

NTNU Vitenskapsmuseet naturhistorisk rapport 2024-3

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Eckbo

**Potential marine Other Effective Area-  
Based Conservation Measures (OECMs) in  
Norway: Current compliance status in  
relation to CBD and IUCN guiding  
principles, definitions and criteria**

## **NTNU Vitenskapsmuseet naturhistorisk rapport**

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# Sammendrag

Dunshea, G., Olaussen, K. & Eckbo, N.H. 2024. Potential marine Other Effective Area-Based Conservation Measures (OECMs) in Norway: Current compliance status in relation to CBD and IUCN guiding principles, definitions and criteria. – NTNU Vitenskapsmuseet naturhistorisk rapport 2024-3: 1-71.

Denne studien er utført på oppdrag fra Naturvernforbundet. Vi har vurdert ulike marine forvaltningstiltak og hvordan disse samsvarer med konvensjonen om biologisk mangfolds (CBD) retningslinjer og kriterier for rapportering av «andre effektive arealbaserte forvaltningstiltak» (OECM). Funnene viser at andelen av norske havområder som kan vurderes som OECM'er, og dermed bidra til Naturavtalens mål om 30% vern, i dag er langt under de 44 prosentene som er rapportert av regjeringen.

## Hovedfunn:

Etter gjennomgang av 61 hummerfredningsområder, 18 korallrev forbudsområder, 17 vernede bunnområder, fem bevaringssoner, 492 tarehøstingsområder og en rekke andre arealbaserte fiskeriforvaltningstiltak som ble vurdert ved hjelp av IUCN World Commission on Protected Areas 2023 Site-level tool, finner vi at:

- Bare 25 hummerfredningsområder (83,28 km<sup>2</sup> totalt) og fire korallrev forbudsområder (120,65 km<sup>2</sup> totalt) oppfyller CBD/IUCN OECM kriteriene på nåværende tidspunkt. Ingen av de andre arealbaserte forvaltningstiltakene kan defineres som områder «that achieve positive and sustained long-term outcomes for the *in situ* conservation of biodiversity» (CBD-beslutning 14/8, 2018) i henhold til CBD's veiledende retningslinjer og kriterier for OECM'er. Områdene som oppfyller OECM kriteriene utgjør bare 0,01% av Norges havområder.
- De enorme områdene i Norges økonomiske sone hvor bunnhabitatene er vernet (593 845 km<sup>2</sup>) og som utgjør nesten 30% av Norges havareal, kan ikke betraktes som OECM'er av flere grunner: en slik vertikal sonering vil kun beskytte deler av økosystemet mot en enkelt trussel (fiske med bunnredskap); disse nye fiskeområdene kan åpnes for bunntråling i fremtiden om det utvikles relevant fiskeri; petroleumsaktivitet pågår innenfor området; og store deler overlapper og/eller ligger helt inntil områder hvor det nå er åpnet opp for gruvedrift på havbunnen etter Stortingets vedtak av 9. januar 2024.
- Fiskevernsonen ved Svalbard og Svalbards territorialfarvann (23 211 km<sup>2</sup>) oppfyller ikke OECM kriteriene med gjeldende reguleringer, men ved å adressere mangler og justere reguleringene deretter kan disse områdene potensielt omgjøres til OECM'er.

## Anbefalinger:

- Noen av de marine forvaltningsområdene overlapper helt eller delvis med andre verneområder som allerede er rapportert inn og som da ekskluderer områder for videre evaluering opp mot OECM kriteriene. Ved å redefinere grensene vil det være lettere å vurdere hvilke områder som oppfyller kriteriene både som OECM og andre verneområder slik at man også unngår dobbelrapportering.

For Fiskevernsonen ved Svalbard og Svalbards territorialfarvann er det mulig å gjøre deler av disse områdene om til OECM'er ved å endre noen av definisjonene og reguleringene i disse forvaltningsområdene slik at de samsvarer med OECM kriteriene.

- For å unngå en kunstig fremstilling av Norges bidrag mot 30x30 målet ved å inkludere enorme havområder som ikke samsvarer med OECM kriteriene, ber vi den norske regjeringen om å revidere sine holdninger til marine OECM'er i tråd med CBD sine retningslinjer og kriterier for rapportering av OECM'er.

Nøkkelord: Konvensjonen om biologisk mangfold – vern av biologisk mangfold – verneområder

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# Summary

Dunshea, G., Olaussen, K. & Eckbo, N.H. 2024. Potential marine Other Effective Area-Based Conservation Measures (OECMs) in Norway: Current compliance status in relation to CBD and IUCN guiding principles, definitions and criteria. – NTNU Vitenskapsmuseet naturhistorisk rapport 2024-3: 1-71.

This study was commissioned by Naturvernforbundet, the Norwegian Society for the Conservation of Nature, to assess potential Norwegian marine “Other Effective Conservation Measures” (OECMs) for their compliance with the Convention on Biological Diversity’s (CBD) OECM guidelines. The findings indicate that the proportion of Norway’s ocean area that can be considered OECMs – and contribute towards the GBF’s 30% target – is currently far below the 44% reported by the Government.

## Key Findings:

Out of 61 lobster reserves, 18 coral reef protected areas, 17 protected bottom habitat areas, 5 conservation zones, 492 kelp harvesting areas, and a range of other area-based fishery measures that was assessed using the IUCN World Commission on Protected Areas 2023 Site-level tool, we find that:

- Twenty-five lobster reserves (83.28 km<sup>2</sup> in total) and four coral reef protected areas (120.65 km<sup>2</sup> in total) currently meet the CBD/IUCN OECM criteria. None of the other marine management area categories and types can be defined as areas “that achieve positive and sustained long-term outcomes for the *in situ* conservation of biodiversity” (CBD Decision 14/8, 2018) according to CBD guiding principles and common characteristics for OECMs. These OECM-compliant areas make up only 0.01% of Norway’s ocean area.
- Norway’s vast protected bottom habitat areas – spanning 593,845 km<sup>2</sup>, nearly 30% of Norway’s total ocean area – cannot be considered OECMs because: they are vertically zoned and only protect a subset of biodiversity from a single threat (bottom fishing); “new fishing areas” could be opened to bottom trawling in the future; petroleum facilities overlap with parts of the areas and new exploration leases are being granted within the areas; and enormous swathes overlap and/or are adjacent to the large areas now at risk from deep-sea mining exploration and exploitation following the Norwegian Parliament’s decision of 9 January 2024.
- The 23,211 km<sup>2</sup> new fishing area closure in the Svalbard Protection Zone and Territorial Waters does not currently comply with OECM status, but there is a potential opportunity to create an OECM here after addressing current deficits preventing the area from meeting OECM criteria

