Swedish Agency for Marine and Water Management

Marine spatial plans for

Gulf of Bothnia, Baltic Sea and Skagerrak/Kattegat

Proposal to the Government (reg. no 3628-2019)
16 December 2019

This document contains the following excerpts from the original document:

This document

In December 2019, the Swedish Agency for Marine and Water Management (SwAM) submitted a proposal for national marine spatial plans to the Government in accordance with the Marine Spatial Planning Ordinance. (Reg. no 3628-2019).

This document contains excerpts in English of the proposal. The excerpts relate to expected implications and impact of the marine spatial plan proposal (chapters 4, 12 and 13). Please note the page numbers do not correspond to the original document.

The original document in its entirety and supporting documents are available in Swedish on the website of SwAM, www.havochvatten.se On the website there is also a useful on-line map tool where it is possible to browse the planning maps.

Foreword

The Swedish Agency for Marine and Water Management is responsible for drafting proposals for Sweden's first national plans for the Gulf of Bothnia, the Baltic Sea and the Skagerrak/Kattegat. We now submit these proposals to the Swedish government. The proposals are based on a long and comprehensive collecting of knowledge and dialogue with industry and trade organizations, non-governmental organizations, universities, public authorities, county administrative boards, regions, municipalities, authorities in other countries, businesses and the public. We would like to thank all those who participated in various ways and contributed to the proposals.

Marine spatial plans provide guidance on what is the most suitable use of the sea. They guide national authorities, municipalities and courts in future decisions, management, planning and licensing. Industry can also obtain guidance from the plans.

Marine spatial plans shall contribute to sustainable development. They combine business policy objectives, social objectives and environmental objectives.

Gothenburg, December 2019

Jakob Granit

Director-General

Swedish Agency for Marine and Water Management

Summary

This is the proposal for marine spatial plans that the Swedish Agency for Marine and Water Management submits to the Government, in accordance with the Marine Spatial Planning Ordinance.

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 on what is the best use of the sea. The marine spatial plans guide national authorities, municipalities and courts in future decisions, planning and licensing. Industry can also obtain guidance from the plan.

Marine spatial plans shall contribute to sustainable development. They shall reconcile economic, social and environmental objectives. The marine spatial plans provide guidance on most suitable use. The use or uses specified for an area take precedence over other uses. In large parts of the sea, different uses can coexist if they adapt to each other. The marine spatial plans give guidance on which use or uses take precedence, and on necessary adaptations.

The marine spatial plans specify thirteen uses:

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

The marine spatial plans also specify areas where particular consideration has to be made to high nature values, to high culture values, or to the interests of Sweden's total defence. Proposals for uses are based on trade-offs and suitability assessment considering location, characteristics and needs. National interests and other public interests are important when making the trade-offs.

The impacts of the proposed marine spatial plans have been assessed from ecological, economic and social perspectives. Impact assessments have been carried out in parallel with and as an integral part of the planning. Impacts are additionally analysed in a separate environmental report and a separate sustainability report.

This is the first time ever that Sweden produces national marine spatial plans. The plan proposals are based on new legislation, societal goals, extensive planning evidence and a wide-ranging dialogue with stakeholders.

Figure 1. General map of Sweden's three marine spatial plan areas.

4. Impact assessment

A stepwise and integrated process

Impact assessments have been carried out as part of the planning process over several years. This began with the work to produce a report on the current status for marine spatial planning (Swedish Agency for Marine and Water Management report 2015-2). This report included the first description of the status of the marine environment as a basis for planning. It was followed by the production of a roadmap for marine spatial planning. This included the scope of the strategic environmental assessment and the identification of environmental objectives, among other things.

Sweden's neighbouring countries were informed, in accordance with the Espoo Convention, about the Swedish marine spatial planning and work on strategic environmental assessment in connection with consultations on the roadmap.

The integration of environmental considerations continued through a thematic working group on nature conservation and marine ecology, which identified future spatial needs for nature conservation. Since then, three major dialogue phases have taken place: the informal dialogue on the first drafts of marine spatial plans in 2017, the formal consultation in 2018, and the review of plan proposals in 2019. Sustainability assessments and socio-economic impact analyses of subareas have also been produced in various steps during the process.

