning area is highly varied, with an emphasis on Skagerrak and Öresund. There is furthermore a considerable difference in the methodology of the action plans, which were largely drawn up in accordance with or inspired by the Mosaic framework (Swedish Geological Survey, 2018c). Regional action plans and their future development will eventually become an essential basis for marine spatial planning and the further development of national marine spatial plans.

Conservation plans for Natura 2000 areas

County administrative boards are responsible for producing conservation plans for Natura 2000 areas. Conservation plans include descriptions of what species and habitats are to be protected. Use of the sea in and near existing and planned protected areas must not damage indicated values warranting protection, or cause disruption to the species it is intended to protect in such a way that conservation in the area becomes significantly more difficult.

Additional needs

From an overall perspective there is a need for continued mapping of the marine environment and an improved understanding of how different uses impact it and marine ecosystem services. More specifically there is a particular need for improved planning evidence for high nature values with regard to climate refuges. The same applies for the routes of migrating birds and bats which may be impacted by fixed installations in the sea. There is also a need for more knowledge and improved planning evidence regarding the impact of defence activities on high nature values.

Green infrastructure

Green infrastructure is nature networks that contribute to functioning habitats for plants and animals, and to human well-being.

"Green infrastructure constitutes ecologically functional networks of habitats and structures, nature areas and built elements which are shaped, used and managed in such a way that biodiversity is preserved and ecosystem services which are important for society are promoted throughout the landscape."

See the Swedish Agency for Marine and Water Management's website, green infrastructure

Recreation

Outdoor life, recreational fishing and sea and seaside tourism include landscape and nature experiences as well as various outdoor activities. They also include visits to cultural landscape sites such as fishing villages, lighthouses and pilot stations, as well as shipwreck diving. These sites are significant for local identity, well-being and quality of life.

Areas that are attractive for visitors are important for regional development and for the development of maritime industries. Proximity to the sea, high nature values and cultural heritage values make coastal landscapes attractive for living and recreation as well as for growing national and international tourism.

Recreation mainly takes place along the coast, in areas that are only partially included in national marine spatial plans, even if quite a few activities take place at sea as well. Opportunities for recreation along the coast may be affected by marine spatial planning at sea.

The planning goals relating to recreation are:

- Create conditions for regional development, recreation and preservation of culture values.
- Create conditions for good accessibility.

Existing use

Friluftsaktiviteter

Many different types of outdoor activities are done in or by the sea, such as water sports, diving, hunting and kayaking. Sweden has a rich biological marine life. There are many well-preserved wrecks which are of interest to divers. Snorkel routes have been arranged in certain locations in order to promote interest in the underwater environment.

Birdwatching is a popular outdoor activity which depends on bird populations. Hunting of seabirds among other prey also occurs along the coast and is often organised by companies.

Recreational boating

In 2015 the number of seaworthy leisure craft in Sweden was estimated at 765,000, and there are more than 1,500 marinas of which just over 400 are classified as guest harbours (SweBoat, 2018). The Skagerrak/Kattegat and the Baltic Sea each account for around 45 per cent of overnight stays, while the Gulf of Bothnia accounts for just over 6 per cent. Of overnight stays in guest harbours in 2017, 37 per cent were by foreign-registered boats, primarily from northern European countries. Day trips and fishing trips are the most common uses of motorboats, while sailing boats are more used for longer trips with overnight stays. International cruise tourism is of significant volume in Swedish ports, and is expected to grow.

Recreational fishing

Recreational fishing refers to fishing for recreation or for home consumption of the catch. The catch may not be sold. Conditions for recreational fishing are good in Sweden, and it is a popular activity. 1.3 million people engaged in recreational fishing in Swedish waters on at least one occasion in 2018, and together they spent SEK 9.9 billion on expenses and investments such as boat purchases, fishing permits and travel. Of the total number of recreational fishing days in Sweden, 30 per cent were for recreational fishing

in the sea and along the sea coasts (Statistics Sweden, 2019a). Recreational fishing includes all fishing that is not carried out with a fishing licence or a personal fishing licence. Recreational fishing is divided into sport fishing and subsistence fishing depending on the type of equipment used and what the object of the activity is. Equipment can be handheld equipment in combination with a limited amount of other equipment, primarily nets and cages. The term "sport fishing" is normally used for fishing with handheld equipment. Some recreational fishing is by means of organised charter boat trips, not least in Öresund. Charter boat fishing makes recreational fishing accessible and also creates local jobs.

Recreational fishing is most popular during the summer months, but is also done during the winter on the sea ice. This includes jig-fishing, which is done through a hole drilled in the ice (Swedish Agency for Marine and Water Management, 2019a). Recreational salmon fishing is done at sea using trolling, and in coastal areas primarily by fishing with pound nets. Trolling and fishing by hand line is not included in free hand equipment fishing in private waters on the east coast. Most recreational fishing is ordinary rod and line fishing. Since recreational fishing is often done close to where the person fishing lives, the intensity of the fishing is often related to population density and is spread out along the entire coast. But there are other factors as well, such as areas protected from the wind and rain, access to services, and the attractiveness of the fish populations.

Recreation in the Gulf of Bothnia

Tourist sites and viewpoints by the sea, and guest and natural harbours for leisure craft have a considerable significance for outdoor life and the tourism industry in coastal areas of the Gulf of Bothnia. A particularly important area is Höga Kusten, with its topographically varied coastline and traces of the world's biggest post-glacial rebound. The Bothnian Bay archipelago, with excursion boat traffic, ice roads, a large number of tourist destinations and more than 4,000 islands, is also of considerable importance. When the ice thickness permits, popular winter sports include kick-sledding, skating and skiing on the ice.

The recreational areas are important for regional development with respect to accommodation, outdoor life and tourism. It is estimated that the potential for developing the tourism industry is considerable, as the relatively undeveloped Norrland coast is very attractive and offers plenty of opportunities for sport fishing.

Recreational fishing is an important outdoor activity in the Gulf of Bothnia. Statistics show that Swedes spent around 390,000 fishing days in the coastal and marine areas of the Gulf of Bothnia in 2017 (Statistics Sweden, 2018a). The most important species are perch, whitefish, herring and pike (Swedish University of Agricultural Sciences, 2017a).

Recreational fishing in the Gulf of Bothnia reaches its peak in the summer, but is a popular activity all year round. In winter when the sea freezes over, people go ice fishing by drilling holes in the ice and using nets, rods or an "angeldon". 70 per cent of all wintertime recreational fishing in the Gulf of Bothnia is jig-fishing (Swedish Agency for Marine and Water Management, 2019a).

Recreation in the Baltic Sea

The Baltic Sea area includes the metropolitan regions of Stockholm and Malmö, Sweden's largest islands Gotland and Öland, unique transboundary archipelago environments and areas of great significance for holiday homes and outdoor life.

Conditions on land vary, from Skåne's sandy beaches via the limestone cliffs of Gotland's coasts to Stockholm's archipelago with its islands and skerries of gneiss and granite. In the more densely populated coastal areas of Skåne and Stockholm county, the pressure on attractive coastal areas is considerable. On Gotland and Öland the leisure and tourism sectors are important for regional development. In the Stockholm Archipelago and the sea beyond it are valuable areas for outdoor life.

Öresund is densely populated and one of the most developed areas in Sweden, with intense leisure craft traffic and regular fishing tours on excursion boats. Along Sweden's southwest coast are valuable nature environments that provide opportunities for outdoor life, the hospitality sector and activities such as sport and shipwreck diving.

Large sections of the Gotland coast have untouched and varied natural landscapes which are used by both permanent residents and tourists for outdoor life. There are also many old and well preserved fishing villages with a high cultural heritage value along the coast. The Hoburg Bank, Salvorev and Gotska Sandön are Sweden's most important bird areas in the Baltic Sea, which along with Natura 2000 areas in the coastal zone are important destinations for outdoor life, recreation and birdwatching.

Recreational fishing is an important outdoor activity in the Baltic Sea area. Statistics show that Swedes spent around 1.8 million fishing days in the Baltic Proper and Öresund in 2017 (Statistics Sweden, 2018a). Most recreational fishing in the Baltic Sea is near the coast.

Pike and perch are the most commonly caught species in recreational fishing in the Baltic. Other species include cod, whitefish and flatfish (Swedish University of Agricultural Sciences, 2017a). Trolling for salmon also occurs, particularly in the Simrishamn area as well as off other parts of the Skåne and Blekinge coasts.

Recreation in the Skagerrak/Kattegat

Tourism in the Skagerrak/Kattegat is growing and development pressure is considerable in the coastal zone. The population of Halland doubles during the summer, while the population of northern Bohuslän increases fivefold. Recreational boating is extensive here as well, and 27 per cent of all boating-related overnight stays in Sweden are in northern Bohuslän (Swedish Agency for Marine and Water Management, 2015b).

The entire coastal zone is important for regional development with respect to accommodation, outdoor life and recreation, with activities including swimming, diving and recreational boating. The Koster Archipelago in the Skagerrak has very high outdoor values, which is illustrated e g by the Kosterhavet National Park.

The Skagerrak also has extensive leisure craft traffic along routes between the Gothenburg area and Jutland and Läsö in Denmark. The Kattegat, in the southern part of the marine spatial planning area, also has a great deal of leisure craft activity, making the area the busiest one in terms of traffic.

Recreational fishing is a significant outdoor activity in the Skagerrak/Kattegat. Statistics show that Swedes spent around 1,250,000 fishing days in the Skagerrak and Kattegat coastal and marine areas in 2017 (Statistics Sweden, 2018a). Most recreational fishing in the Skagerrak/Kattegat is thought to be near the coast. In the Skagerrak most fishing is by boat, while in the Kattegat about half of all fishing is by boat and half from land. In terms of quantity, mackerel is the most important species by far for recreational fishing in the Skagerrak/Kattegat. Other species include cod, crab, lobster and flatfish (Swedish University of Agricultural Sciences, 2017a).

Claims

Outdoor life, recreational fishing and tourism have varying needs in the sea, including high nature and culture values, good accessibility and services, good water quality and rich plant and animal life (e g viable fish populations with natural size distribution). The tourism industry is expected to continue growing, thus creating conditions for further development along the coast. This may also increase the pressure mainly on the coastal zones of the metropolitan regions, and therefore affect and be affected by developments in the sea.

Policy goals

In 2012 the Riksdag adopted ten goals for the implementation of outdoor activities policy, to be achieved by 2020. These state that:

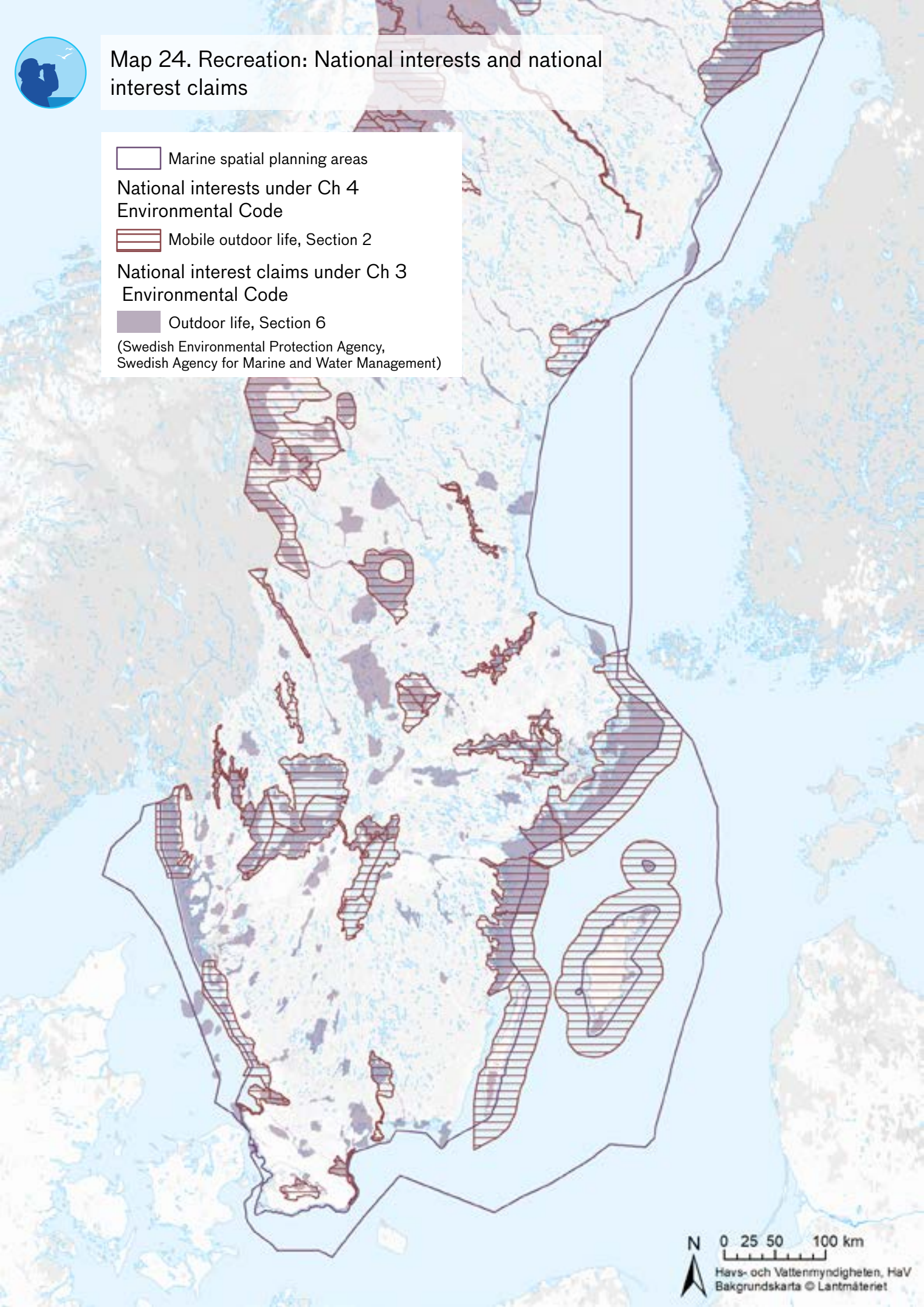
- nature must be accessible to all
- personal and non-profit involvement are of central importance
- the public right of access be upheld
- sustainable use of nature consider the needs of outdoor life
- municipalities have a major responsibility for nature close to population centres
- outdoor life contribute to rural development and regional growth
- protected areas are an asset to outdoor life
- recreation has a given role in education
- physical activity and relaxation improves public health
- decisions regarding outdoor life be made on the basis of good knowledge.

Read more about outdoor activities policy on the websites of the Public Health Agency of Sweden and the Swedish Environmental Protection Agency.

National interest claims under Chapter 3 of the Environmental Code

"Outdoor life" refers to time spent outdoors in natural and cultural landscapes for well-being and nature experiences. The national interest claims for outdoor life are defined as areas with considerable values due to particular nature and culture qualities, which include possibilities for recreational fishing. A varied landscape is an important nature quality for outdoor life.

Map 24. Recreation: National interests and national interest claims



An area is deemed to be of national interest for outdoor life if its nature and/or culture qualities and accessibility to the public makes it currently or potentially attractive to visitors from far away. Other areas may also be of national interest for outdoor life if they are important for the outdoor life of many people and are much used for this purpose. This applies above all to the three metropolitan regions, where the need for nature close to population centres must be given particular consideration.

The Swedish Agency for Marine and Water Management determines national interests for marine outdoor life under Chapter 3, Section 6 of the Environmental Code. Along the coast there are national interest claims that may be affected by maritime activities.

Read more about the national interest claims on the Swedish Agency for Marine and Water Management website.

National interests under Chapter 4 of the Environmental Code

There are also geographically delimited national interest areas for outdoor recreational exercise under Chapter 4, Section 2 of the Environmental Code, which have been determined by the Riksdag.

These areas have nature and culture qualities high enough to make them currently or potentially attractive to visitors from all or most of the country, or to visitors from abroad. The interests of tourism and outdoor life – primarily outdoor recreational exercise – must be given particular consideration in licensing examinations for developments or other interventions in the environment.

Read more about national interests on the website of of the Swedish National Board of Housing, Building and Planning.

The delimitations specified in the Environmental Code are general, and more detailed delimitations may be made in municipal comprehensive planning following consultation with the county administrative board.

Improvements to planning evidence

There is a need for integrated planning evidence from a local perspective, uniformly compiled in coordination between counties, so that national marine spatial planning can address local interests.

International coordination

Leisure craft traffic and fishing excursion activities in the sea between Sweden and our neighbouring countries is intensive. During the summer in particular, this can lead to crowding and competition over space in marine areas.

Environment and climate

Environmental impact

Outdoor life and tourism involve a large number of activities which to varying degrees require access to a healthy sea and various ecosystem services. But while tourism and outdoor life require ecosystem services from nature, the activities they involve also affect the environment adversely in several ways.

Motorised traffic at sea, from large cruise ships to small motorised leisure craft, causes discharges into the sea. Recreational boating may also have an adverse impact through mechanical wear on sea beds in valuable shallow

areas such as eelgrass meadows. Jetties can also lead to the disappearance of eelgrass meadows. Other forms of transportation in outdoor life and tourism also use motorised vessels to a large extent. Holiday homes and commercial accommodation produce sewage water that leads to discharges of nitrogen and phosphorus into the sea. In this way, land-based tourism and outdoor life also contribute to the eutrophication of the sea.

Other pollutants in the sea come from various types of boat paint. These pollutants are found in the water and bottom sediment, and accumulate in fish and shellfish. Tourists who holiday by and in the sea also contribute to marine waste, which is washed ashore or left on the beach. The environmental impact of the transport system, in the form of emissions, noise and consumption of finite resources is also caused partly by tourism. Noise from jet-skis and other motorised leisure craft is a growing problem. Disruptive leisure activities such as these can discourage other types of tourism and outdoor life. As tourism increases, so the risk increases that areas with high nature values become overdeveloped and that plant and animal life are adversely affected, e g by anchoring and the intensive use of natural harbours.

Climate

Increasing levels of tourism may mean bigger emissions of carbon dioxide, since many foreign tourists travel long distances, often by air. Cruise ships and motorboats also cause such emissions. Climate changes may affect the conditions for tourism and outdoor life in several ways. A warmer climate could eventually jeopardise the annual formation of ice on the Bothnian Bay archipelago, thus shortening the double tourist seasons here, in summer and winter. A warmer climate could also, in the long term, make holidaying in Sweden more attractive. On the other hand, increased rainfall during the summer could have the opposite effect. Changes in temperature and salinity affect fish populations and the conditions for recreational fishing. In the north of Sweden, rising sea levels may affect coastal conditions in the very long term. In Skåne, where land is already subsiding, this tendency may be reinforced, leading to increased beach erosion.

Maritime shipping

Maritime shipping is a global sector of great importance for Sweden, affecting 90 per cent of our exports and imports by volume; it is also important for the transportation of passengers (Swedish Transport Administration, 2013). Vessels primarily ply an extensive network of navigation channels and shipping routes in Sweden's seas and larger lakes. Industry is dependent on an effective transport system as this affects geographical transaction costs. Maritime shipping is most important for raw material intensive export industries and for other industrial sectors that export large volumes. It is furthermore significant for the civil defence objective of maintaining Sweden's supply of goods and services.

The planning goals relating to maritime shipping are:

- Create conditions for sustainable maritime shipping.
- Create conditions for good accessibility.

Existing use

Sweden's system of navigation channels is divided into four classes of channel, with classes 1 and 2 primarily used for commercial shipping. Classes 3 and 4 are intended for smaller shipping vessels and leisure craft traffic. All navigation channels have restrictions regarding the size of vessels that may use them. They have different standards of signage, adapted to the type of traffic for which they are intended. Beyond the archipelagos there are what are known as shipping routes, without signage, that link the navigation channels. Shipping routes can change in winter, as vessels then take the most navigable route, with or without assistance from icebreakers. Vessels also navigate outside of the shipping routes described in planning or as national interests. In reality, maritime traffic can use all areas that do not have explicit restrictions or technical obstructions.

Route systems

Route systems are intended to reduce the risk of accidents. The term "route system" comprises traffic separation schemes (TSS), one-way and two-way lanes, recommended lanes, deep-water lanes and areas with prohibitions.

The UN's International Maritime Organisation (IMO) is the international body empowered to establish and adopt regulations on route systems for international maritime shipping. Route systems are recommended, but may be made mandatory through a decision by the IMO. Such changes are negotiated with all of the IMO's member states.

Goods flows

Of port freight volumes, which in 2017 amounted to roughly 175 million tonnes (Trafikanalys, 2018), around four-fifths was transported by cargo ships while ferries accounted for one-fifth. Gothenburg is the biggest port, with 41 million tonnes of freight handled in 2017. Goods flows to and from Sweden primarily involve the major transoceanic ports on the North Sea and the English Channel, such as Antwerp, Rotterdam and Hamburg. Goods transports using international maritime shipping have increased over the last decade, while domestic transports have remained largely constant. In a normal year, domestic maritime shipping only makes up about seven per cent of total maritime transports, calculated as a share of goods carried. Petroleum products, minerals, limestone and cement are the most common goods.

Passenger traffic

Passenger traffic is also of great importance. In addition to the significant passenger traffic between the mainland and Gotland, there is a large number of international ferry links. In total, about 26 million passengers travel using maritime traffic in Sweden every year, which is a couple of million more than the total number of air traffic passengers. Sweden has ferry links with Norway, Denmark, Germany, Poland, Lithuania, Latvia, Estonia, Russia and Finland.

Ports

Sweden's ports are important logistics hubs in regional, national and international goods transport chains. There are more than a hundred ports in Sweden – general purpose ports as well as industry ports of varying size – that handle goods and serve as freight terminals for transhipment from maritime shipping to roads and railways. The ports fulfil different functions in the transport system, which has determined their location and specialisation in various types of goods. The EU has designated core ports in the Trans-European Transport Networks (TEN-T). These are considered strategically important and are prioritised, and connect with the nine TEN-T core network corridors. Five of these core ports are in Sweden and belong to the Scandinavian-Mediterranean corridor: Luleå, Stockholm, Gothenburg, Malmö/Köpenhamn (CMP), and Trelleborg. A further 21 Swedish ports are part of the overall TEN-T network (Ministry of Enterprise and Innovation, 2018). The ten biggest ports in Sweden account for about two-thirds of the goods turnover (Swedish Transport Administration, 2013).

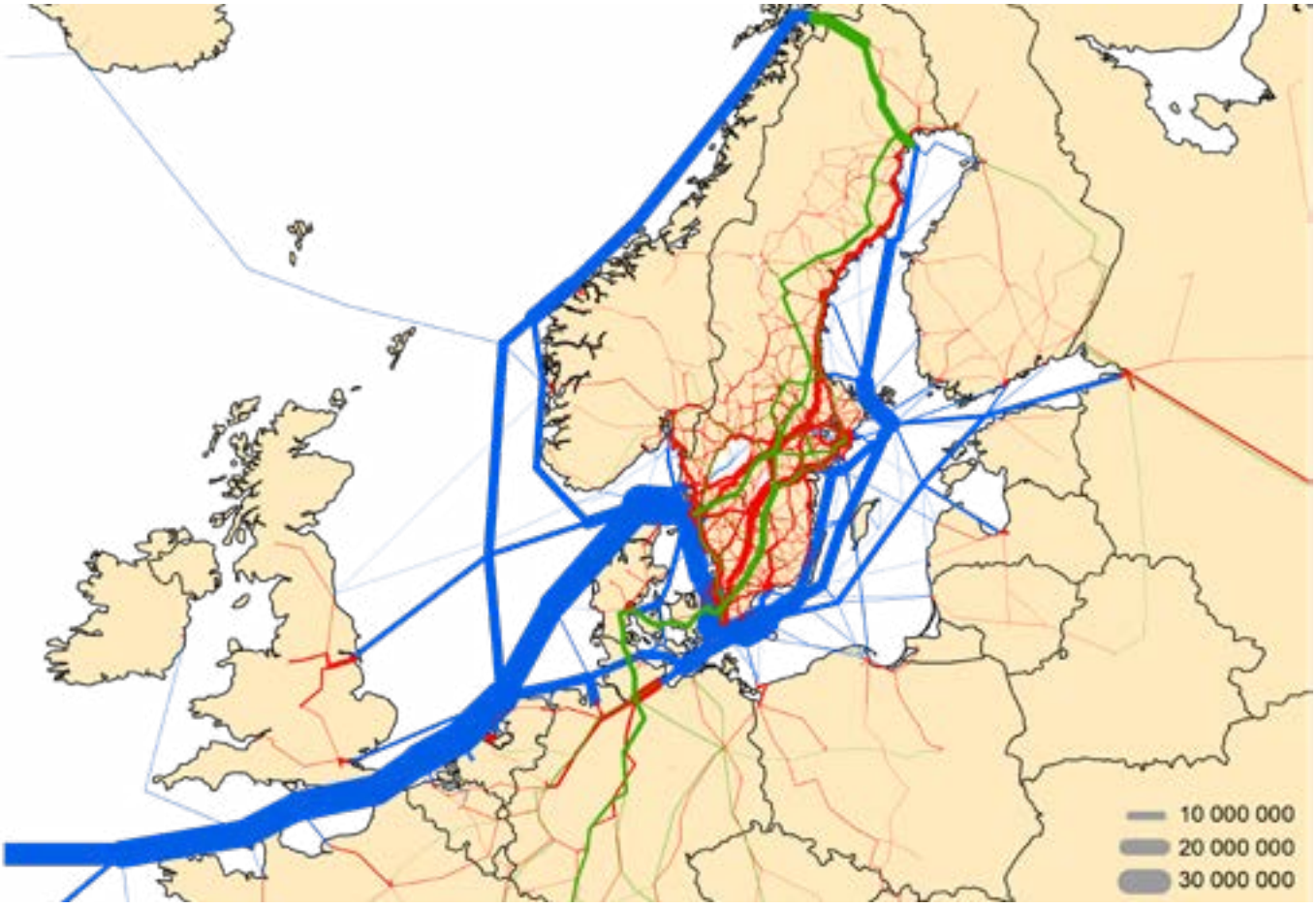


Figure 38. Total flows, in tonnes per month, using maritime shipping (blue), railways (red). (Source: Trafikanalys 2016).