## Recommendations:

- Some marine management areas have boundaries that overlap currently reported protected area, which obfuscates their assessment to meeting OECM criteria. Redefining these areas would aid in both assessment to OECM compliance and, if appropriate, reporting of the OECM protected areas
- For the Svalbard Protection Zone and Territorial Waters, there are certain definitions and spatial planning approaches that could be adopted to bring parts of this area into OECM compliance.
- To avoid artificially inflating Norway’s contribution to the 30x30 target by including huge ocean areas that are currently non-compliant with OECM criteria, we call on the Norwegian Government to revisit their position on marine OECMs and bring it into alignment with the CBD guiding principles and common characteristics for OECMs.

Key words: Convention on Biological Diversity – Biodiversity Conservation – Protected Areas

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## Preface

In 2023 the Convention of Biological Diversity (CBD) implemented a new agreement, *The Kunming-Montreal Global Biodiversity Framework* (GBF). Part of the GBF – Target 3 - consists of protected area and protected area coverage targets with the goal of 30% of marine and coastal areas effectively conserved and managed through systems of protected areas. These protected area systems can be made up of two broad categories that qualify as protected areas. The first category is “traditional” protected areas that comply with International Union of the Conservation of Nature (IUCN) definitions, an example of which may include marine reserves etc. The second type of protected area is known as “Other Effective Conservation Measures” (OECMs), which are areas that managed in ways that may not have a primary objective of long-term *in situ* biodiversity conservation, but nevertheless are considered as achieving long-term *in situ* biodiversity conservation outcomes. Norway, as a member of the 15<sup>th</sup> Conference of Parties to the CBD that adopted the GBF last year, is obliged to attempt to meet the targets in the GBF agreement. As such, defining the marine areas in Norway that can be reported as protected areas and OECMs to meet GBF Target 3 goals has become a focus of the Norwegian government.

This report was commissioned by the Norwegian Society for the Conservation of Nature in collaboration with the PEW Charitable Trusts, in August 2022. The overall aim of the project was an independent academic assessment identifying potential marine “Other Effective Conservation Measures” (OECMs) - given Norwegian marine managed area types - and to outline what are appropriate Norwegian OECMs according to IUCN guidelines and CBD guiding principles and common characteristics of OECMs.

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# 1 Introduction

The last global assessment of biodiversity status and trends provided by IPBES<sup>1</sup> - The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services – paints a sombre picture. When published in 2019, it showed that the majority of ecosystem and biodiversity health indicators on land, in freshwater, wetland and ocean ecosystems show serious decline, which has accelerated over the last 50 years<sup>1</sup>. There were up to 1 million species facing extinction within decades with a likely increase in extinction rate without substantial measures to curtail drivers of biodiversity loss<sup>1</sup>. The IPBES report also described in detail the interconnectedness of human societal needs and correct functioning of biological systems. Biodiversity loss affects ecosystem resilience, function and ultimately the ecosystem services that human societies depend upon.

There have been coordinated global efforts for decades to address biodiversity loss through multilateral treaties and agreements. Since 1992 the Convention on Biological Diversity multilateral treaty (CBD – currently with 196 parties including Norway) has had the goal of conserving and sustainably, fairly and equitably using biodiversity. The CBD has implemented various protocols/plans for conservation and use of biodiversity and from 2002 has implemented goals and commitments in relation to **protected areas and protected area coverage** (Box 1). In 2010, the CBD “*Strategic Plan for Biodiversity, 2011-2020*” included the “*Aichi Biodiversity Targets*”, which were important because they differentiated between sustainable use of biodiversity (Targets 5-10) and safeguarding biodiversity (Targets 11-13) in their strategic goal targets. Aichi Target 11 had explicit targets for geographical coverage goals for protected areas: 17% of terrestrial and inland waters and 10% of coastal and marine areas, up from “*at least 10% of each of the worlds ecological regions*” in 2002. With the ever more ambitious CBD goals and targets set each decade, there has been concurrent recognition of failure to meet previous targets: targets set in 2002 were unmet as of 2010<sup>2</sup> and in 2020 it was acknowledged that none of the Aichi targets were fully achieved<sup>3</sup>. In 2023 the CBD replaced the *Strategic Plan for Biodiversity, 2011-2020* with a new agreement: *The Kunming-Montreal Global Biodiversity Framework* (GBF). The GBF has set yet more ambitious targets to be achieved for sustainable resource use (Targets 5, 9 &10) and biodiversity conservation (Target 3). Specifically for Target 3, that by 2030: “*at least 30% of terrestrial and inland water areas, marine and coastal areas ... are effectively conserved and managed through ... systems of protected areas and other effective conservation measures...*”. While scepticism on the prospect for achieving this target is warranted, given past failures, there appears to be promising contemporary momentum to meet GBF 2030 Target 3. For example, two other intergovernmental groups have either committed to ensuring the delivery of this target - the High Ambition Coalition for Nature and People (117 countries, including Norway) – or, suggested yet more ambitious sub-targets - the High-Level Panel for a Sustainable Ocean Economy (18 counties, including Norway) endorses that 30% of oceans be fully protected (Box 1) in Marine Protected Areas.

The critical point in the language concerning protected area targets since the 2010 Aichi Biodiversity Target 11 and recently the GBF 2030 Target 3, is that the target specifications are expressed in terms a combination of “*protected areas*” and of “*other effective conservation measures*”. The meaning of “protected area” with a primary objective of biodiversity conservation is somewhat intuitive (Box 1). However, “other effective conservation measures” (OECMs) refers to an explicit area - that is not a protected area with a primary objective of biodiversity conservation - that is governed and managed in ways that achieve effective and long-term *in situ* biodiversity conservation, potentially among other values (see Box 1 for further details).