Table 1. Impact assessments in the marine spatial planning process

	Early stage 2017	Consultation 2018	Review 2019	Proposals to the Government 2019
Environmental assessment	All draft plans	All consultation proposals	All review proposals	All plan proposals
Sustainability assessment	The draft plan for the Baltic Sea	All consultation proposals	All review proposals	All plan proposals
Socio-economic impact analysis	None	Gävle Bay and southern Kattegat	The Baltic Sea review proposals	Text

The results of the impact assessments from dialogue and consultation phases have been fed back into the planning process. The feedback has made it possible to consider and change draft plans, based on the results of the impact assessments. This has allowed environmental, social and economic aspects to be integrated into planning.

Special coordination sessions were held in the autumn of 2018 to convey and discuss the results of the impact assessments, which have been taken into account in planning.

A guide or tutorial to environmental assessments in marine spatial planning was developed ahead of the consultation phase, as working material designed to facilitate the integration of environmental considerations into the marine spatial plans. A comprehensive cartographic material showing nature values, marine green infrastructure, has also been produced and used in the planning process. This map material, known as the Green map, has been gradually developed throughout the process in order to make use of the best available data.

The consultation version of the marine spatial plans included alternative planning options in the form of different planning solutions for sub-areas. They were based on possible trade-offs between interests identified during the course of the planning process. Most of them concerned the issue of energy extraction, but maritime shipping also featured.

The review version of the marine spatial plans included options for maritime shipping based on separate studies. It also included a comparison with the proposals for energy areas in the consultation version.

The current final plan proposals to the government also includes planning options for maritime shipping, as well as proposals for possible changes to enhance the environmental benefits and to strengthen certain aspects of sustainability.

Applying a holistic perspective

A starting point in Chapter 1 of the Environmental Code is that the Code is to be applied so that land, water and the physical environment are used to ensure long-term good management of the ecological, social, cultural and societal aspects of the economy. The Marine Spatial Planning Ordinance and the Environmental Code require a strategic environmental assessment in marine spatial planning and the development of environmental reports in the context of consultation. According to the same ordinance, the plan proposals shall also present the implications and consequences of the use of the sea resulting from the proposals. Furthermore, since the purpose of the marine spatial plans is to contribute to sustainable development, there is a need to assess the sustainability of the marine plans. Therefore, environmental as well as sustainability assessments need to be developed, as are socioeconomic impact analysis.

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 will also provide an overview of how marine spatial plans can contribute to sustainable development. The environmental assessment has the purpose, expressly stated in the

Environmental Code, of contributing to the integration of environmental considerations in planning. With supplementary socio-economic assessments and sustainability assessments, all considered together, this works in accordance with the Environmental Code's overall objective and scope for sustainable development.

In preparation for the consultation phase, the Swedish Agency for Marine and Water Management developed the Symphony planning support tool, which allows for analysis of interacting, 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 for delivery 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.

Zero alternative

The impact assessments show the difference in impacts of applying the marine spatial plans and not applying them. It involves assessing one future scenario with marine spatial plans and one without the plans, the latter called the zero alternative. The reference year for the zero alternative is 2030. Both the environmental report and sustainability report 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, evidence, 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 dealt with in the environmental assessment, and are presented in a report published in 2018 [Swedish title: Symphony – Integrerat planeringsstöd för statlig havsplanering utifrån en ekosystemansats].

12. Implications of the marine spatial plan proposals

New holistic 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 holistic perspective has to take ongoing sector planning and management into account. Conflicts between aims are highlighted when different societal goals have to be 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 at different planning levels – from the local perspective to the international. During this first process of national marine spatial planning, the planning and presentation have been conceived such that the marine spatial plans' guidance is provided at the appropriate level. The descriptions of designations for uses and consideration in the marine spatial plans are an example of this. Marine spatial plans provide guidance on which functions and values that 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 have priority in a given area, management and interventions can be adapted in the future.

Various 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 planning cycles, for instance in method development, common planning evidence, and in monitoring of implementation of 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. Future claims for new activities in the sea will be part of continuing marine spatial planning, with coexistence as the guiding principle.

Use of the sea

Development of ongoing activities

The 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 EU Strategy for the Baltic Sea region’s goal of increasing prosperity and connecting the 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 lanes around Gotland is investigated on the premise that the environmental impact of maritime shipping needs to be reduced, in particular negative effects on birds and porpoises, while at the same time providing an efficient, climate smart and safe traffic system.