Maritime shipping in the Gulf of Bothnia

Many large and important industries in Norrland use the sea route for their transports, with traffic to Finnish as well as Swedish ports before most of the goods reach end users in Central Europe or the United Kingdom. Winter conditions in the Gulf of Bothnia are difficult, however, with thick and extensive sea ice. During normal or harsh winter conditions, the entire north and central Baltic Sea is covered in ice. This affects the conditions for maritime shipping, which needs large areas and access alternative shipping routes in order to ensure navigability. Maritime shipping has limited manoeuvring space in the North Bothnian Sea and North Kvarken, and is subject to a traffic separation scheme (TSS) due to depth conditions and the narrow passage.

Maritime shipping in the Baltic Sea

Maritime shipping is extensive throughout the Baltic Sea. There are several important ports along the Baltic Sea coast. Maritime traffic is to the mainland coast as well as to Gotland and farther north or south, to both Swedish and foreign ports. West of Gotland, most of the traffic has Swedish destinations, while international traffic to and from the Gulf of Finland and the Baltic states dominate to the south and east of Gotland.

There are three alternative routes for maritime traffic to and from the Baltic Sea: Öresund, the Kiel Canal and the Great Belt. The busiest shipping route in the Baltic Sea is the Öresund route which runs in the South Baltic Sea along Sweden's south coast in a system of traffic separation schemes.

Maritime shipping in the Skagerrak/Kattegat

SMaritime traffic is extensive throughout the Skagerrak/Kattegat, including near the coast, and there are several ports with considerable significance for Sweden's foreign trade. A large share of the traffic to and from the Baltic Sea passes through the Kattegat and Öresund. Shipping routes then extend through the Skagerrak and out into the North Sea and the Atlantic.

Maritime traffic in Kattegat is important and extensive as the area is one of only two routes into the Baltic Sea for large vessels. Shipping routes extend throughout the marine area, with several running north to south and in to the ports along the coast on the Swedish as well as the Danish side.

In the south, outside Stora and Lilla Middelgrund, vessels have the choice of passing through Öresund or the Great Belt, both of which limit vessels' maximum height and draught. The Great Belt Bridge limits vessels' height. In order to guarantee safe maritime traffic in the shallow waters of the Kattegat, new traffic separation schemes were adopted in 2018 on both sides of the offshore banks (International Maritime Organisation, 2018). These measures come into force during 2020.

The Skagerrak/Kattegat is home to Sweden's two biggest ports, Gothenburg and Brofjorden. Maritime shipping is therefore spread throughout the maritime planning area, with several shipping routes from Oslo in the north to Kattegat in the south, and in towards the coast as well as out past Skagen towards the North Sea.

Claims

Vessel size and goods volumes in Swedish ports have increased substantially in recent decades, while the number of vessels has fallen. Goods transports are continuing to grow for all transport modes, but maritime shipping shows the greatest growth, with an average annual increase of 2.3 per cent during 2018–2029. This suggests a total increase of almost 30 per cent by 2029. Additionally, the national goods transport strategy includes promoting the transfer of road and rail goods transports to maritime shipping. This is part of an ongoing development towards sustainable maritime shipping, intended to reduce the environmental impact of transportation.

The space required for maritime shipping in and across the sea is currently under considerable pressure. Maritime shipping is carried out in all the areas comprehended by marine spatial plans, and its total need of space is much greater than the areas designated for maritime shipping use in the marine spatial plans. Maritime shipping is expected to increase in the future, meaning that maintenance of existing specially designated areas is of the greatest importance for ensuring navigability and accessibility. Altered patterns of trade and demands for new links may eventually increase the need for specially designated areas.

Technological development

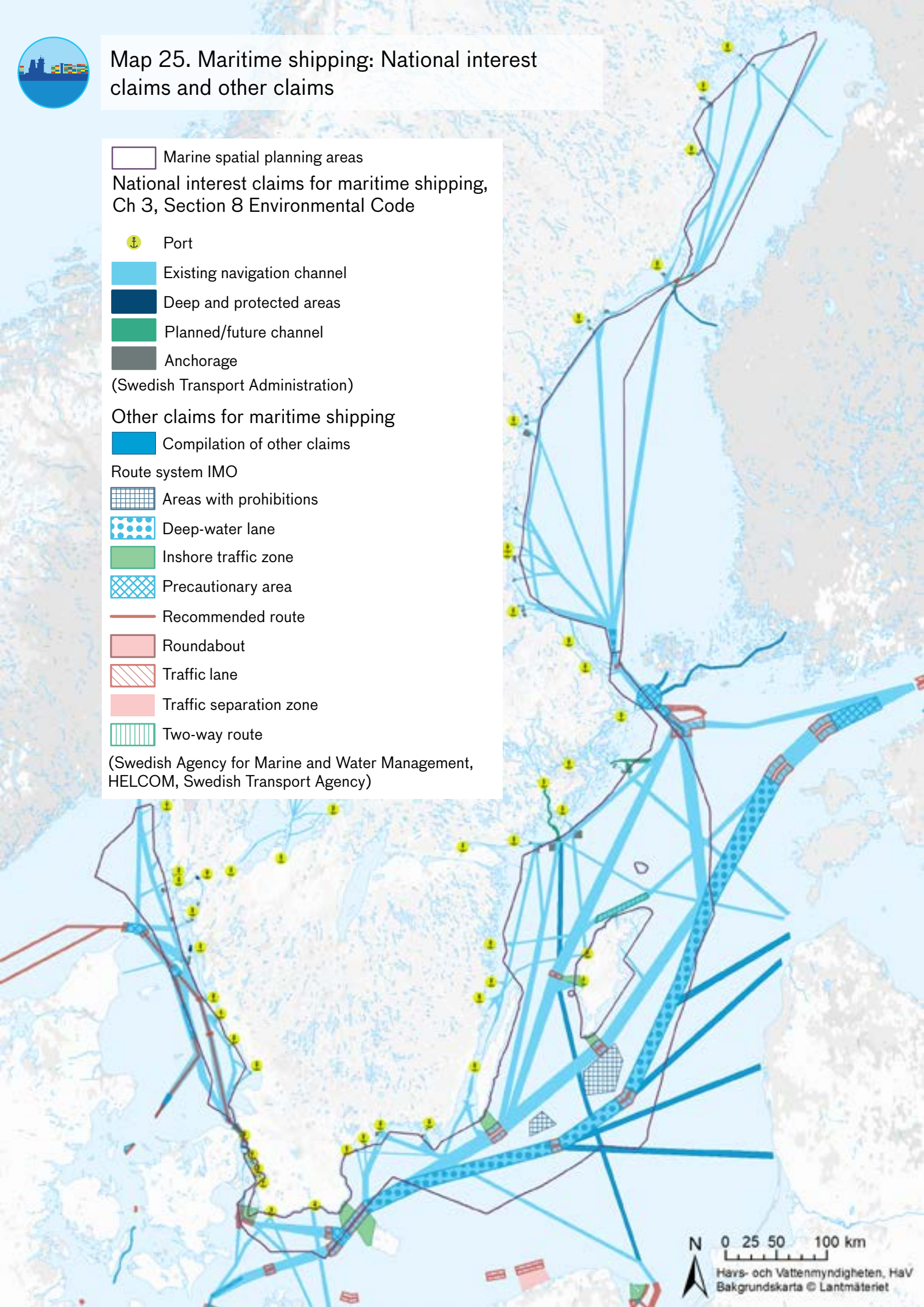
In the current situation it is difficult to plan for new developments in technology. Automated vessels and vessels with new designs and fuels are being developed. A shift to vessels that use liquid natural gas (LNG), methanol or other alternative fuels would contribute to a reduced dependence on oil. This may mean that some ports will need to be converted, or that traffic intensity to LNG bunker ports will intensify. Electrification is also in progress, with electric ferries plying the route between Helsingborg and Helsingør, for example.

Development is also ongoing of systems for traffic control and navigation, including route optimisation (Sea Traffic Management, STM). These systems are intended to increase safety, reduce environmental impacts, and increase efficiency at sea. By sharing information in real time, with all parties being informed about each other's routes, intentions and plans, it is estimated that the number of groundings and collisions will be reduced by more than 60 per cent (Swedish Maritime Administration, 2018 & STM, 2019).

The future

New requirements bringing higher transport costs may affect the development of maritime shipping. Cruise traffic in the Baltic Sea continues to grow, with more and bigger vessels. Developments in global shipping mean that vessels calling at Swedish ports are getting longer, wider and with a deeper draught, which also increases the safety requirements for navigation channels. The need for investment has increased considerably in recent years, due to safety deficiencies in ports and connecting navigation channels, and this need can be expected to increase further in the future. Possible measures would primarily involve deepening and widening (Swedish Transport Administration, 2013).

Map 25. Maritime shipping: National interest claims and other claims



National interest claims under Chapter 3 of the Environmental Code

The Swedish Transport Administration determines national interests for communications installations for maritime shipping, roads, railways and aviation under Chapter 3, Section 8 of the Environmental Code. National interest claims are for existing, planned and future installations.

Designated national interests for shipping include shipping routes connected with each other and with an international network, the extension and scope of which is determined by routes established by the IMO and HELCOM as well as by RAIS analyses of actual vessel movements.

Read more about the national interest claims on the Swedish Transport Administration's website.

Other claims

The marine spatial planning process identified shipping routes that connect with shipping routes to Sweden's neighbouring countries.

International coordination

A large part of maritime shipping is international, and any comprehensive picture of shipping in Swedish waters assumes collaboration with Sweden's neighbours.

Shipping routes and traffic separations are largely shared between Sweden, Finland and Denmark, but large international shipping routes also pass through Swedish waters.

Legal considerations

Regulation of maritime shipping is based on the Convention on the Law of the Sea (SÖ 2000:1). Sweden has sovereignty over its territorial waters, which nominally gives it the unlimited right to regulate various activities, with the exception of other states' vessels right to innocent passage. Sweden has a limited right to regulate traffic within its territorial waters by establishing navigation channels and installing traffic separation schemes, but such regulations must take the IMO's recommendations into account. In Sweden's exclusive economic zone, by contrast, freedom of navigation applies. Still, in addition to its sovereign rights, a coastal state has jurisdiction within its exclusive economic zone in certain respects, including for the protection and preservation of the marine environment. In exercising its rights and obligations, a coastal state must show reasonable consideration for other states' rights and obligations, including freedom of navigation. Consideration must also be paid to the IMO's regulatory framework. Changes to international navigation routes for environmental reasons may nonetheless be possible if they are adopted by the IMO.