### **Box 1: Protected areas and Other Effective Conservation Measures (OECMs): Definitions, guiding principles and guidelines**

#### **Protected Areas**

The CBD and the IUCN use slightly different wording to define a protected area<sup>4</sup>: For the CBD it is a “... *geographically defined area which is designated or regulated and managed to achieve specific conservation objectives*” (Article 2 of the CBD) while the IUCN defines a protected area as a “... *clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*”<sup>5</sup>. Although different wording, the definitions are considered equivalent<sup>4,6</sup>. The IUCN considers there to be six different categories of protected areas<sup>5</sup> (and the CBD encourages reporting of protected areas in these categories<sup>4,7,8</sup>), ranging from the most stringent to least stringent governance characteristics<sup>5</sup>. These areas range from Category I (Strict nature reserves) consisting of “*Areas strictly protected for biodiversity... with human visitation, use and impacts controlled and limited...<sup>5</sup>*”, to Category VI (Protected areas with sustainable use of natural resources) consisting of “*Areas that conserve ecosystems ... that are.. generally large, mainly in natural condition... with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims.*” These categories are meant to be based around primary management objectives that should apply to at least three quarters of the protected area – the so-called 75% rule<sup>5</sup>. In terms of the aims of intergovernmental groups for 30% of oceans “protected” by 2030, IUCN protection levels for these targets are not uniformly explicitly defined.

#### **OECMs**

OECMs are defined as “*a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values*”<sup>9</sup>. There are explicit guiding principles and common characteristics for OECMs outlined in Annex III of CBD Decision 14/8<sup>9</sup>, in brief, they are: 1) OECMs have, or can achieve “... *significant biodiversity value...*” (Annex III, A. (a)); 2) They should through complementarity, coherence and connectivity “...*strengthen the existing protected area networks...*”. There is thus an emphasis on their relevance and integration into protected area networks considering concepts of complementarity, “...*representativeness and coverage...*”, “...*and connectivity...*” of ecosystems “...*and enhanced resilience, including with regard to climate change...*” (Annex III, A. (b, d, f)); 3) OECMs “...*reflect an opportunity to provide in situ conservation of biodiversity over the long-term... they may allow for sustainable human activities while offering a clear benefit to biodiversity conservation. By recognizing an area, there is an incentive for sustaining existing biodiversity values...*” (Annex III, A. (c)); 4) OECMs “...*with relevant scientific and technical information and knowledge, have the potential to demonstrate positive biodiversity outcomes by successfully conserving in situ species, habitat and ecosystems... by preventing, reducing or eliminating existing, or potential threats, and increasing resilience...*” (Annex III, A. (e)); 5) OECM recognition should “...*follow appropriate consultation with... governance authorities, land owners and rights owners, stakeholders and the public...*” and if within the territories of indigenous peoples, should “...*be on the basis of self-identification with their free, prior and informed consent...*” (Annex III, A. (g, h, i)); 6) that the best available scientific, indigenous and local knowledge be used for recognizing OECMs “...*delimiting their location and size, informing management approaches and measuring performance... documented in a transparent manner to provide for a relevant evaluation of the effectiveness, functionality and relevance in the context of Target 11...*” (Annex III, A. (l, m)).

Despite first appearing in Aichi Biodiversity Target 11 in 2010, the OECM concept is relatively new. The formal definition and guiding principles for OECMs were only made available in 2018<sup>9</sup> as were the first guidelines for recognizing and reporting OECM sites<sup>4,5</sup>(Box 1). There is little scientific literature on OECMs in comparison to protected areas<sup>10</sup> and despite recent further guidelines to aid in identifying and appraising potential OECM sites<sup>6,7</sup>, some challenges have been noted across the spectrum of OECM initial identification, reporting and monitoring<sup>8,9</sup>. In the marine environment there are concerns that OECMs may potentially be misused to artificially bolster GBF signatory 2030 Target 3 statistics, either through ‘blue-washing’ misapplication of OECM criteria (i.e. simply



declaring an unsuitable existing managed area an OECM) or through confounding the protection and/or management of selected elements of biodiversity in an area with long-term biodiversity conservation outcomes for the entire area<sup>15</sup>. Examples of the latter may be: 1) Areas closed to a particular form of impact (e.g. bottom trawl fishing) but without sufficient management, monitoring or regulation of other potential biodiversity impacts<sup>15</sup> or; 2) Using the demonstration of sustainable resource use (relevant only to GBF targets 5, 9 & 10 and not GBF target 3) as evidence of positive and sustained *in situ* biodiversity conservation. While sustainable resource use might be congruent with, and a component of, positive and sustained *in situ* biodiversity conservation, it is not evidence of it in and of itself. A specific example of such a misapplication is the recent decision by the Canadian Government to allow oil and gas exploration drilling<sup>10</sup> in a previously defined (and reported) OECM<sup>11,12</sup> with the governments proposed 'solution' to simply redefine the boundaries of the OECM to exclude the area should oil and gas resources be found. There would clearly never be any sincere intention for "*long term in situ conservation benefits*" if such an approach – to redefine OECM boundaries *ad hoc*, dependent on any potential future industrial activity – is acceptable practice in the international community. Of critical importance is that the definition of an OECM is, in every way except official designation, complimentary to that of a protected area (Box 1). **Put simply, OECMs are intended to confer the long-term *in situ* biodiversity conservation outcomes of officially designated protected areas, without being officially named as such.**

The International Union for the Conservation of Nature (IUCN) has developed guidelines for both recognizing and reporting OECMs<sup>5</sup> as well as a site-level assessment tool for identifying OECMs<sup>7</sup>. The IUCN explicitly recommends that any area that meets all elements of the IUCN definition of a protected area be officially designated as such, rather than an OECM<sup>11</sup>. There is however an exception, considering the three broad area-based governance approaches the IUCN describes<sup>11</sup> that may fulfil all criteria to call an area an OECM. The first governance approach (the 'exception'), **Primary Conservation**, is where an area has all the attributes to meet IUCN criteria of a protected area (Box 1) but is not designated as one because the responsible governance authority does not wish it to be officially recognized and/or reported as such. An example here might include areas managed by indigenous peoples who may object to the formal designation of the area as 'protected' in national government frameworks. The second approach, "**Secondary Conservation**", is where an area is actively managed for a primary objective other than biodiversity conservation (e.g. watershed protection), but where biodiversity conservation is a secondary objective and other criteria of OECM status are met. The third approach, "**Ancillary protection**" is where biodiversity conservation is not a management objective at all but where it occurs in the long term anyway and other criteria of OECM status, principle and guidelines are met.