The marine spatial plans address the societal goals for continued and developed commercial fishing by specifying priority 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 is 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 planning maps show lanes that are needed in order for the transport function to be

maintained. In reality, maritime traffic can use all areas that do not have explicit restrictions. For fishing, the planning maps show important fishing grounds. However, fishing can continue in other areas, in accordance with the current fisheries regulations. In the event of future claims from other activities, the exact location and place needs to be analysed in a more detailed plan. Trade-offs 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 the marine spatial plans partly in that defence and security are given due weight in trade-offs 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 places 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 made use of. In the Gulf of Bothnia, principally in the South Bothnian Sea, the national planning 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 irreconcilable 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 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. A public inquiry into the current energy establishment system is therefore needed. Issues that have been brought up as obstacles to co- existence include uncertainty regarding the extent, likelihood and timing of wind power establishment. In addition to increased power production, planning assumptions that facilitate future offshore wind farms can influence balancing power as well as reduce the need for transferring electricity from northern to southern Sweden.

Since the marine spatial plans are intended as guidance and are based on overall considerations, they do not amount to a guarantee that all the areas for energy extraction in the plans will be possible to develop. The fact that the plans specify priority provides the means for future

decisions. In following licensing processes, energy projects are examined against the functions and values to be maintained, including Natura 2000 areas. Adaptation requirements are then imposed in relation to local circumstances and planned activities, among other things.

The areas specified for energy extraction in the marine plans allow for a total of about 23 TWh to 31 TWh in annual electricity production, depending on the proportion of the areas that will be able to be used, with regard to nature conservation, defence, cultural heritage and other interests. Wind conditions, installed technology and design of the wind farms also affect the outcome. The calculations have been based on an assumed 33 to 50 percent utilization of areas that are currently without permit. The calculations also include existing wind farms and areas where there are permits to construct wind power plants.

There are several electricity transmission connections between Sweden and neighbouring countries. The transmission network has the designation electricity transmission in the plan. In order to increase integration between Swedish and European networks, more links are foreseen. In the Swedish planning process, it was too early to designate specific locations for future access points between countries.

Material supply

The marine spatial plan provides guidance on sand extraction use in four areas. In three areas, sand has not been extracted before. 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. The extent of the distribution in these areas, marked with dots in the plan map, should be determined in a licensing procedure. Supporting documentation describes the precautions required in order for extraction operations to be carried out with minimised negative effects.

Cultural heritage and recreational 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 impact on cultural heritage and landscape. 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 continued marine spatial planning, remains in the sea as well as cultural landscapes may occasion further guidance in the marine spatial plans based on more developed supporting documentation. Overall supporting documentation for planning 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 parts of the marine and water management that will contribute to achieving the objective of good environmental status in the sea. Overall, the aim is to strike the right balance between the interests of the maritime ecosystem we need. To a large extent, employment and development in various sectors depends on the marine ecosystem services, such as food and oxygen.

The 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 on spawning and nursery areas.

The guidance in the marine spatial plans also introduces a new way of promoting the development of valuable ecosystem services, in addition to established forms of nature protection, which is beneficial for many interests. By providing guidance on particular consideration to 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 to build resilience in times of climate change.

The guidance on particular consideration concerns planning and licensing, but is also directed at 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 specified 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 actors in planning operations and activities in time and space, with the possibility to adapt to changing circumstances, in order to be able to contribute to the ecosystem services of the sea within their own remit.

13. Impacts of the marine spatial plan proposals

A description of the expected impacts of the marine spatial plans is an important part of the basis for decision on the plans. The Environmental Code and the Marine Spatial Planning Ordinance specify requirements for what has to be included and how presentation has to be done. Chapter 4 describes the impact assessment process, whereas this chapter gives a general description of the results of the impact assessment carried out. The chapter contains the points of departure, the results of the environmental report, the results of the sustainability report, as well as an assessment of how the plans will contribute to the achievement of the planning objectives, the environmental quality objectives and the global goals for sustainable development.