Environment and climate

Environmental impact

Maritime shipping has an impact on the environment through discharges into both air and water. While a vessel is in operation it discharges gases into the air, lubricants and oils from propeller casings leak into the sea, and waste from toilets, cleaning and kitchens accumulates and has to be disposed of. Non-native species can spread via ballast water and biofouling.

Normal operations and accidents cause discharges of oil and chemicals into the water, which sometimes also reach land. Small, continuous discharges make up the greater part of oil discharges into the Baltic Sea.

Maritime shipping also affects the sea bed and the coastline more directly near navigation channels and ports, e g through erosion and dredging which can cause disruptions or the release of environmental toxins. Dumping of dredging sludge can also have environmental effects.

Awareness has increased in recent years of the environmental impact of underwater noise generated by shipping vessels, and research in this field has intensified. It has been established that marine mammals and fish in particular can be affected by noise, which may drive them away from areas, but there are still large knowledge gaps about how continuous low-frequency noise affects marine organisms in the longer term.

Most maritime shipping regulations intended to protect the environment are international. Possibilities for separate national regulations are limited. The International Maritime Organisation, IMO, has classified the Baltic Sea as a particularly sensitive marine area (or a PSSA – Particularly Sensitive Sea Area) where specific measures may be undertaken. These measures include traffic control, more stringent application of requirements regarding discharges, and equipment requirements (Swedish Transport Agency, 2016).

Climate

Maritime shipping affects the climate through emissions of greenhouse gases due to the use of fossil fuels. There are nevertheless often advantages to shifting transports from roads to maritime vessels, as this reduces the overall climate impact.

Mineral extraction

Existing use

Sand extraction involves extracting certain fractions of sand and gravel from the sea bed, for use primarily in the production of construction materials or for beach replenishment. In Sweden there is currently one licence for sand, gravel and stone extraction, granted to the municipality of Ystad for ten years from April 2011, for the extraction of 340,000 m^3 sand, gravel and stone in total, within a specified area for beach replenishment at Ystads Sandskog and Löderups Strandbad. The sand is used to counteract ongoing coastal erosion in the immediate surroundings. Ystad municipality's licence specifies four annual extraction periods as well as the amount extracted, and requires the establishment of environmental control programmes following each extraction period.

Marine sand extraction is normally done through suction using a trailing suction hopper dredger. This involves a specially equipped ship dragging a suction pipe, which may be likened to a vacuum cleaner nozzle, along the sea bed. The nozzle sucks up an even layer of sand from the seabed. The tracks left by sand suction are between one and three metres wide, and up to half a metre deep. The trailing suction technique follows the guidelines from the International Council for the Exploration of the Sea (ICES) for how extraction operations are to be carried out with a minimal environmental impact. The extracted material is loaded onto the ships. The ships that normally operate in the Baltic Sea have a maximum loading capacity of 8,000 tonnes, but there are ships that can load up to 50,000–80,000 tonnes (Swedish Geological Survey, 2017a & 2018d).

The planning goal relating to materials extraction is:

- Create preparedness for possible future extraction of minerals, and for carbon capture and storage.

Claims

An alternative to natural gravel extracted on land is to utilise marine deposits of sand and gravel. Extraction of sand and gravel can be of great significance for the production of construction materials, concrete and concrete goods.

The areas where marine sand and gravel could partially replace natural gravel are coastal regions that use considerable amounts of natural gravel but have scarce deposits of it on land, and where expansion in construction and industry is expected to continue. For these regions, marine sand and gravel could be economically and environmentally sustainable alternatives to natural gravel on land. However, sustainability is affected to a high degree by the distance between extraction and use sites, and by associated transport costs (Swedish Geological Survey, 2017a).

Stockholm–the Mälaren Valley, Skåne, and Gothenburg and West Götaland are the most likely regions to make use of marine sand and gravel as part of materials supply. The need for materials in these regions means that marine sand and gravel can compete with the market price of natural gravel from land extraction sites. These regions also have ports capable of receiving, storing and processing marine sand and gravel, and then conveying the material onward via roads and railways. In addition to uses in the construction

industry, there is also an interest in using marine sand and gravel as protection against coastal erosion, via beach replenishment. This last use is primarily of interest in southern Sweden, which suffers most from coastal erosion.

As part of implementing Sweden's maritime strategy, the Swedish Geological Survey (SGU) was commissioned by the government in 2017 to review, in consultation with the Swedish Agency for Marine and Water Management, what the conditions and costs would be for extraction of marine gravel and sand. The aim was to ensure that any extraction could be carried out in a way that is sustainable over the long term, and that it could become part of local and regional planning for materials supply. The commission has involved studying nine different geographical areas with the potential for extraction of marine sand and gravel (Swedish Geological Survey, 2017a).

Four of the nine areas on the Swedish continental shelf have been identified as the most appropriate for sand extraction considering nature values, biological and geological factors, technical characteristics, and sediment dynamics. The four areas are Sandflyttan, Sandhammar Bank and Klippbanken in the south Baltic Sea, and the Svalan and Falken shallows in the Bothnian Bay. The appropriateness classification applies to specific parts of these areas. The area by Sandflyttan lies within a Natura 2000 area.

The commission report gives examples of conditions that have to be met in order for extraction operations to begin. Before any extraction operations can begin, an area needs to be carefully evaluated regarding physical, archaeological and biological aspects, among others. To ensure that adverse effects do not arise from any extraction operations, such operations need to be continuously evaluated using appropriate monitoring programmes. The report also contains a proposal for guidelines for how extraction operations are to be carried out.

Sand extraction in a Natura 2000 area can only be permitted if it complies with Chapter 7, Sections 28a–29 of the Environmental Code.

National interest claims under Chapter 3 of the Environmental Code

The Swedish Geological Survey determines national interests for extraction of marine sand and gravel, under Chapter 3, Section 7 of the Environmental Code. There are currently no national interest claims.

However, under Chapter 3, Section 7, first paragraph of the Environmental Code, land and water areas that hold valuable substances or materials must, as far as this is possible, be protected against interventions that could make extraction of these materials or substances more difficult.

Development and trends

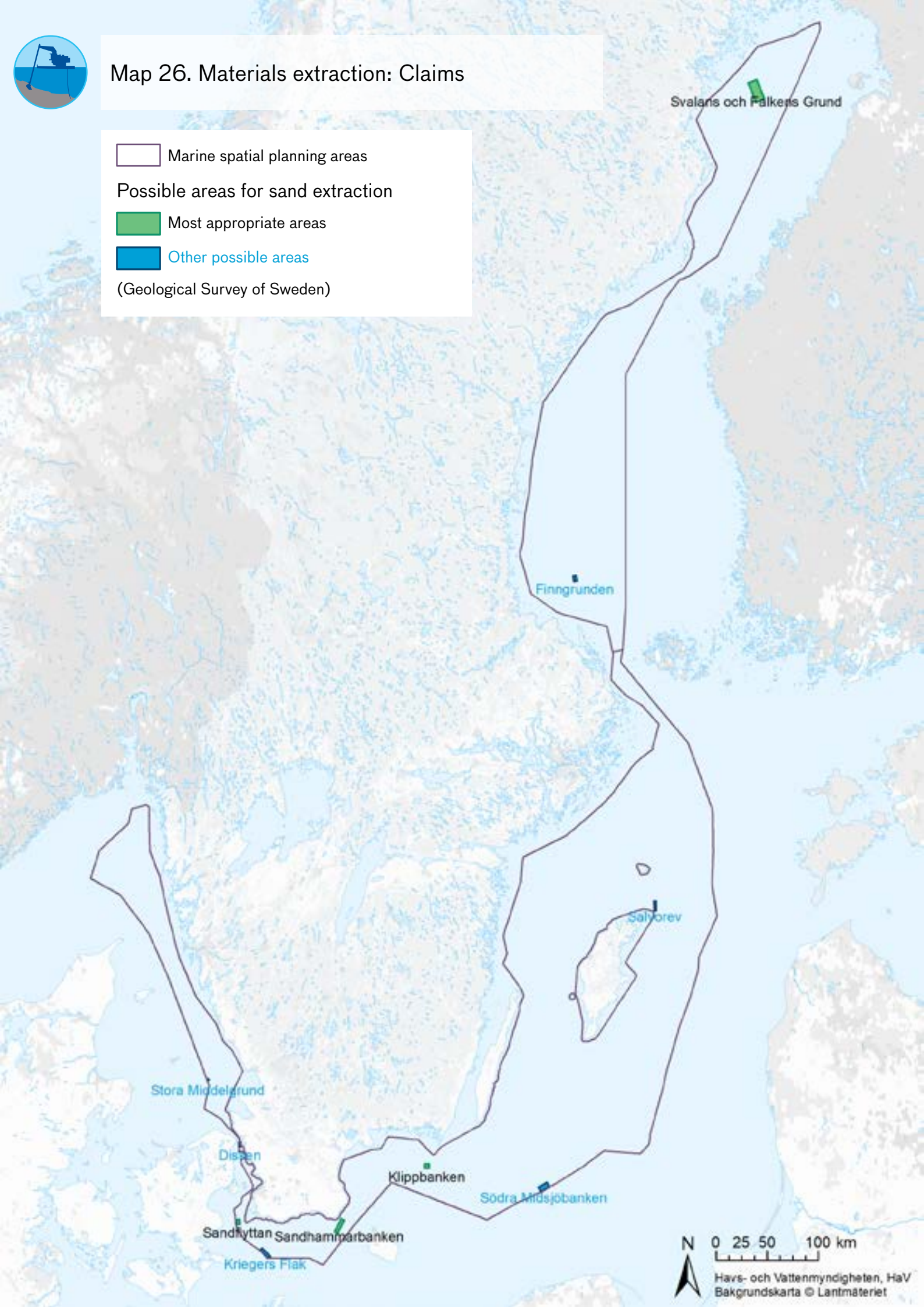
Interest is growing in exploring the possibilities of extracting sand, gravel and stones from the continental shelf for construction, infrastructure and beach replenishment. The *Good-quality Groundwater* environmental quality objective states that natural gravel deposits of great significance for the drinking water supply, energy storage and for natural and cultural landscapes must be preserved. This in turn means that extraction of natural gravel deposits on land, for use in materials supply, must be reduced.

Areas of interest for sand extraction

The areas that are most appropriate for sand extraction fulfil the requirements below. Shallow, biologically sensitive hard sea beds close to the coast are to be avoided (Swedish Geological Survey, 2017a). Appropriate areas:

- are located on slopes and in depressions deeper than the photic zone
- consist of larger and thicker sand and gravel deposits all the way to the sea bed surface
- have a bottom substrate made up primarily of sand and gravel fractions
- have a high enough level of movement in the bottom water for considerable transport and accumulation of sand and gravel to occur on the sea bed
- are located far enough from the coast that the risk of increased coastal erosion is negligible.

Map 26. Materials extraction: Claims



The background to these developments is that gravel eskers and other glacial river deposits on land are of great importance as drinking water reservoirs, and that extraction of natural gravel on land has to be reduced in order to meet the environmental quality objectives.

The need for beach replenishment may increase as a result of coastal development and climate change. This issue has so far been particularly evident in south-eastern Skåne. Sand and gravel extraction on land is increasingly often coming into conflict with the supply of drinking water. At the same time, importation of marine sand implies environmental impacts that are difficult to quantify and control.

The extraction of minerals from the sea is being discussed in several parts of the world, including Europe. In the Baltic Sea area, a discussion about extraction of polymetallic nodules has been going on for some time, with Russia in particular as an active participant. There is an ongoing three-year EU project (2019–2021), called Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials (MINDeSEA), one of the aims of which is to map the deposits of minerals in Europe's seas, including the Baltic Sea and the Skagerrak/Kattegat. The Swedish Geological Survey is participating in the project (GeoERA, 2019). This knowledge, as well as other knowledge support, will be needed for any future plans to extract minerals in marine areas.

Extraction of drinking water from the sea is a developing activity in the Baltic Sea. There are already desalination plants (known as brackish-water works) at Sandvik, on Öland, and at Kvarnåkershamn on southern Gotland. One of the aims of these plants is to meet drinking water needs, as groundwater levels have reached critically low levels during certain periods of recent years.

International coordination

Sand extraction is being carried out in several of Sweden's neighbouring countries. Danish sand extraction in the south Kattegat and Öresund is taking place very close to Swedish waters. However, the latter extraction site will be discontinued as licences granted in Öresund expire, as the Danish government decided in November 2018 to remove the possibility of renewing licences or applying for new ones in Öresund (Folketinget, 2018).