In Norway, a parliamentary report on the conservation of marine nature was presented in spring 2021, explaining the concept of OECMs<sup>13</sup>. Norway has so far not reported any OECMs to the CBD, but in Oct 2023 a preliminary assessment of potential OECM candidates in Norway was published<sup>14</sup>.

There are several managed area types that have different governance frameworks that may qualify for OECM status in Norwegian waters. These include but are not limited to: 1) lobster reserves, 2) cold-water coral reefs, 3) important bird and biodiversity area (marine IBAs) and 4) particularly valuable and vulnerable areas (SVOs). Similarly, there are the overarching legislative frameworks for resource use and environmental protection that apply to all Norwegian marine waters, which also contain certain area-specific provisions.

The Norwegian Society for the Conservation of Nature in August 2022 commissioned an independent academic assessment identifying potential marine OECMs given Norwegian marine managed area types, and outlining what are appropriate Norwegian OECMs according to IUCN guidelines and CBD guiding principles and common characteristics of OECMs. The task was performed by marine researchers at Norwegian University of Science and Technology (NTNU) University Museum, Department of Natural History and University of Southeastern Norway (USN), Department of Natural Sciences.

## 2 Methodology

### 2.1 Identifying potential marine OECMs

We initially identified the main types of current marine area designation categories. These are: 1) lobster reserves, 2) cold water coral-reefs, 3) important bird and biodiversity area (marine IBAs) and 4) particularly valuable and vulnerable areas (SVO). We also reviewed the area-based fisheries management measures that have been recently proposed to be reported as marine OECMs in Norway in addition to these. (Hoel, *et al.* 2023. OTHER EFFECTIVE AREA-BASED CONSERVATION MEASURES – OECMS: ANDRE EFFEKTIVE AREALBASERTE BEVARINGS-TILTAK)<sup>14</sup>. All sites, managed area types and area-based fisheries management measures were evaluated against the CBD guiding principles and common characteristics of OECMs, as distilled by IUCN criteria for identifying and reporting OECMs. A map showing the proposed OECMs can be found here: [Vurdering av fiskerireguleringer - Oversikt \(fiskeridir.no\)](https://www.fiskeridir.no/verdiverdi/verdiverdi-tiltak).

Our evaluation was based on the IUCN WCPA 2023 Site-level tool for identifying other effective area-based conservation measures (OECMs)<sup>7</sup>: <https://doi.org/10.2305/WZJH1425>. Note that for the purposes of this report, we did not consider any consent requirements – we only considered whether specific sites or managed area types complied with OECM criteria according to steps 1 & 3 of the site assessment tool. We also did not consider any of the “quality” considerations in relation to complementarity, coherence, connectivity and how any area may contribute to protected area networks. Where possible, for example where sites were already geographically defined, we assessed specific individual sites (local/mesoscale areas with defined geographical boundaries). Where this was not possible, we evaluated managed area types, their use, potential impacts and the regulatory framework(s) applied to these area types.

The IUCN-WCPA site-level tool considers all aspects of the definition of an OECM (Box 1) into several assessment criteria's, to be applied sequentially:

- **Step 1 - Criterion 1: The site is not a protected area:**
  - To avoid double counting when assessing the global coverage of these areas in Global Biodiversity Frameworks, Sustainable Development Goals (SDGs), all sites reported to the World Database on Protected Areas (WDPA) were excluded.
  - If part of the area-based measure overlaps with existing PA's, only the part not overlapping can be recognized as an OECM.
- **Step 1 - Criterion 2: There is a reasonable likelihood that the site supports important biodiversity values:**
  - If available information suggests that the site supports important biodiversity values, the site meets this criterion.
- **Step 3 - Criterion 3: The site is a geographically defined area:**
  - If the site has clear boundaries and is mapped (preferably in digital form), the site meets this criterion.
- **Step 3 - Criterion 4: The site is confirmed to support important biodiversity values:**
  - Available information must confirm that the site support at least one of the following important biodiversity values to meet this criterion:
    - a) Rare, threatened, or endangered species and ecosystems.
    - b) Natural ecosystems which are underrepresented in protected area networks.
    - c) High level of ecological integrity or intactness.
    - d) Significant population/extent of endemic or range-restricted species or ecosystems.
    - e) Important species aggregations, such as spawning, breeding or feeding areas.
    - f) Importance for ecological connectivity, as part of a network of sites in a larger area.
- **Step 3 - Criterion 5: Institutions or mechanisms exist to govern and manage the site**
  - Sites where one or more agencies, indigenous people or private entity, has a mandate to govern and manage the site , meets this criterion.

- **Step 3 - Criterion 6: Governance and management of the site achieve or are expected to achieve the *in situ* conservation of important biodiversity values**
  - Sites where positive biodiversity outcomes are documented, even though conservation is not the primary objective, or sites where significant progress has already been made with restoring or reintroducing important biodiversity values, meets this criterion. For many of the potential OECM's, conservation outcomes have not yet been documented, but it is assumed that there will be positive outcomes based on studies from other sites with the same regulations.
- **Step 3 - Criterion 7: *In situ* conservation of important biodiversity values is expected to be for the long term:**
  - Sites where conservation measures have a secure legal form of recognition which cannot easily be reversed and are in place long-term, meaning they are in place for the foreseeable future.
- **Step 3 - Criterion 8: Governance and management arrangements address equity considerations:**
  - Sites where local community representatives and other rights-holders have been involved in the process.