Strategic environmental assessment
= the process in which the environmental effects of the plan are assessed

Environmental report
= the document collecting the results of the strategic environmental assessment process

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

Sustainability report
= the document collecting the results of the sustainability assessment

Points of departure

Planning and impact assessments have been integrated in a systematic approach based on a comprehensive knowledge base. The work on the impact assessments has been developed in several stages during the planning process.

According to the Environmental Code, the scope of the environmental report must be proportionate in relation to assessment methods, current knowledge, the level and detail of the plan, and the stage of the decision-making process in which the plan is. Marine spatial planning is a new form of national planning at a strategic level. The strategic environmental assessment of the plans has been adapted accordingly. The establishment of any activity will be preceded by an environmental examination as part of a licensing procedure, and in some cases a Natura 2000 permit procedure, that considers specific circumstances and conditions. This means that more specific environmental assessments will be carried out at local level.

Strategic environmental assessment and sustainability assessment

The sustainability report and the environmental report include detailed descriptions of the results of the impact assessment process. In earlier stages, socio-economic impact analyses were carried out on the Baltic Sea (review phase), on the Gävle Bay for Gulf of Bothnia (consultation phase) and on the southern Kattegat for Skagerrak/Kattegat (consultation phase). The reports are available in Swedish on the website of the Swedish Agency for Marine Environment.

The effects of the plan proposals are assessed in relation to the zero alternative, which identifies the expected development within different sectors by 2030 and the expected future change to the state of the

environment if there were no marine spatial plans. The zero alternative is described in the separate sustainability report and environmental report.

At the end of the chapter, the assessed impacts of the plan proposals are presented in relation to the planning objectives, the environmental quality objectives and the global goals for sustainable development.

Conclusions of the Strategic Environmental Assessment

The strategic environmental assessment assesses the effects on the environment along relevant environmental aspects stated in the Environmental Code: population and health, landscape and cultural environment, marine ecology and benthic environment, climate and air, as well as management of land and water use. The results are presented in an environmental report published in December 2019. [Swedish title: Miljökonsekvensbeskrivning av havsplaner för Bottniska viken, Östersjön och Västerhavet]. Below is an overall summary.

Environmental impact

Population and health

The environmental impact assessment estimates that the marine spatial plans could imply some limitations to outdoor life in energy areas, and the visual impact of wind turbines on the landscape could affect cultural ecosystem services. The conservation of nature values is of importance to population and health. The marine spatial plans are considered to have some positive effect, as they provide guidance on particular consideration of high nature values and nature use. The overall assessment is that the overall impact of the marine spatial plans does not have a significant impact on population and health.

Natural and cultural landscapes

A positive environmental impact on the landscape aspect is identified in the environmental report, stemming from the guidance on particular consideration of high cultural landscape values, as well as culture use (Gulf of Bothnia) and recreation use. Conservation 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, in particular on the assumptions about reduced risk of a disturbance to cultural heritage remains in the sea.

Cultural landscapes may be adversely affected by energy extraction use and other uses which cause physical disturbance to the seabed, namely sand extraction, fishing close or on the seabed, as well as leisure activities primarily at shallower areas. However, impacts and

Geographical extent of effects

Local scale = within a marine area

Regional scale = within a marine planning area

Duration of effects

Reversible in the short term = effects below 2 years

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

Long term irreversible = effects over a period of more than 5 years

Irreversible effects = lasting effects

environmental effects are considered to be low in the areas where the marine spatial plans provide guidance on these uses. In the southern Bothnian Sea and in the Kattegat, energy extraction is estimated to have a moderate negative impact on the landscape aspect.

Marine ecology and seabed environments

The impacts identified for marine ecology and seabed environments are principally connected to the two uses energy extraction and sand extraction, in relation to the zero alternative

For marine ecology and seabed environments, the impacts and effects are related to a geographical scale in which “local” refers to effects within a marine area, while ”regional” refers to impacts within a plan area.

For the duration of temporary negative effects, “reversible in short-term” refers to a period of up to two years, “reversible in the medium term” refers to two to five years, and “reversible in the long term” to a period longer than five years.

Table 12. Overall environmental impact. The table indicates degree of environmental impact on different aspects in the three marine spatial plan areas respectively.