Oil and gas are being extracted in the Baltic Sea, from Russian and Polish parts of the continental shelf. Latvia and Lithuania also have deposits in their parts of the continental shelf, but no extraction is currently going on. At present Lithuania has no plans to open up marine areas for prospecting and extraction. Latvia has issued prospecting and extraction licences, but so far no exploratory drilling or extraction has taken place in the Latvian part of the continental shelf (Swedish Geological Survey, 2017b). In Sweden there is no legal possibility of getting a licence to extract fossil fuels in Swedish territorial waters or the exclusive economic zone, as Sweden has not incorporated into national law the sections of the EU's Offshore Directive that concern licences for gas and oil extraction.

Legal considerations

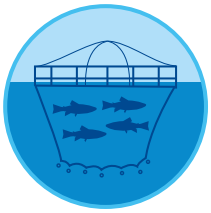
Depending on the scope of the operation and the possibility of considerable damage ensuing, either the government or the Swedish Geological Survey (SGU) grants licences for sand, gravel and stone extraction in public waters on the continental shelf, under the Ordinance on the Continental Shelf (1966:315). SGU is also the supervisory authority regarding compliance with regulations and conditions for licences, under the Act on the Continental Shelf. If sand extraction involves an encroachment of ancient remains, a permit is also required under Chapter 2, Section 12 of the Cultural Landscape Act (1988:950). Anyone wanting to extract sand should therefore establish whether this would affect any ancient remains, and consult with the county administrative board.

Environment and climate

The extraction of natural gravel from the sea bed involves the removal of sediment, along with the associated benthic flora and fauna. In addition to immediate adverse effects on the sea bed, this can also have adverse effects for bird and fish populations that normally feed on these resources. Spawning fish present in such areas can have their egg-laying disrupted. Benthic fauna and flora normally recover within a few months or years after extraction, but there is considerable variation between the different types of habitat. The International Council for the Exploration of the Sea (ICES) and many of its member states have drawn up guidelines for how e g extraction operations are to be conducted in order minimise their environmental impact (ICES, 2016).

Extraction of marine sand and gravel can also lead to various physical changes in the coastal zone and cause beach loss, as well as reduce natural protection against coastal erosion and affect current and sea bed conditions. In connection with marine sand extraction, measures should be taken to minimise the risk of the formation of depressions (sea bed areas deeper than their surroundings) where hypoxia may develop in the bottom layer of water.

Aquaculture and blue biotechnology



Aquaculture is the cultivation of all types of aquatic animals and plants, such as fish, crayfish, mussels and algae. Blue biotechnology is about investigating and using different marine organisms in order to develop new products.

Aquaculture in Sweden comprises the cultivation of fish, shellfish and algae. Sweden's excellent water resources provide good conditions for aquaculture in several different parts of the country. Still, the impact on nutritive salts is high in several marine areas, which limits possibilities of establishing open pen net fish farms there.

Cultivation of micro and macro algae has potential for producing oils, vitamins and special proteins. These may eventually become ingredients in foods, animal feed, medicines or fuels. Cultivation of algae, ascidians and mussels can also contribute to improving the marine environment by absorbing nutrients. This means that it can provide both advances in blue bioeconomy and environmental benefits.

The planning goal relating to aquaculture and blue biotechnology is:

- Create preparedness for future establishment of sustainable aquaculture.

Existing use

In the Bothnian Bay aquaculture is currently only carried out near the coast, and not in the marine spatial planning area. The farms are located primarily along Höga Kusten, and comprise ten rainbow trout farms. These farms make up the greater part of Swedish marine fish farming for food.

There is a limited amount of aquaculture in the Baltic Sea. Cultivation is in coastal waters and not in the marine spatial planning area. For the Baltic it is of particular interest to practise aquaculture that also contributes to improving the marine environment, e g through nutrient uptake, as the marine area is eutrophic. Blue mussels and algae are examples of species that could be considered under certain circumstances. Blue mussels can furthermore be the basis for animal feed production. There is a mussel farm off Söderköping that serves as an environmental measure.

In the Skagerrak/Kattegat, blue mussels are principally cultivated for consumption, but there is also a trial farm for macro algae. Research is also being carried out on the cultivation and use of ascidians.

Claims

Research and technological development are currently going on regarding various species and cultivation methods. In the future, farms in the open sea may be a possibility.

At present there is no comprehensive mapping of possible geographical development areas for aquaculture in the planning areas. However, researchers at KTH Royal Institute of Technology have carried out a localisation study of macro algae on the west coast (J-B E Thomas et al, 2019). One of the goals of the national aquaculture strategy (Swedish Board of Agriculture, 2012) is that a majority of Sweden's municipalities identify and include suitable locations for aquaculture in their comprehensive plans. Such new documentation, together with developments in cultivation techniques, can eventually

provide planning conditions for aquaculture in the marine spatial planning areas.

Aquaculture public interest

The Environmental Code contains no provisions regarding national interests for aquaculture, but mentions aquaculture as a public interest. Under Chapter 3, Section 5, first paragraph of the Environmental Code, water areas of significance for aquaculture must be protected, as far as this is possible, against interventions that could make it markedly more difficult to practise aquaculture.

Development and trends

Awareness among consumers that makes them demand innovative, environmentally adapted and healthy alternative foods creates a development potential for the cultivation of marine foods. Algae farming is an industry in its initial stages of development in Sweden. There is a large and growing global market for farmed macro algae, and there is good potential for this type of farming to expand in Sweden as well. Technological development is underway for mussel and ascidian farming, involving submerged farms that are less sensitive to waves and ice. This type of farming may eventually become possible beyond the archipelago as well, in the open sea.

Through increased knowledge and development of blue biotechnology it may become possible in the future to extract genetic resources for other industrial applications or for pharmaceutical use (European Commission, 2019).

International coordination

International coordination principally concerns market trends for farmed fish, access to feed, and the extent to which the shared marine environment can withstand increased fish farming.

Legal considerations

A licence from the county administrative board is required in order to build and run a fish farm, under Chapter 2, Section 16 of the Fishing, Aquaculture and Fisheries Ordinance (1994:1716). The term "fish farming" also refers to cultivation of aquatic molluscs and marine crustaceans, see Section 4 of the Fishing Act (1993:787). A fish farm (but not a shellfish farm) may also have a notification or licensing obligation as an environmentally hazardous activity, under Chapter 9 of the Environmental Code. Such matters are examined, under the Environmental Testing Ordinance (2013:251), by the county administrative board or, in the event of a notification obligation, by the municipality concerned, depending on how much feed is consumed on the farm.

Environment and climate

Environmental impact

Fish farming in open systems has adverse effects on the environment due to surplus nutrients from the farm, the risk of escapes and the spreading

of infections, and the risk that various chemicals used in farming reach the surrounding areas.

Mussel farms have a less negative environmental impact primarily because the impact is limited to the locality: immediately below and around the farm, an increased organic pressure may occur, and sometimes also local hypoxia in the sediment.

However, the mussels' consumption of micro algae means that nutrients are absorbed from the sea, which can reduce eutrophication.

Environmental studies have indicated that the environmental impact of algae farming is very small. However, they may be visible from land and take up space in the open sea (Gröndahl, 2018).

Climate

Fish farming in Scandinavia is primarily of fish of the *Salmoniformes* order that require cold water. A warmer climate with warmer seawater could have an adverse effect on the conditions for farming these species. Other species such as pike, zander and perch, on the other hand, benefit from warmer water temperatures. It is also possible that disease and parasite pressure will increase with warmer water temperatures. Discharges into the sea and increasing levels of carbon dioxide in the atmosphere contribute to the acidification of seawater, which could be problematic for mussel and oyster farming as it makes calcification more difficult. Changed weather conditions in terms of wind and waves could affect farming. Climate changes affecting the salinity of the water flowing into the Baltic Sea and the Gulf of Bothnia could have major consequences for aquaculture in these areas.

Commercial fishing

Commercial fishing provides consumers and animal feed manufacturers with fish, and also creates job opportunities and helps sustain the identity and vitality of coastal communities. Commercial fishing and related activities also uphold the local cultural landscape in many places, and often contribute to making them attractive for tourism. Fishing is more or less intensive in all of Sweden's marine areas, but the inherent dynamics of fishing mean that fishing pressure varies both geographically and over time. Small-scale fishing in Sweden is normally done within limited areas due the capacity and specialisation of the vessels, while other fishing is more dynamic and occurs across larger areas, including areas beyond Sweden's territorial waters or exclusive economic zone. Where fishing occurs varies with the seasons, but it also depends on how fishing opportunities evolve over time, i e how fish populations and the regulation of them develop.

The planning goal relating to commercial fishing is:

- Create conditions for sustainable commercial fishing.

Existing use

Swedish fishing is more or less intensive in the Baltic Sea including the Gulf of Bothnia, as well as in the Skagerrak and Kattegat, and periodically also farther away in the North Sea and the Norwegian Sea. Commercial fishing in the Gulf of Bothnia is seasonal, according to ice periods.

The Gulf of Bothnia, the Baltic Sea and the Skagerrak/Kattegat have different physical and ecological conditions for the occurrence of marine species such as fish and shellfish, which in turn influence fishing. The ecosystems of the Gulf of Bothnia and the Baltic Sea have a relatively simple structure with few dominant species, which also makes the ecosystems extra sensitive. Many of the species here exist close to their tolerance limit for salinity, which may make them particularly sensitive to changes. By contrast, the Skagerrak/Kattegat possesses considerable biodiversity and a higher productivity at all levels of the food chain. The composition of species in the Gulf of Bothnia and the Baltic Sea changes from south to north with decreasing salinity, which means that the proportion of marine species also decreases. Several important species of fish such herring/Baltic herring and sprat occur in all three areas, while others are unique to their respective waters. Cod occurs in both the Skagerrak/Kattegat and the Baltic Sea.

Commercial fishing in coastal waters suffers damage from seals and cormorants. Seals cause damage to equipment, and both seals and cormorants compete for the fish catches. In some areas it is periodically impossible to carry out profitable fishing. Both species are hunted as part of a wildlife damage management programme. Under the Hunting Ordinance (1987:905) the Swedish Environmental Protection Agency may decide to issue licences for hunting grey seal – following consultation with the Swedish Agency for Marine and Water Management and an assessment of whether the measure is scientifically justified from an ecosystem perspective. These provisions will cease to apply on 1 January 2022.

Fishing by the vessels from other EU countries occurs in Sweden's territorial waters as well as its exclusive economic zone. Swedish fishing vessels also often land their catches in foreign ports on the Baltic and Skagerrak/Kattegat coasts.

Commercial fishing in the Gulf of Bothnia

Commercial fishing in the Gulf of Bothnia is mostly small-scale and is geographically widely dispersed, but the biggest concentration is in the South Bothnian Sea. Fishing is sparse in the open sea, while it occurs more densely in coastal waters. Coastal fishing in the South Bothnian Sea is mostly done with passive equipment. Periodically intensive pelagic fishing is carried out primarily around the offshore banks and in the south-eastern parts of the marine area.

Commercial fishing carried out in the North Bothnian Sea is limited, uses passive equipment and occurs in coastal waters, with occasional pelagic fishing in the southern parts of the North Bothnian Sea.

Fermented Baltic herring and vendace roe are two well-known products from the Gulf of Bothnia. Catches of Baltic herring are landed locally. Fishing for vendace occurs outside of the marine spatial planning area, closer to the coast. Fishing for Baltic herring by Finnish vessels also occurs in Sweden's territorial waters and its exclusive economic zone in the Gulf of Bothnia. Lövskär in Luleå and Norrsundet, just north of Gävle, are important fishing ports on the Gulf of Bothnia (Swedish Agency for Marine and Water Management, 2018d).

Commercial fishing in the Baltic Sea

Fishing in the Baltic Sea planning area makes up a large share of Swedish commercial fishing, both in terms of value and catch volumes. Fishing is carried out by fishing companies mainly based on the east coast, but there are also some vessels from the west coast.

The most important species in the Baltic Sea, in terms of value and quantity, are sprat, herring or Baltic herring, and cod. Other species that are fished commercially, but are of considerably less importance, include European flounder and turbot. There is also some inshore fishing for eel. Fishing methods are both passive, e g with nets, and active using a trawl. Fishing in Öresund is only done with passive equipment. The biggest catches of herring and sprat are in an area south of Gotland, between Poland and Sweden, while cod is mostly caught in the Bight of Hanö area.