Note that we did not apply Criterion 8 here as it is relevant only to the process of OECMs actually becoming declared and reported etc. To assess how well the sites correspond to these first seven IUCN WCPA 2023 Site-level tool criteria at an individual site level, we condensed their elements that are relevant for our purposes, into four categories covering: **1) Biodiversity values (IUCN WCPA 2023 Site-level tool Criteria 2 & 4)** considering known or likely biodiversity values of the specific area, **2) Geographic Boundary status (IUCN WCPA 2023 Site-level tool Criteria 1 & 3)** particularly considering overlap with other already reported protected areas, **3) Regulations (IUCN WCPA 2023 Site-level tool Criteria 5-7)** and governance frameworks that facilitate prevention/mitigation of threats to biodiversity, biodiversity conservation efficacy demonstration, have included consultation and whether regulatory/governance frameworks are short- or long-term, and **4) Available Knowledge (IUCN WCPA 2023 Site-level tool Criteria 2, 4, 5 & 6)** on the specific area that facilitates assessing area-specific biodiversity value, use, threats and the likely effect of management actions.

The four categories of **Biodiversity Values, Geographic Boundary Status, Regulations** and **Available Knowledge** were scored on a four-point ordinal scale where a score of 1 represents a clear violation of the IUCN WCPA 2023 Site-level tool criteria and a score of 4 represents the area clearly meeting the IUCN WCPA criteria, with scores 2-3 intermediate. Further details of how each score on the ordinal 1-4 scale was defined for each of our four categories are provided in Table 1.

**Table 1.** Definitions use to score the four categories used in this study to assess whether individual sites meet the criteria 1-8 from the IUCN WCPA 2023 Site-level tool for identifying other effective area-based conservation measures (OECMs).

Categories used in this study	Rating classes	Scoring
<b>Biodiversity values (IUCN WCPA 2023 Site-level tool Criteria 2 &amp; 4)</b> Biodiversity values were assessed by compiling existing biological information from the Fisheries Directorate, the Norwegian Environment Agency, municipality reports, other gray literature scientific reports and the peer-reviewed scientific literature.	Sites where only one species <b>or</b> one important nature type are documented and/or the site is in poor condition	1
	Sites where only one species <b>and</b> one important nature type are documented	2
	Sites with limited biological mapping noting important habitats, nature types etc (e.g. from kartlegging av marint biologisk mangfold) and as important areas for multiple species and/or nature types, with some confirmation by survey data	3
	Sites with biological mapping documented noting important habitats, nature types etc (e.g. from kartlegging av marint biologisk mangfold) and as important areas for multiple	4

	species and/or nature types, that have been confirmed by survey data	
<b>Boundaries</b> <b>(IUCN WCPA 2023 Site-level tool Criteria 1 &amp; 3)</b> All assessed areas had geographically defined boundaries. Scores 1-4 refer to the extent of boundary overlap with areas reported to IUCN as protected areas by the Norwegian Government	Full overlap	1
	Partly overlap	2
	No overlap	3
	No overlap and in a spatially coherent network	4
<b>Regulation</b> <b>(IUCN WCPA 2023 Site-level tool Criteria 5-8)</b> It was assessed whether national legislation exists regarding access, use and impacts of areas, the timeframes over which the legislation applies and the extent to which the legislation mandates active management of the above.	No regulations	1
	Some regulatory framework that clearly does not constitute sustainable resource use and/or foster long term biodiversity conservation outcomes, or is of limited timeframe, or does not monitor and manage access, use and impacts.	2
	Managed and monitored areas, with law bound regulations in place for the foreseeable future with access, use and impact specifications but without complete scope for whole ecosystem protection (e.g. lobster reserves, where hook and line fishing are allowed, but other types of fishing are banned)	3
	Managed and monitored areas, with law bound regulations in place for the foreseeable future regarding access, use and impacts (An example here would be the scientific research no take reserve at Tvedestrand where no fishing or hunting is allowed, <b><u>if the law did not expire December 31, 2023</u></b> )	4
<b>Available knowledge</b> <b>(IUCN WCPA 2023 Site-level tool Criteria 2, 4, 5 &amp; 6)</b> What information is available about the area concerning, existing biodiversity, use, access and threats as well as about the (potential) effects of management actions	No available knowledge	1
	No knowledge on one or more category: existing biodiversity, use, access or impacts of an area and no knowledge regarding potential effects of management actions	2
	Existing knowledge on biodiversity, use, access and threats and a highly likely positive biodiversity outcome from the regulation	3
	Documented knowledge on the effects of the regulation on biodiversity outcomes and knowledge of potential threats	4

In applying the scoring tool in Table 1 for each specific area type and individual area, we generally considered that areas that scored a 3 or 4 in all four categories are likely to meet all criteria for an OECM in the ***IUCN WCPA 2023 Site-level tool for identifying other effective area-based conservation measures (OECMs)***. In some cases, sites with lower scores in certain categories were still regarded as likely to meet OECM criteria, given background knowledge on the system and the demonstrated effect of management regulation. In other cases, due to a clear conflict or deficit concerning one of the above categories with existing area types, there was no need to further score the area type with the additional detail in Table 1.

## 3 Results

In considering existing area-based marine management measures in Norway for their potential as OECMs, this review explicitly considered: 61 lobster reserves, 18 coral reef protected areas, 17 protected bottom habitat areas, 5 conservation zones, 492 kelp harvesting areas and reference zones, and a range of other area-based fishery measures. Areas with well mapped biodiversity values such as Important Bird and Biodiversity Areas (IBAs) and Ecologically and Biologically Significant marine Areas (EBSA, SVOs in Norwegian) were also evaluated.

### 3.1 Lobster reserves

The European lobster (*Homarus gammarus* L.) population in Norway has experienced high fishing pressure<sup>15</sup>. In the early 2000s, estimates of the lobster populations in southern Norway indicated a collapse and<sup>15,16</sup> the species is now listed as “vulnerable” on the Norwegian Red List for species<sup>17</sup>. To reverse this trend, four experimental lobster reserves were established in 2006, banning all gear types except hook-and line<sup>18</sup>. Outside of reserves lobsters are also protected from harvesting most of the year and can only be harvested from October 1 until November 30 (up to and including Vestland county, for the rest of Norway lobsters can be harvested until December 31)<sup>19</sup>.