	Gulf of Bothnia	Baltic Sea	Skagerrak/ Kattegat
Plankton	Marginal negative	No effect	Marginal positive
Fish, including spawning	Marginal negative	No effect	Low positive
Mammals	Low negative	Marginal positive	Marginal positive
Birds	Moderate negative	Moderate negative	Marginal negative
Bottom environment	Marginal negative	No effect	Moderate positive
Water	Marginal negative	No effect	No effect
Cultural environment	Marginal negative	Low negative	No effect
Landscape	Low negative	Low positive	Low negative
Air	Marginal negative	No effect	No effect
Climate	Moderate positive	Low positive	Marginal positive
Population and health	No effect	No effect	Marginal positive

For the **Gulf of Bothnia** the environmental report states that the marine spatial plan is estimated to have some negative effects on marine ecology, including seabed environments, due to the energy extraction 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 affect wintering birds and coastal birds negatively. The impact on birds is local, but also has international relevance due to the potential effects on migratory birds. The effect is regarded as irreversible, and several wind farms in the same area may potentially give a cumulative effect. In the Bothnian Bay, sand extraction is estimated to have a small negative impact on ringed seal and on seabed environments. The impact is local but may have cross-border significance for the populations.

For the **Baltic Sea**, the environmental report states that the marine spatial plans' guidance on particular consideration of high nature values is estimated to result in reduced impact from fishing in particular, due to reduced disturbance to the sea bed and smaller by-catches. This has some positive effects for seabed habitats, plants, fish, Baltic and Belt Sea harbour porpoises, grey seal, coastal birds and wintering birds. The expected reduction in trawling may also have some positive effects on water quality due to local reductions in turbidity, but the effects are variable and relatively small. On the other hand, sand extraction and installation of wind farms are estimated to have low to moderate local negative effects for marine ecology and seabed environments. They are estimated to be reversible in the short to long term, depending on the species and the type of seabed environment. Planned energy extraction on the South Middle bank is estimated to cause some disruption during the installation phase, but no significant negative changes in the seabed characteristics of the area as a whole. Negative effects for fish caused by disturbance of bottom environments include increased turbidity, hence affecting both benthic and pelagic species. However, these effects are estimated to be relatively low, short-term and reversible, thus not affecting stocks negatively. Sand extraction areas are also estimated to affect nursery areas for cod in the south-western Baltic Sea. Some effects on the marine ecology, positive as well as negative, are relevant to the coastal zone and in cases where populations move over of large areas, are of regional or international relevance. Wind power at the South Middle bank is estimated to affect birds negatively, with a local impact but international effect on the population wintering in Swedish waters. This effect is expected to be irreversible. Installation of offshore wind power at the South Middle Bank is also at risk of disturbing the noise-sensitive and threatened Baltic population of harbour porpoise during the construction phase.

Benthic species = species that live close to the bottom of the sea, for examples cod

Pelagic species = species living in free water, for example herring

The marine spatial plan for the Baltic Sea includes maritime shipping investigation areas for the shipping lanes around Gotland. The environmental report presents an assessment of the differences in environmental effects of maritime traffic in the areas around the Hoburg bank and the Salvo reef, with current shipping lanes and rerouted maritime traffic respectively. The impacts analysed here are underwater noise and oil discharges. For rerouted maritime traffic by the Hoburg bank, the analysis indicates 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 seabed is soft and thus reflecting noise less. A reduced negative effect would also be achieved if maritime traffic passed areas with lower nature values. For the Salvo reef, the analysis indicates some positive local effects, primarily for fish and birds.

For the **Skagerrak/Kattegat**, the environmental impact assessment indicates that the plan contributes to certain positive effects for the marine ecology, including for fish species, nursery areas and bottom environments. In the Skagerrak, this also applies to the North Sea harbour porpoise and harbour seal. The Kattegat is an important area for the Belt Sea harbour porpoise. The marine spatial plan is considered to have a small but temporary negative impact from offshore wind construction as the effect does not have a lasting impact on the population. One of the reasons for positive effects is the adoption of a reduction in bottom trawling in areas with guidance on particular consideration to high nature values. Trawler fishing that reduces physical disturbance of the seabed can have a positive effect on the ground. In the Kattegat, wind power is considered to have a small negative impact on sea birds. It is a local effect that also relates to the coastal zone, but because of the possible negative effect on migratory birds it also has an international relevance. There is a risk of cumulative effects of several wind farms being established in the area. The effect is considered to be irreversible on the basis of the assumption that given licences will be renewed.