Cod is used as food, while most of the Baltic cod and sprat is used in the production of fish meal and fish food. Important fishing ports include Västervik in Småland, Byxelkrok on Öland, Ronehamn on Gotland, Nogersund and Karlskrona in Blekinge, and Simrishamn and Trelleborg in Skåne. Large quantities are also landed in Denmark (Swedish Agency for Marine and Water Management, 2017a & 2018d).

Commercial fishing in the Skagerrak/Kattegatt

The west coast has a long tradition of using and handling fish and shellfish from the sea. Commercial fishing is important both regionally and locally, and contributes to the identity and vitality of coastal communities through fishing itself as well as its importance for land-based industries such as fish processing, shipbuilding, port activities and the manufacturing of equipment. The tourism industry also benefits from a dynamic local fisheries industry.

Commercial fishing in the Skagerrak/Kattegat is varied, and includes fishing for northern prawn and Norway lobster as well as mixed fishing for cod, haddock

"Pelagic fishing" refers to fishing for species that live in the open seas, as opposed to coastal waters or near the sea bed. "Demersal fishing" refers to fishing close to the sea bed, such as bottom trawling.

Fisheries management

In order to avoid over-exploitation of fish resources there is an extensive regulatory framework for fisheries management, which limits commercial fishing activity as well as the size of catches. Commercial fishing at sea requires a fishing licence, and special permits for some types of fishing. There are restrictions regarding where, when and how fishing may be carried out. Annual quotas are set at the EU level for the commercially most important species, and these are then distributed between the member states. In order to create stability and encourage the long view in fisheries management, a system of management plans has been put in place for certain fish stocks whose geographical range often extends across the waters of several countries.

In Sweden there is a special trawling limit inside of which trawling is not permitted, except in what are known as trawl fishing areas. In the Gulf of Bothnia, the Baltic Sea and the Skagerrak, this limit runs four nautical miles from the baseline. In the Kattegat, the limit runs at three nautical miles from the coastline. Trawling is not permitted at all in Öresund. There is also a number of fish protection areas along the Swedish coast and farther out in the Baltic Sea and Kattegat, where fishing is not permitted at any time or at certain times of the year.

and saithe. Mackerel, herring and sprat are also fished in these waters. Fishing is both passive, e g with cages, and active with trawl and seine nets. Catches are primarily used as food (Swedish Agency for Marine and Water Management, 2017a). There is a large number of big and important fishing ports in the Skagerrak/Kattagat. Glommen and Träslövsläge are two important ports in Halland County. In addition to the large number of fishing ports in Bohuslän, including Rönnäng, Ellö, Grebbestad and Öckerö, there is also the port of Gothenburg, with important fish landings as well as Sweden's biggest fish auction (Swedish Agency for Marine and Water Management, 2018d).

Claims

Access to good fish stocks is a prerequisite of the practice of fishing. Good fish stocks require the fish to have access to appropriate habitats during their various life stages. Areas for fish reproduction and growth are particularly important, as are areas for migration in some cases. Viable commercial fishing therefore requires a sufficient level of knowledge about and protection of these habitats. The need for improved knowledge about fish stocks is closely tied to assessments made within the framework of marine environment management. Commercially important fish and shellfish species are significant elements of e g efforts in national marine mapping. A need for improved knowledge about the relationship between fish habitats and human influences has also been identified in ecosystem-based fisheries management.

Fishing relies on a functioning infrastructure of available fishing sites, ports and landing places, and on the ability of fishing vessels to be able to move between them. One particular challenge is the dynamic nature of fishing over time, which means that fishing has to adapt to evolving fish stocks, in terms of their size as well as their density and distribution. There are also economic dynamics to consider, in terms of market conditions and the profitability of fishing companies.

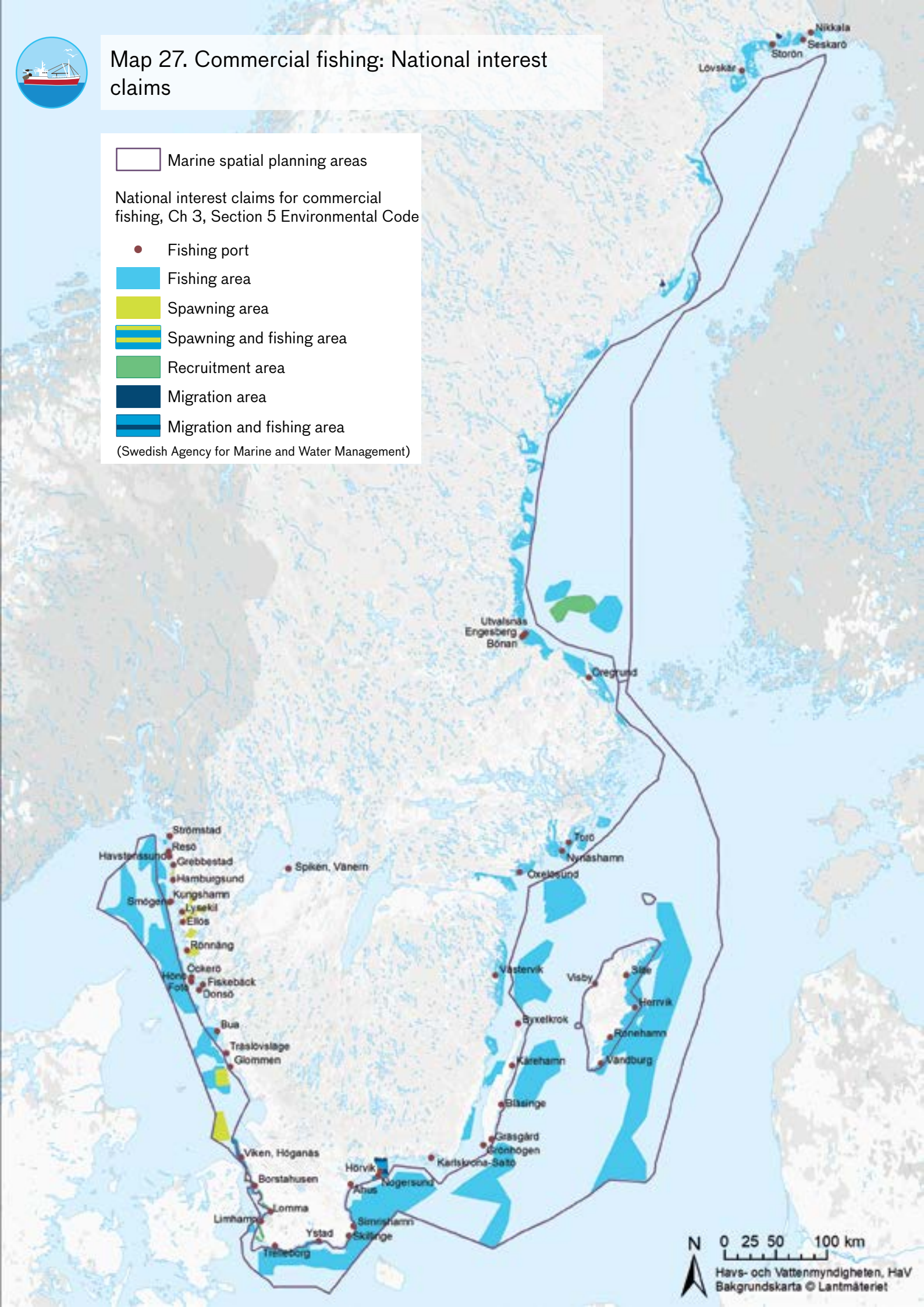
Sustainable use of stocks and improved profitability are two underlying elements of the national target presented in the strategy Swedish Commercial Fishing 2020 (Swedish Agency for Marine and Water Management & Swedish Board of Agriculture, 2016).

Development and trends

Good professional knowledge, and awareness among consumers which makes them demand innovative, environmentally adapted and healthy alternative foods mean that there is considerable development potential for commercial fishing. As in many other industries, the fishing industry has applied measures to improve efficiency, which has led to reductions in the number of employees and vessels in commercial fishing. At the same time, it is a societal goal to promote small-scale inshore fishing. Other factors that may have an effect on fishing activities include changed patterns of consumption, technological developments, and adaptations to reduce the impact of fishing on sea bed environments, for example.

In addition to the current dynamics, climate change may further force commercial fishing to change fishing patterns and fishing areas as the distribution of various species changes.

Map 27. Commercial fishing: National interest claims



Map 28. Commercial fishing: Other claims

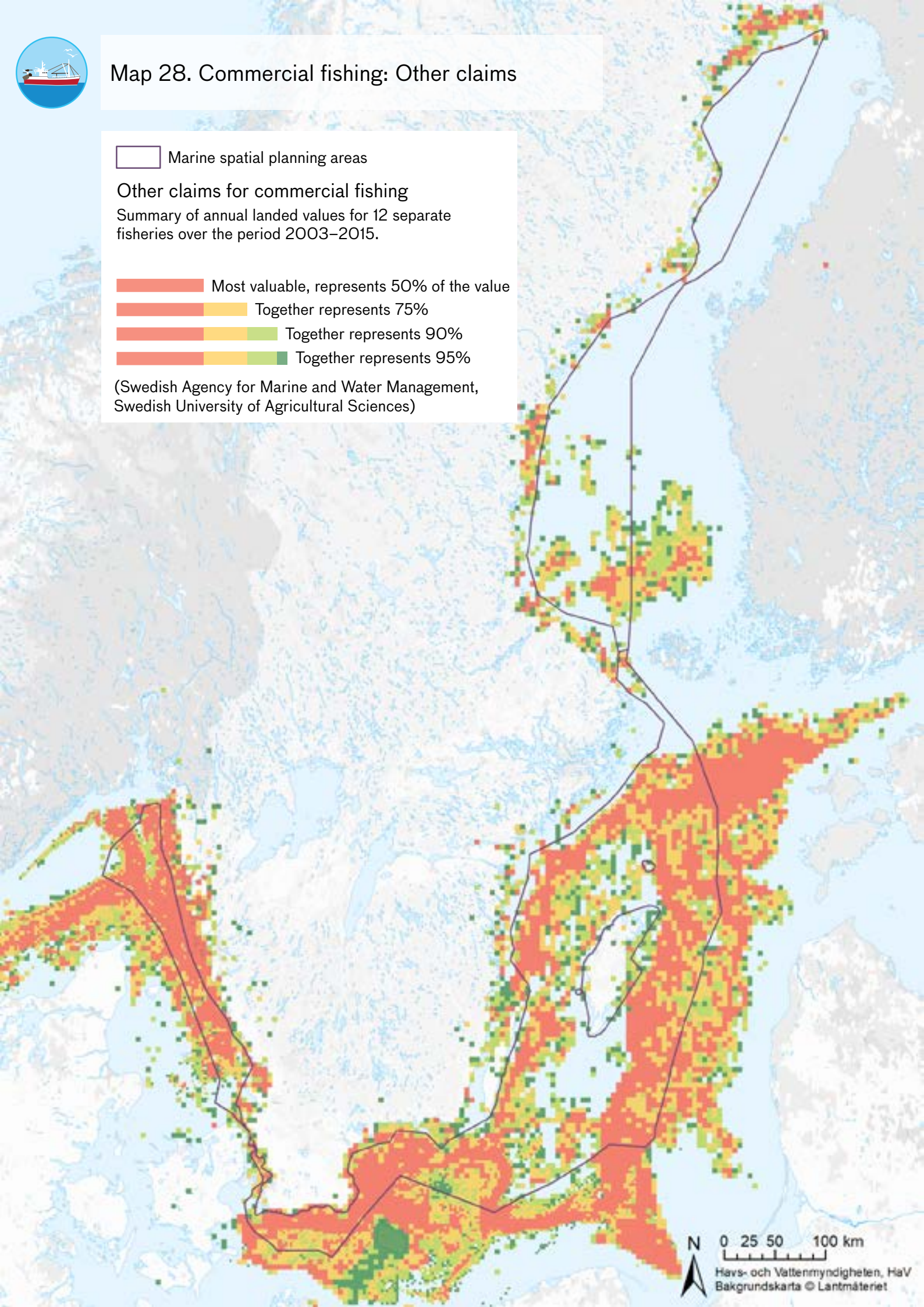
Marine spatial planning areas

Other claims for commercial fishing

Summary of annual landed values for 12 separate fisheries over the period 2003–2015.