There are now 61 established lobster reserves in Norway (as of November 2023), and the numbers are increasing every year as the Directorate of Fisheries has encouraged all coastal municipalities to establish at least one of these reserves. Coastal municipalities nominate potential sites themselves, and site-selection is often based on local knowledge of suitable habitats and lobster density through fishing effort. There is no requirement for scientific research to verify the suitability of an area as a lobster reserve. There are also no requirements of population monitoring after implementation of the reserve<sup>20</sup>.

There are different types of regulations that apply to lobster reserves:

- a) All but hook-and-line type fishing gear and purse seines, is prohibited (Forskrift om fredningsområder for hummer, § 1).
- b) Fishing with fyke nets and lobster traps are prohibited along the shore down to a depth of 50 m counted from the lowest water level (Forskrift om fredningsområder for hummer, § 2).
- c) All but hook-and-line type fishing gear and purse seines, is prohibited along the shore down to a depth of 50 m counted from the lowest water level (Forskrift om fredningsområder for hummer, § 3).
- d) Fishing with lobster traps is prohibited along the shoreline down to a depth of 50 m counted from the lowest water level (Forskrift om fredningsområder for hummer, § 4).

Sites where regulations c) and d) applies are all located inside Sognefjorden, which is the world's second longest, and Norway's deepest and longest fjord system. Sognefjorden are also heavily affected by anthropogenic influences, such as cruise ships, fish farms, hydroelectric stations, and pollution<sup>21</sup>. These reserves are not recognized as PA's and do not overlap with currently reported PA's. However, the whole Sognefjord is proposed for inclusion in the national marine protection plan (2004)/ongoing protection process<sup>22</sup>. The sites are in a network with each other, but the boundaries are narrow, hugging the shoreline and following the shoreline down to a depth of 50 meters, which in certain areas is only 10s of meters wide. There are no existing studies on the effect of these types of regulations in Norway. Lobsters are only protected in <50m depth and studies have shown that during the winter, lobsters seek deeper water (50–60 m) within the constraints of their home range location<sup>23</sup> thus, potentially limiting protection of lobster during fishing season (mid-late autumn). Monitoring of illegal fishing activities would also be challenging with these types of regulations. In addition, these regulations expire 31.12.2027 and will not achieve sustained long-term outcomes. These sites were therefore not considered further, mostly due to the limited regulatory timeframe.

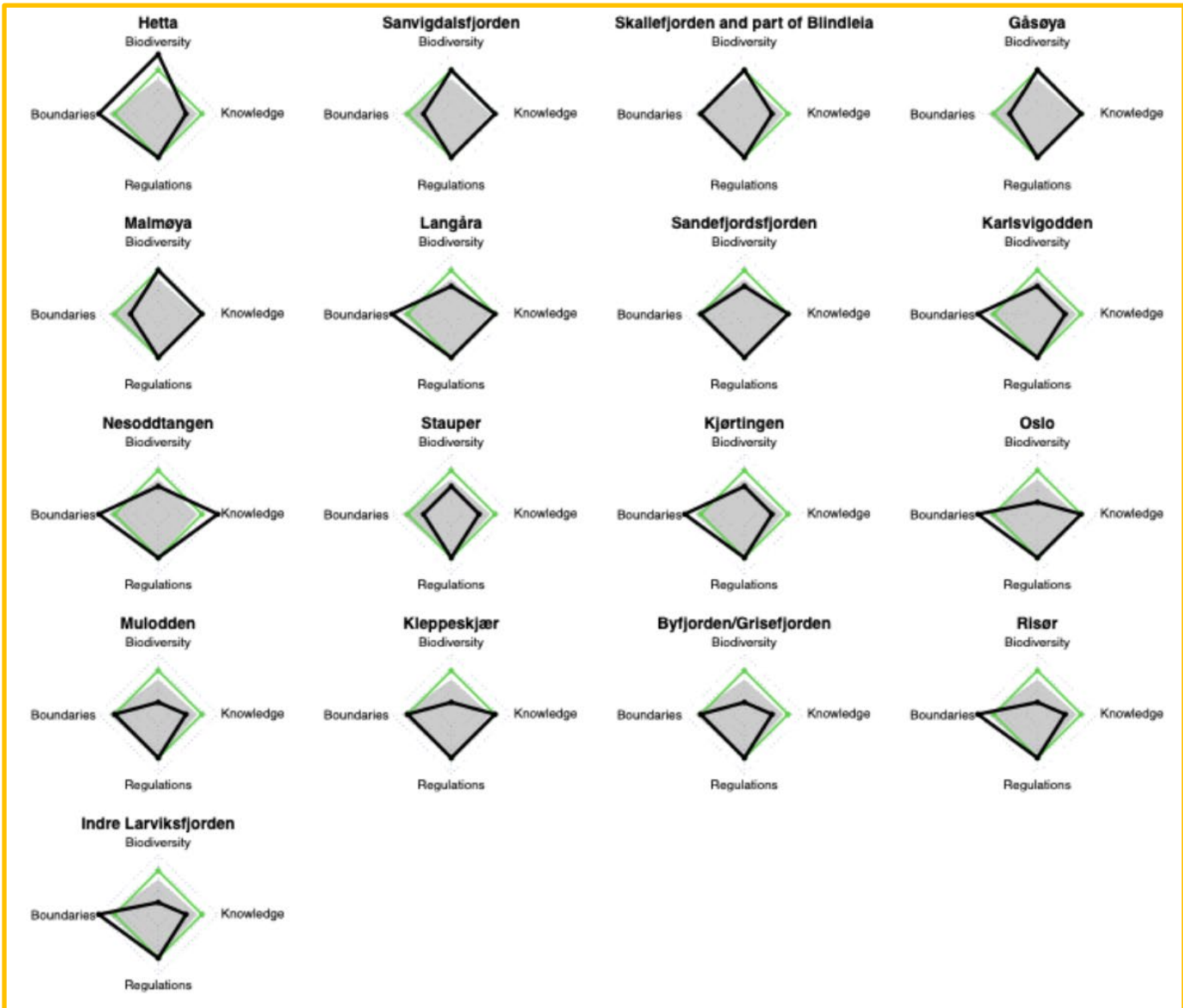
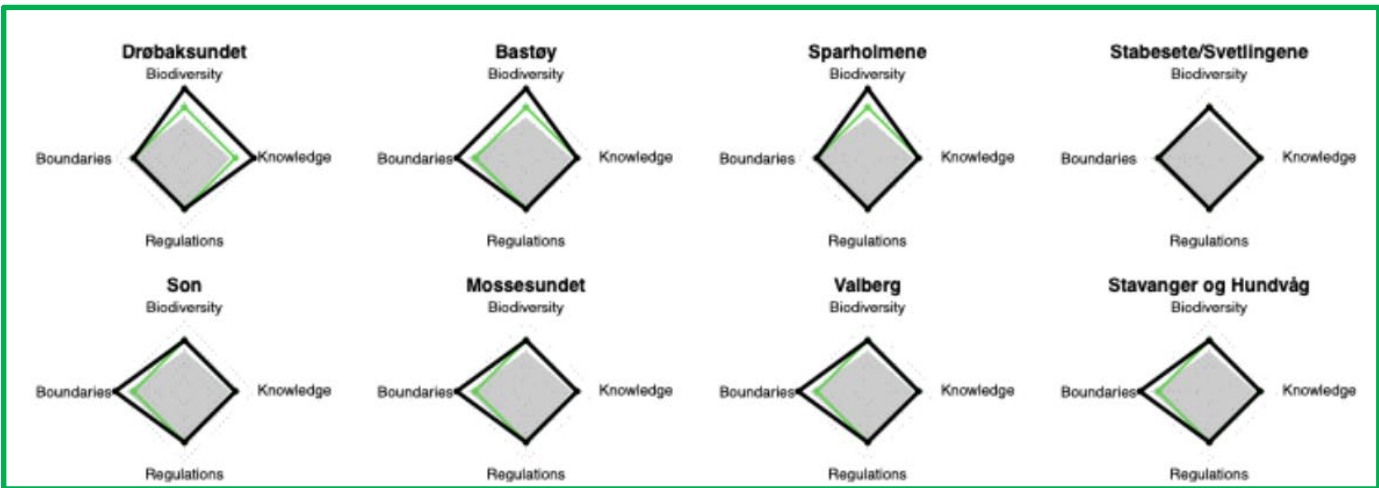
Sites where regulation b) applies are all located in the innermost parts of Hardangerfjorden and fjord branches. This region is one of the most intensely used areas in Norway for fish-farming, and many of the rivers connected to the fjord system have upstream hydro-electric power plants<sup>24,25</sup>. The inner fjord system is also still polluted from the past metal processing industry operations<sup>26</sup>. These sites under regulation b) also only applies along the shoreline and down to a depth of 50 meters and are not sustained long-term as it expires 31.12.2025. They are not considered further due to the limited regulatory timeframe.