Climate and air

The additional production of renewable electricity is expected to be realised on the basis of the plans will provide a climate benefit in terms of reduced greenhouse gas emissions if it replaces electricity from energy sources with higher emissions. Electricity production in Sweden is linked to very low greenhouse gas emissions in international comparison due to the high share of energy from hydro- and nuclear energy. However, wind power is assumed to have the potential to contribute to a net power reduction of CO2. The areas designated for energy extraction in the marine spatial plans can add substantially to the Swedish electricity production. Even in a more a restrictive scenario, where wind power only replaces electricity from the Nordic electricity market, there may be significant emission reductions.

Maritime traffic for services in the field of energy and the extraction of sand extraction can have a local negative impact on air quality. However, the effects are marginal and, in the environment impact assessment, the impact on air quality is not assessed to be significant.

Management

The environmental report states that the marine spatial plans, all things considered, are assessed to have a positive impact on the management aspect that includes land, water and the physical environment as well as materials, raw materials and energy. This assessment is based, among other things, on the fact that the marine spatial plans promote coexistence between uses and coordination in management. Sand extraction contributes with a quality material high in demand, which may reduce the need for imports and extraction from land-based sources. The negative effects of the extraction will be possible to reduce by complying with the requirements imposed at the licensing stage. Energy extraction at sea contributes to energy from a renewable source and reduces the need for land use for energy production.

Good environmental status

The environmental assessment includes a qualitative analysis of the contribution of the marine spatial plans to achieving good environmental status in Swedish waters for relevant assessment criteria under the Marine Strategy Framework Directive and the criteria of the Water Framework Directive that are related to the marine environment, as well as environmental quality standards for the North Sea and the Baltic. The overall assessment indicates small effects, negative as well as positive. Sand and energy extraction are assessed to primarily have local negative effects, because the affected bottom environments are geographically limited and small in relation to the plan areas as a whole. For wintering sea birds and Baltic sea harbour porpoises, offshore wind generation can have a moderate negative impact, but with potential cross-border relevance. Based on the current state of knowledge and the plurality of other pressures, it is not possible to predict effects of the changes brought about by the plans at population level for all species. More detailed investigations will be required in licensing examinations for offshore wind power operations. The marine spatial plans are assessed to contribute positively to the objective of good environmental status through guidance on nature use and particular consideration of high nature values.

Conclusions from the Sustainability Assessment

The objective of the sustainability assessment set out in a sustainability report is to assess the extent to which the plans contribute to a sustainable development.

The results are set out in in a sustainability report published in December 2019 [Swedish title: Hållbarhetsbeskrivning av havsplaner för Bottniska viken, Östersjön och Västerhavet]. Below is an overall summary.

Sustainability report

The sustainability assessment was carried out with a multi-criteria analysis based on the three dimensions of economic, ecological and social sustainability, with a set of selected criteria for each dimension. Potential societal and economic impacts are analysed, including their linkages with impacts on ecosystem services. The sustainability assessment contains elements of socio-economic analysis, in the form of the fact that different benefits and costs are analysed in relation to the sectors or interests that are considered to be affected by the plans. The socio-economic impact studies carried out earlier for the consultation phase and review phase respectively have been the basis for these analyses. The assessment of impacts on ecosystem services has been carried out jointly for the sustainability report and the environmental report.

Economic sustainability

As far as economic aspects are concerned, the sustainability assessment shows that marine spatial plans affect mainly the interests of energy extraction, sand extraction, marine recreation and commercial fishing. This is largely because the marine spatial plans designate space for energy extraction and sand extraction. Positive economic effects are mainly linked to the use energy extraction with a high degree of energy extraction in the Gulf of Bothnia marine spatial plan. The designation of areas for sand extraction in the Baltic Sea and the Gulf of Bothnia is expected to contribute positively from an economic point of view. For commercial fisheries and recreation, there are both positive and negative economic effects. For example, the use energy extraction can have effects on people through impacts on landscape and accessibility to the sea. This is mainly the case in the Gulf of Bothnia and Skagerrak/Kattegat where areas proposed for energy extraction are closer to land (Ek, Bäckström & Pettersson, 2017).