- Most valuable, represents 50% of the value
- Together represents 75%
- Together represents 90%
- Together represents 95%

(Swedish Agency for Marine and Water Management, Swedish University of Agricultural Sciences)



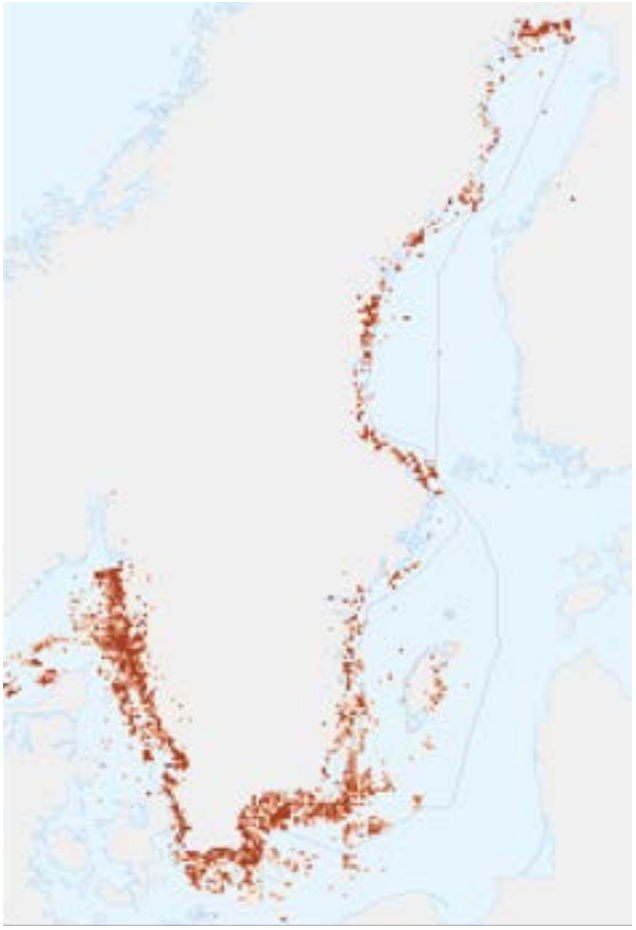


Figure 39. Passive fishing (e g nets).

Figure 40. Pelagic trawling (mid-water/not bottom trawling).

Figure 41. Demersal trawling (close to the sea bed).

Passive fishing

Compilation of annual landed values from passive fishing. Based on six different fisheries, delimited by marine spatial planning area or regionally. The six fisheries are passive fishing in the Gulf of Bothnia, in the Baltic except Öresund, in Öresund and in the Skagerrak/Kattegat, as well as passive fishing for cod and cage-fishing for Norway lobster. Dark colours indicate high values; light colours low values (Swedish University of Agricultural Studies 2017b).

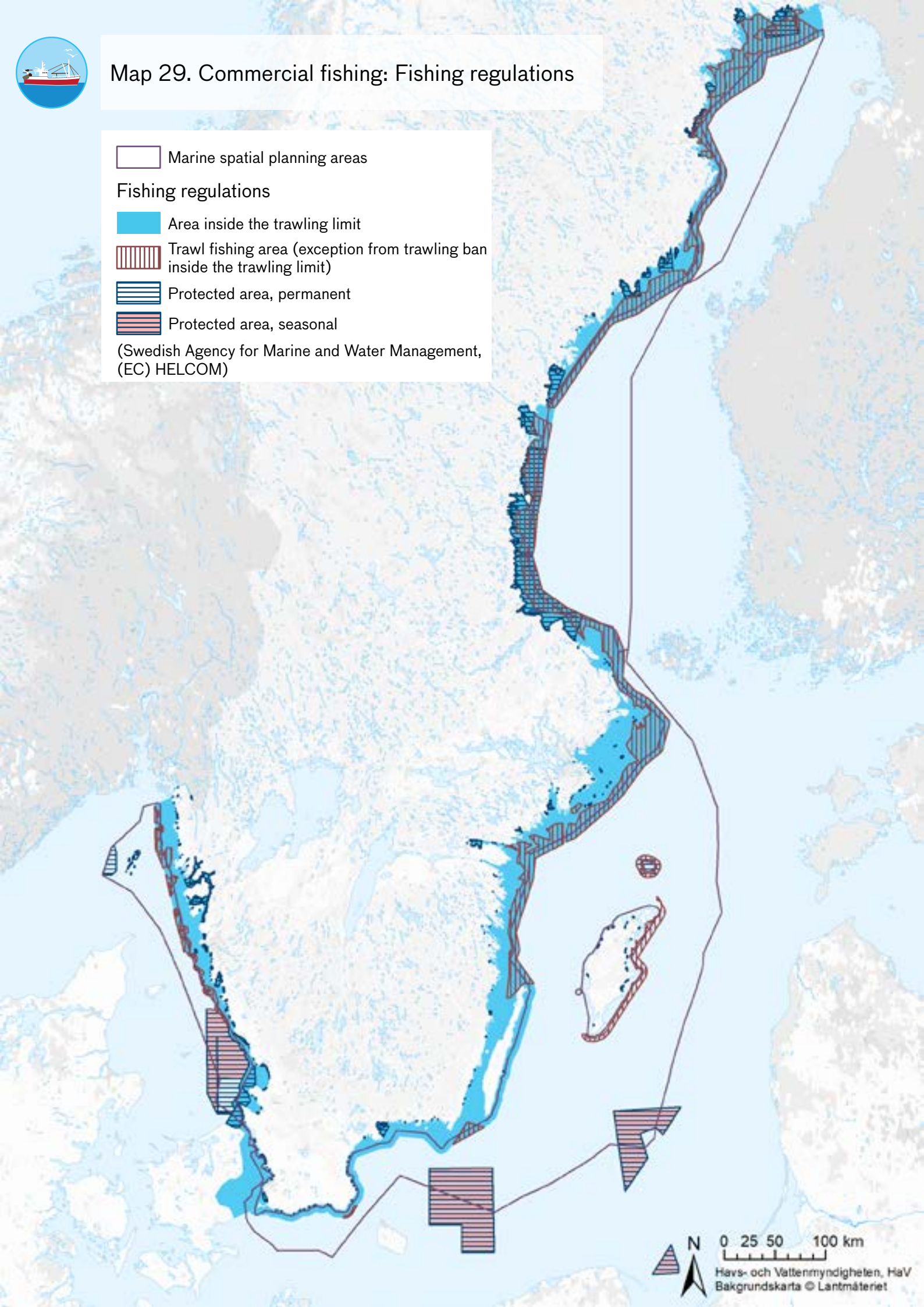
Pelagic trawling

Compilation of annual landed values from pelagic fishing. Based on four different fisheries, delimited by marine spatial planning area or regionally. The four fisheries are pelagic fishing in the Skagerrak/Kattegat, in the Baltic Sea and in the Gulf of Bothnia, and vendace fishing in the Bothnian Bay. Dark colours indicate high values; light colours low values (Swedish University of Agricultural Studies 2017b).

Demersal trawling

Compilation of annual landed values from demersal fishing for fish and shellfish. Based on three different fisheries, delimited by marine spatial planning area. The three fisheries are trawling for, respectively, northern prawn and Norway lobster in the Skagerrak/Kattegat, and trawling for cod in the Baltic Sea. Dark colours indicate high values; light colours low values (Swedish University of Agricultural Studies 2017b).

Map 29. Commercial fishing: Fishing regulations



Ongoing work

Together with the Swedish Board of Agriculture, the Swedish Agency for Marine and Water Management has drawn up a new joint strategy for commercial fishing, aquaculture, recreational fishing and fishing tourism, as well as new, sector-specific action plans. The strategy and action plans apply an ecosystems approach and are intended to strengthen goal fulfilment of the Maritime Strategy and A Food Strategy for Sweden – more jobs and sustainable growth throughout the country (govt bill 2116/2017:104).

To strengthen protection in marine protected areas, the government commission the Swedish Agency for Marine and Water Management to propose fishing regulations in new as well as previously established protected areas, and to propose measures as necessary. The goal is for valuable habitats to be preserved. In the spring and autumn of 2018, the agency presented reports on the effect of bottom trawling in protected areas and inside the trawling limit. A variety of different regulations may be considered, e g to establish areas with a complete ban on fishing or on the use of certain fishing equipment. Such regulation could change fishing patterns and the conditions for planning for the Commercial fishing use in the marine spatial plans. As part of the commission, the agency also reviewed possibilities of modernising the regulatory framework for inshore fishing. The commission report was presented to the Ministry of the Environment and Energy in 2018 (Swedish Agency for Marine and Water Management, 2018j).

Regarding regulation of commercial fishing in protected areas, the Swedish Agency for Marine and Water Management proposed working on regulatory measures for fishing by marine area. The agency would coordinate these efforts, including consultations regarding the introduction of conservation measures necessary for the achievement of the objective by 2020. “Marine area” here refers to a marine spatial planning area as well as the area extending in to the shoreline. A report was submitted to the government on 30 September 2019 (Swedish Agency for Marine and Water Management, 2019).

National interest claims under Chapter 3 of the Environmental Code

National interest claims for commercial fishing under Chapter 3, Section 5 of the Environmental Code concern areas in the sea, lakes and rivers, as well as in home ports and fish landing ports. The Swedish Agency for Marine and Water Management determines national interests for commercial fishing. The areas in the sea comprehend Swedish internal and territorial waters as well as the exclusive economic zone. National interest claims for commercial fishing in the sea concern fishing grounds, spawning and nursery areas, and migration routes for fish.

Read more about the national interest claims on the Swedish Agency for Marine and Water Management website.

National interest claims for commercial fishing that concern fishing grounds are primarily defined on the basis of catch value per surface unit, i e an economic criterion. The areas have been identified on the basis of a selection of data on the annual landing value of twelve fisheries over an extended period. The applied economic criterion is for relative value figures.

National interest claims for commercial fishing that concern spawning and nursery areas and migration routes are defined on the basis of their ecological significance for different life stages of commercially important species of fish and shellfish.

In December 2019 the Swedish Agency for Marine and Water Management decided to revise national interest claims in the marine spatial planning area. The revised national interest claims apply since February 2020.

International coordination

Commercial fishing is mainly managed within the framework of the EU's Common Fisheries Policy (CFP). This deals with fisheries shared with other EU countries. Danish fishing vessels fish in Sweden's territorial waters and exclusive economic zone, for example, and the other EU countries around the Baltic fish in Sweden's exclusive economic zone. In Västervik there are regular landings from Polish fishing vessels, and there are Danish landings in Simrishamn. In the Gulf of Bothnia Finnish vessels fish from the Finnish quota in Sweden's territorial waters and exclusive economic zone, with Norrsundet as an important landing port. In the Skagerrak/Kattegat there is extensive Swedish fishing in Norwegian waters, and a large share of the west Swedish fishing fleet's catch is landed in Denmark. There is also fishing by Norwegian and Danish vessels in Swedish territorial waters, and some of the Danish catch is landed at Smögen. In addition to Norwegian and Danish vessels, German fishing vessels also fish within Sweden's exclusive economic zone. Regulation of fishing outside of Sweden's current national trawling limit, but within Swedish territorial waters, requires agreements with the neighbouring countries concerned, and an EU decision.

Legal considerations

Commercial fishing is regulated within the framework of the EU's Common Fisheries Policy (CFP), with complementary national Swedish fishing legislation. Regulation is based on the Convention on the Law of the Sea. In geographical terms, the fisheries policy regulates commercial fishing to the outer limit of the exclusive economic zone, but applies for EU vessels outside of EU waters as well, under Regulation (EU) No 1380/2013 of the European Parliament and of the Council. Most of the regulations for non-commercial fishing are in national legislation, in Sweden's case the Fishing Act (1993:787). EU member states have free access to fishing in EU waters up to 12 nautical miles from the baselines outside other member states' coasts. In the case of Swedish waters in the Baltic Sea (including the Gulf of Bothnia), Denmark and Finland also have access up to 4 nautical miles, and in the Skagerrak Denmark and Norway have access up to 4 nautical miles from the baselines, while in the Kattegat Denmark has access up to 3 nautical miles from the coastline. Under the access agreements that Sweden has with Denmark and Finland, the fishing state is allowed to fish according to its own rules, i e the rules of the flag state. Fishery in Öresund is shared by Swedish and Danish fishermen. The regulations governing fishing there are laid down in Chapter 2, Section 2 of National Board of Fisheries' regulations on fishing in the Skagerrak, the Kattegat and the Baltic Sea (FIFS 2004:36).