There were 25 sites where regulation a) applies are found from the Oslofjord and up to Austevoll in Vestland county. These reserves vary in size (from 0.5 to 23.16 km<sup>2</sup>) and locations, from sheltered fjords to exposed areas. Many of these reserves overlap with important spawning areas, include breeding areas for seabirds and important nature types such as eelgrass beds, kelp forest, shell sand deposits and soft bottom areas. Studies from several of the lobster reserves with regulation a) have shown positive conservation effects on lobster such as increased density and size<sup>27-29</sup>. Other species that are only harvested by traps or other standing gear, such as crabs also likely gain protection inside the reserves. Additionally, Wrasses (*Ctenolabrus rupestris* and *Shympodus melops* which are also only harvested by traps and are benefitting from gear restrictions<sup>30</sup>. Wrasses became commercially important when the salmonid aquaculture industry increased the use of them as cleaner fish to reduce parasite loads. With only hook and line fishing allowed inside these reserves, this may also partly protect other fish species such as cod<sup>27,31</sup>. Additionally, by preventing the use of several different types of fishing gear, it is also likely that there is less fishing gear that are lost inside the reserves which in turn may reduce the threat of ghost fishing. In some of the lobster reserves, clean-up projects to remove lost fishing gear have also been conducted.

Many of these reserves are small and will thus only effectively protect species with limited mobility and high site-fidelity. Nillos-Kleiven et al.<sup>32</sup> found that there might be increased fishing pressure on the border of these lobster reserves, reducing the effects of protection. Hook and line fishing may also contribute to a significant part of the total fishing mortality<sup>33</sup> depending on how vulnerable different species is to these types of fishing gear. After detailed assessment of the 25 lobster reserves with regulation a), 21 lobster reserves where regulations apply without an expiration date (i.e., in place for the foreseeable future) and with no overlap with PA's already reported to WDPA, were evaluated as likely to currently meet all criteria and potentially be reported as OECM's (See Fig 1.). Eight reserves scored 3 or higher on all categories with the remaining 17 reserves scoring lower on biodiversity values or available knowledge, mainly because most of them are recently established and conservation effects are not yet documented. We consider this remaining 17 to likely meet OECM criteria as well considering the benefits of regulation (a) lobster reserves are well documented. Of the four reserves that ambiguously currently meet OECM criteria due to overlapping boundaries with protected areas, the adjacent areas outside the overlapping already reported protected areas may also qualify as OECM's in some cases (Fig 1). These lobster reserves provisionally meeting OECM criteria represent a combined area of 83.28 km<sup>2</sup> in total, including the mentioned overlapping portions with protected areas.

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**Figure 1 - Overleaf.** Radarcharts on a scale of 1 (inside of chart) to 4 (outside of chart) summarizing lobster reserve site-specific scoring of four categories (Biodiversity values, Boundaries, Regulations & Available Knowledge) encapsulating IUCN criteria of 25 lobster reserve sites qualifying for OECM status. Sites in the top green box scored 3 or higher in all categories. Sites in the orange box scored below 3 in one or more categories. The grey represents the average score across all 25 lobster reserves likely to meet OECM criteria, the green line is a value of 3 for each category and the black like represents the site-specific score for each category. It can be noted from the average (gray area) that the categories where lobster reserves are most deficient in relation to definitively meeting OECM criteria are in clearly demonstrated Biodiversity values and Available Knowledge on sites use, impacts and the efficacy of management actions for biodiversity conservation.