The Maritime Plans Guidance on special consideration of high nature values will likely enhance supportive ecosystem services and contribute to economic sustainability over time. However, for the purpose of the realisation initially, guidance on particular consideration of high nature value may entail certain costs related to adaptations in the field of commercial fishing. Such cost effects also risk affecting processing activities in the processing of fish and seafood, wholesale and retail.

Gulf of Bothnia

The plan is assessed to contribute to economic sustainability through its inclusion of a number of areas for energy extraction.

Although the current profitability of offshore energy extraction is low, the potential is assessed as high, as demand for renewable energy is expected to increase. The guidance on sand extraction at Svalan and Falken banks is deemed to provide good support for extraction activities. However, the marine spatial plan uses energy and sand extraction, are assessed to generate negative, economic effects due to increased pressures on ecosystem services relevant for recreational and commercial fishing.

Baltic Sea

The marine spatial plan's guidance on the particular consideration of high nature values is expected to strengthen supportive ecosystem services and to contribute to the economic sustainability. In addition, the guidance on energy extraction on Southern Middle bank is contributing positively due to an expected increase in demand for renewable electricity in the future. The guidance on sand extraction by the coast of Skåne and in the Hanö Bay is assessed to contribute to positive economic effects. However, the marine spatial plan uses energy and sand extraction, are like for the Gulf of Bothnia also assessed to generate negative, economic effects due to increased pressures on ecosystem services relevant for recreational and commercial fishing.

Skagerrak/Kattegat

The sustainability report indicates limited effects from marine spatial plan proposal for the Skagerrak/Kattegat. The results of the analysis show a positive economic effect from the plan's guidance on energy extraction in the southern Skagerrak/Kattegat. Offshore wind is assessed to have some negative economic effects due to an increased burden on ecosystem services of importance for commercial fishing and recreational use. However, the scope of the impact over time is difficult to assess. The guidance on specific consideration of a high nature values in the plan is assessed to enhance supportive ecosystem services and, in the long run, to promote the environmental conditions that commercial fishing is dependent on, which contributes to economic sustainability. There may also be positive effects from the confirmation of national interest for outdoor life in the plan.

Ecological sustainability

The sustainability report includes two criteria for ecology: marine environment and climate. The assessment according these criteria is based on the environment impact assessment. See previous sections. In addition, benefits in terms of mitigation of climate and potential reduction of greenhouse gas emissions are assessed.

Gulf of Bothnia

Areas designated for energy extraction are mainly in the south of the Gulf of Bothnia. They are contributing to positive effects in terms of

climate, but also to potential negative effects on the marine environment, in particular sea bird.

Baltic Sea

As for positive effects, there is guidance on energy extraction generating positive effects related to climate. In addition, investigation areas for shipping are included. The aim with these is to reduce environmental impact from shipping, possibly by rerouting shipping south of the Hoburg bank to the deep-water routes in the Southeast or to the west of the island of Gotland. Such rerouting is assessed to have a positive impact on the marine environment (see section on marine ecology and bottom environments above), but may potentially have negative climate impacts and increase air pollution caused by increased mileage.

Skagerrak/Kattegat

Also in the Skagerrak/Kattegat the guidance on energy extraction, will have positive impact in relation to climate, albeit to a lesser extent than in the other plan areas. Energy extraction on the Stora Middelgrund and West of Falkenberg will additionally have local negative environmental effects. In terms of the planning area as a whole, a reduction in the environmental burden can be expected due to the plan's guidance in general and the guidance on particular consideration to high nature values.

Social sustainability

Overall, the marine spatial plans are assessed to contribute to social sustainability, in particular due to potential employment effects linked to guidance on energy extraction. However, the marine spatial planning use energy extraction may also potentially have negative effects in terms of reducing the accessibility to sea areas, as well as the impact on landscape and cultural environment. This is mainly the case in the Gulf of Bothnia and the Skagerrak/Kattegat where the designated areas for energy extraction are closer to shore than in the Baltic Sea.

The plans are also assessed to have the potential to contribute to positive health effects through the plan uses recreation, nature and culture, as well as particular consideration to high nature and cultural landscape values, which may result in increased recreational values. The health effects are assessed as relatively small and difficult to measure, but are not negligible.