Environment and climate

Environmental impact

The environmental impact of fishing varies with the fishing method used. Fishing affects the size and structure of fish populations, for the species caught intentionally as well as those caught unintentionally.

In passive fishing especially, other parts of food chains are also affected as marine mammals and birds get caught in the nets. Equipment lost at sea also constitutes a problem as it continues catching animals long after being lost. The reduction in the number of fish at various levels of the food chain also has consequences for the rest of the ecosystem.

Bottom trawling leaves tracks on soft sea beds that can affect benthic creatures and benthic structures, which can result in alterations to species' compositions and benthic environments. According to evidence reported in connection with government commission M2017/02522/Nm on the effects of bottom trawling, six per cent of the species disappear after trawling occurs on a previously unaffected sea bed. The recovery period for a benthic environment where biological values have been degraded by half can be up to six years (Swedish University of Agricultural Sciences, Department of Aquatic Resources, 2018a).

Fishing also affects the environment in the same way as other maritime traffic does, through discharges into the air and water, and these vary greatly depending on the fishing method used.

The size of fish stocks

Annual fisheries studies form the basis of scientific assessments of the size of fish stocks and the quantity of fish that can be caught. Based on these limits, assessments are made of whether fishing for a particular stock is sustainable and whether the fish stock is within safe biological limits. The scientific assessment is made by the ICES, and this is then used as an advisory basis for the annual distribution of quotas to EU member states carried out by the Council of the European Union.

Changes to the surrounding ecosystem affect the structure of the fish populations and the conditions for fishing, but fishing pressure itself can also cause changes to the ecosystem. Eutrophication from e g agriculture and sewage treatment plants affects the ecology of the sea. The addition of nutrients leads to increased algae production, which has a considerable impact in some areas. Environmental pollutants such as dioxin, PCB and mercury, which have long found their way into the sea, are persistent substances that can accumulate and become stored in the fatty tissue of humans and animals.

Increased shipping has meant that the spread of non-native species has increased. Discharges from ships can also harm fish habitats, and habitats can be affected by the waves in the wake of boat traffic. Areas with high concentrations of seal or other fish predators can also bring increased predation pressure and worsen conditions for fishing. Fish resources are additionally affected by physical disruptions to the ecosystem, which can be caused by

dredging, built installations, lost fishing equipment and noise. One important influencing factor is shoreline development, which can lead to fish spawning habitats being destroyed in coastal areas.

Climate

Changes in climate can affect not only the geographic distribution of fish but also their reproduction, growth and access to food, which are factors that need to be taken into consideration in the management of fish stocks. In the Baltic Sea, large scale climate changes are reflected in an expected increase in the average seawater temperature, but also in reduced salinity due to increased runoff and a change in the rate of flow (Swedish Agency for Marine and Water Management, 2017b & 2017c). Changes in the distribution of one or more species of fish can have consequences for commercial fishing such that a fish population may move away from a traditional fishing area or become reduced in size. Climate change is also expected potentially to lead to changed wind conditions, which would make consistent fishing practices more difficult, particularly fishing with nets and trawling with smaller vessels (SOU, Official Reports of the Swedish Government 2007:60).

19. Risks

The term "risks and influence factors" refers to the risks of accidents and other incidents that could have harmful consequences for people and for animal and plant life in the sea. The biggest risks are those connected with accidents, such as collisions, in maritime shipping. Such accidents can mean that oil, chemicals or other hazardous substances leak into the sea. Environmentally hazardous substances from leaks and spills on land can also reach the sea. Risks can also be connected with the leakage of harmful substances which are already in the sea. An example of this is what are known as fibre banks, which contain accumulated waste from industries with harmful substances. Other examples are waste, or ammunition and chemical weapons, which have been dumped in the sea.

Figure 42. The area marked in grey indicates the dumping ground for wrecks containing unknown quantities of chemical weapons. Traces of chemical weapons have been detected in biota and sediment in a large number of locations within the area.

Discharges

Accidents and sunken shipwrecks can be the cause of discharges of oil and various chemicals. In the event of a discharge at sea or by the Swedish coast, marine ecosystem services can be severely affected at the local or regional level. Such discharges primarily affect nature protection interests and any cultural heritage sites, but other interests such as recreation values in outdoor life and tourism, as well as commercial fishing and residential areas along the coast, can also be affected.

Discharges of oil and petroleum products

Oil discharges in the sea can originate from land-based activities, drift in from international waters, or be a result of maritime shipping accidents. Large oil discharges due to maritime shipping are less common today than they were a few decades ago, thanks to more stringent rules, increased environmental monitoring, and improved methods for managing oil spills in ports (Swedish Agency for Marine and Water Management, 2018g).

Sunken and leaking shipwrecks also constitute an oil discharge risk. Approximately 300 environmentally hazardous wrecks have been identified on the Swedish sea bed, and many of these pose a risk of oil leaks (Swedish Maritime Administration, 2011 & 2015). These risks in Swedish waters differ depending on the marine environment and activities. The main influencing factors are corrosion of the wrecks' hulls, military activities, and commercial fishing with a trawl, as fishing often occurs in the vicinity of wrecks due to the reef-like structure of wrecks attracting fish (Chalmers, 2018). Single, large oil discharges from wrecks often have a deadly effect on animals and plants that come into contact with the oil. Smaller, but continuous oil spills are also a source of environmental problems. Effects of these include reduced reproduction, genetic impacts, cancer and reduced resilience. Over an extended period of time, these effects can cause equally great or greater harm than a single, large oil spill.

Discharges of other harmful substances

The risk of serious consequences from chemical discharges may be smaller than from oil discharges, since most chemicals constitute a less serious environmental hazard. Still, consequences depend on the type of chemical and the location of the discharge. These types of discharges are costlier and require more resources to clean up than oil discharges. There are some areas

with concentrations of environmentally hazardous substances from historic dumping, which affects the possibilities for development of present-day activities there. For example, there are approximately 23,000 drums of waste containing mercury in the sea by Sundsvall Bay. Mines and dumped chemical weapons from the world wars also constitute a risk for humans and the environment. Ammunition from military exercises can constitute pollution.

Sunken and leaking shipwrecks also constitute a chemicals discharge risk. A significant proportion of these are ships fully loaded with chemical weapons, which were dumped after the second world war. There is an area affected in this way off Måseskär in the Skagerrak, where samples taken from fish in recent years contain levels of mustard gas confirming that there are leaks and that these are being absorbed in the environment (Swedish Agency for Marine and Water Management, 2018i).

Fibre banks

Fibre banks are found principally along the coast of the Bothnian Sea. Historic pollution by the pulp and paper industry has created large accumulations on the sea bed in this area, in the form of fibre banks and fibre-rich sediment. Along the coast of the Bothnian Sea there are also accumulations of contaminated sediment which do not contain fibres.

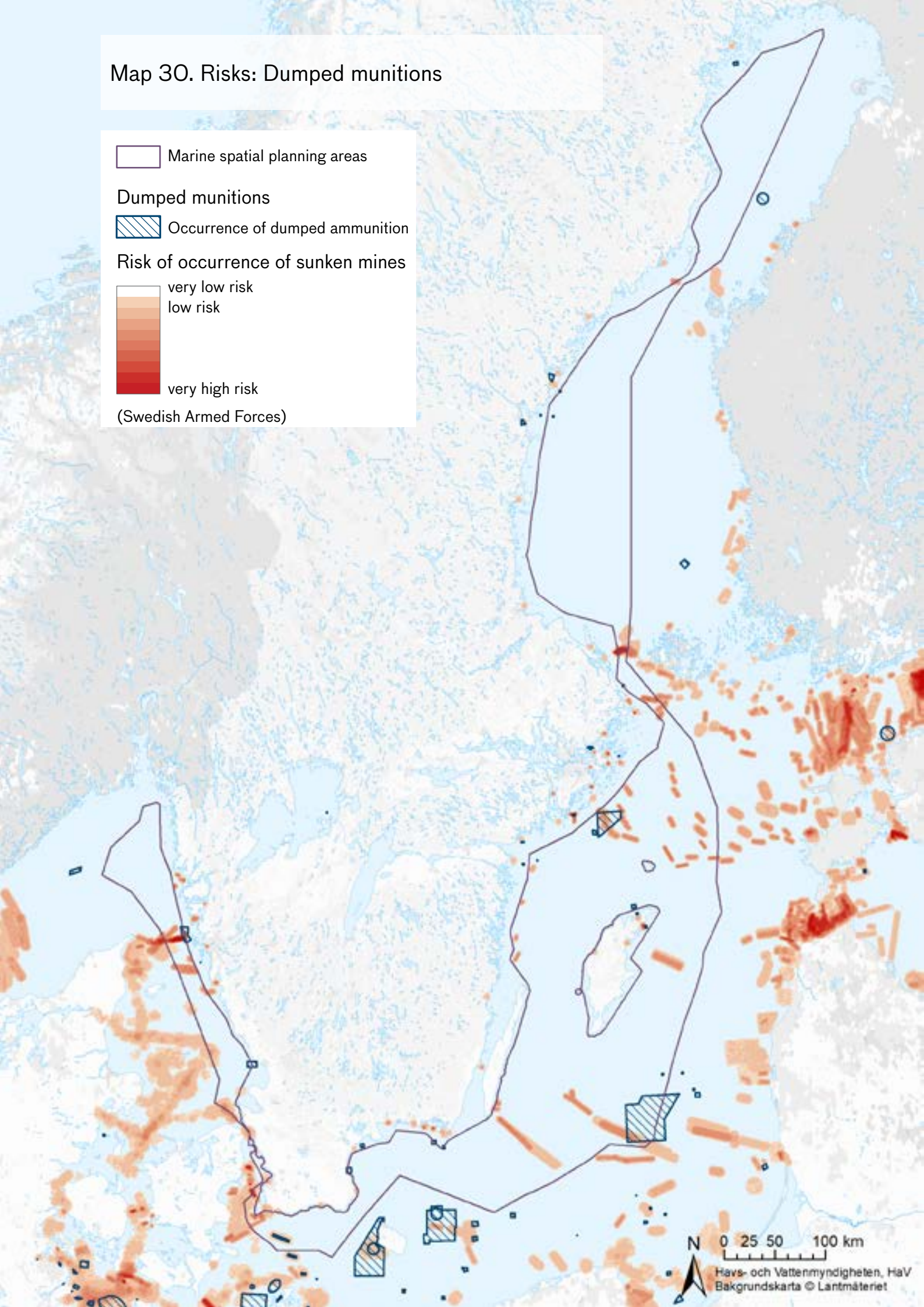
Many environmentally harmful substances have been identified in the fibre banks, including high levels of the environmental toxins PCB, DDT and arsenic as well as heavy metals such as mercury, lead and cadmium (Swedish Geological Survey, 2016a). The need for decontamination of contaminated sediment in the Bothnian Sea may grow, as the fibre banks are neither physically nor chemically stable. There is a risk that environmental toxins spread to deeper areas, where they can be absorbed by benthic organisms and move further up the food chain.

Storms and waves, changes to bottom currents, and various human activities such as shipping, dredging and trawling can also contribute to the spreading of contaminated sediment (Swedish Geological Survey, 2018a). Post-glacial rebound will eventually mean that contaminated bottom areas, which are today under water, rise above the surface and become subjected to erosion in the form of waves and wind, with the risk of spreading that this implies.

Saritime accidentsr

Maritime accidents are not particularly common, and can usually be attributed to traffic intensity or groundings. The risks here are oil discharges and interruptions to transports. The likelihood of accidents is higher in the narrow waters around Öresund and in the entrance channels to the various ports (Swedish Civil Contingencies Agency, 2016). The risks of accidents at sea have also been assessed in the BRISK (Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea) EU project. According to BRISK, the biggest risks in Swedish marine areas are by Svenska Björn, northeast of Öland's southern shallows, and in Bornholmsgattet and Öresund. Every year 38,000 vessels pass through Öresund, which makes the intensity of traffic a risk in itself. Around 51,000 vessels pass through Bornholmsgattet every year. With its intersecting and connecting channels this means that Bornholmsgattet, according to BRISK, is the busiest area in the Baltic Sea, where the likelihood of a serious accident is greatest.

Map 30. Risks: Dumped munitions



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