Gulf of Bothnia

In the plan area, the guidance on energy extraction is expected to have positive effects on employment in the wind power industry. At the same time, it may give rise to negative effects on social aspects such as accessibility and cultural landscapes.

Baltic Sea

As for social sustainability, the guidance on areas designated for energy extraction may lead to an increase in job opportunities. However, wind power generation can have negative effects related to accessibility and cultural environment.

Skagerrak/Kattegat

As for social sustainability, the guidance on areas designated for energy extraction may lead to an increase in job opportunities. However, wind power generation can have negative effects related to accessibility, cultural environment and the tourism sector.

Other sustainability aspects

The marine spatial plan will provide clarity on the prescribed use, which supports, for example, the work of municipalities in comprehensive planning. The MSP process helps to enable greater consensus between cities, authorities and other stakeholders on the trade-offs between interests. Marine spatial planning makes it the future use of the sea easier to predict. Decisions on future use in, for example, licensing will have a clearer framework to relate to, which can make licencing and permitting faster and cheaper for the actors involved in the process. It is difficult to predict in more detail how the marine spatial plan contributes to this type of benefit, and the subsequent benefits are difficult to quantify. A potential benefit is associated with cost savings is a more efficient planning process for the sea in Swedish coastal municipalities.

It has not been possible to fully apply a systems perspective approach in the impact assessments of the marine spatial plans. With a systems perspective approach we here refer to comparing the potential impact of using the sea for a specific activity with alternatives located on land. Not having a full-fledged systems perspective may in practice lead to an underestimation of the societal benefits of not locating an activity on land. By way of example, the ocean is being used for transporting huge amount of goods resulting in pressures on the marine environment, but at the same time, the sea transports are reducing the need for space and investments as well as reducing the environmental impact on land. Other examples are as food production, sand extraction, and the climate benefits of renewable energy.

Effectiveness of the marine spatial plans

Effectiveness: planning objectives

In summary, the plans are assessed to contribute to the planning objective of good marine environment and sustainable growth. This assessment is based on an overall assessment of the respective areas of the plan, largely linked to renewable energy areas and the strengthening of natural values and ecosystem services.

Effectiveness: Sweden's environmental quality objectives

The marine spatial plans are considered to have certain direct impacts in relation to some of the environmental quality objectives; 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. The most affected are reduced climate impact and, a balanced marine environment, flourishing coastal areas and archipelagos.

The plans are through inclusion of a number of areas for energy extraction promoting establishment of offshore wind energy. The planning guidance is expected to facilitate the granting of authorisation processes, thus increasing the rate of renewable energy extraction. Guidance on the establishment of offshore wind and sand extraction risks disturbing valuable species and habitats,

At the same time, the marine spatial plan opens up the possibility for increased protection of species and habitats in far more and larger areas through the guidance on consideration of high nature values. High Nature Value Assessments have been included in the trade-offs for the most appropriate use, with the result that interfering activities are avoided in the most valuable natural areas. Guidance on the consideration of high nature values also signals to the need for operators and regulators to apply in particular sustainability principles in future activities. Attention is drawn to the importance of these areas for biodiversity, the integrity of ecosystems and resilience in a changing climate. In addition, the use nature in the plans confirms the existing and planned protected areas, fish spawning grounds and areas of national interest in nature conservation.

Effectiveness: Global Goals

The plan proposals are evaluated positively in all three plan areas for the global sustainable development goals number 7 and 13 related to sustainable energy and reduced climate change and climate impact. The positive contributions increase with the scale of increased energy extraction and is therefore highest in the Gulf of Bothnia. Energy extraction can give rise to local negative environmental impacts on goal 14 Life below water, for example through the impact on the marine bottom environment, which affects target 14.2 on protecting and restoring ecosystems, and

potentially some impact on cultural environments too, of target 11.4 on protecting the world's cultural and natural heritage. The plans guidance on particular consideration of high nature values, as well as cultural values, are considered to be a positive contribution to goal 14 and goal 15 Life on land through expected environmental measures within commercial fishing and other sectors. This impact is likely to be greatest in Skagerrak/Kattegat, where the guidance on particular consideration is assessed to give an overall positive contribution to target 14.4 on sustainable fishing.

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