## 3.2 Coral reef protected areas

Coral reefs in Norway are built up by the reef-forming species *Desmophyllum pertusum* (formerly known as *Lophelia pertusa*), which forms some of the largest known cold-water coral (CWC) reefs in the world. CWC reefs are found along most of the continental shelf and includes some of the largest known (Røst and Sula Reef) and the shallowest (Trondheimsfjorden) CWC reefs, in the world<sup>34</sup>. These reefs are complex and important habitats, promoting high diversity of invertebrates<sup>35,36</sup> and fish species<sup>35–37</sup>.

Over 30% of the worlds known *D. pertusum* reefs are found in Norwegian waters and is listed as “near threatened” on the Norwegian Red List for species<sup>38</sup>, giving Norway a special responsibility in protecting this species and the ecosystem it creates<sup>34</sup>. Cold-water coral ecosystems are fragile, slow growing and long lived, making them especially vulnerable to anthropogenic activities. Fishing, especially with bottom contact gear, and exploitation of oil, gas, and mineral resources are considered the largest threats to coral reefs<sup>39</sup>. Remote operated vehicles (ROV) surveys have confirmed that corals exposed to trawling shows a great level of damage, including dislodged and crushed colonies. It is estimated that between 30 and 50% of Norwegian reef areas are impacted or damaged<sup>40–42</sup>.

When it became possible to obtain images of coral reefs hundreds of meters below the surface, scientists and managers realized their importance and conservation measures were put in place. This influences where oil companies can lay their pipelines<sup>43</sup> and dictates where bottom trawling activities can occur in areas with known coral reefs. Deliberate destruction of coral reefs is prohibited, and fishers must exercise caution when fishing in the vicinity of known coral reef areas (Forskift om beskyttelse av korallrev mot ødeleggelse som følge av fiskeriaktivitet, 2016, § 2).

Today 18 of these cold-water coral reefs are given special protection under the Marine Resource Act and three (Selligrunnen inside Tauterryggen marine protected area, Rødberg marine protected area and Skarnsundet marine protected area, all located inside Trondheimsfjorden) under the Nature Diversity Act. There are three different regulations that applies for coral reef protected areas under the Marine Resource Act:

- a) all use of fishing gear that are dragged along the bottom i.e., mainly bottom trawling, is banned (Forskift om beskyttelse av korallrev mot ødeleggelse som følge av fiskeriaktivitet, 2016, § 3).
- b) all use of fishing gear that are dragged along the bottom, as well as gillnets, long-lines and traps is prohibited (Forskift om beskyttelse av korallrev mot ødeleggelse som følge av fiskeriaktivitet, 2016, § 4).
- c) all use of fishing gear that are dragged along the bottom, as well as gillnets, long-lines, traps and all hook-and-line gear is banned (Forskift om beskyttelse av korallrev mot ødeleggelse som følge av fiskeriaktivitet, 2016, § 5).

For sites where regulation a) applies, only parts of the water column will benefit from this regulation and will not prevent negative effects of other pelagic fisheries on the ecosystem. Although bottom trawling is a major threat to coral reefs<sup>40,44</sup>, gillnetting and long-lining are also known to damage coral colonies<sup>40,42,45,46</sup>. It is also recommended by IUCN to avoid this type of vertically zoned regulations as it may undermine conservation outcomes, disrupt ecological connectivity, and makes monitoring of the site challenging<sup>5</sup>. Sites where regulation a) applies, due to their vertical zoning regulations not recommended by the IUCN and lack of regulation of key processes known to damage corals (gillnetting and long lining), they were not considered at likely OECMs and not evaluated further.

Research from other coral protected areas where regulations b) and c) applies, has shown higher species richness and abundance inside the protected coral reef area compared to areas impacted by fishing activities. The average fish density was higher in the intact coral habitats and recovery of *D. pertusum* (*L. pertusa*) were seen after 10 years of protection<sup>42</sup>. However, in some of these sites extensive trawling activity may occur immediately outside the boundaries of the coral



protected area. Bottom trawling causes resuspension of large amounts of sediments and may cause smothering of organisms. Studies has shown that *D. pertusum* (*L. pertusa*) handles light sediment loads, but polyps start to die if they are covered by thicker sediments<sup>47</sup>.

There are several current known threats to CWC habitats. Dumping of mine tailings and oil exploration also cause resuspension of sediments that can smother organisms. Mine tailing particles also cause particularly adverse effects for coral metabolism and health<sup>48</sup>. Drill cuttings from the oil industry produces huge amounts of waste sediments that can impact the fauna in close proximity to drilling sites<sup>49</sup>. In both the Sula and Træna coral reef complex, exploration wells have been drilled and in the block that includes the Træna coral reef, an extraction permit has been granted. Oil facilities are located close by the boundaries of both the Sula coral reef and Storneset coral reef. Some of the CWC protected areas also have aquaculture facilities located near them. Emissions of inorganic nutrients and organic materials from nearby fish farms can negatively affect corals. Kutti et al.<sup>50</sup> found that effluents from fish farms caused metabolic depression, which in turn reduced the energy stores and growth in *D. pertusum* (*L. pertusa*).

After detailed assessment (Appendix I) of coral protected areas where regulations b) and c) apply, and only considering: 1) CWC areas not already reported to the WDPA as protected areas, and 2) CWC areas with no overlap with other PA's already reported, all four remaining CWC areas were evaluated as likely to meet all criteria and potentially be considered OECMs and reported as such. These are the CWC habitats at Hola, Midsundrevet, Straumsneset and Nakken v/Huglo (Appendix I). These coral reef areas provisionally meeting OECM criteria represent a combined area of 120.65 km<sup>2</sup> in total.

### 3.3 Protected bottom habitats

As an effect of global warming and reduction in sea ice cover, expansion of fishing activities in new ice-free parts of the northern Barents Sea is possible and impact these marine ecosystems. In 2011, Norway implemented regulations protecting all marine ecosystems below 1000 m from damages by bottom contact fishing gear. The main objective was to protect vulnerable ecosystems on the seabed, and it applies to all waters under Norwegian jurisdiction, including the fisheries zone around Jan Mayen and the fisheries protection zone around Svalbard<sup>51</sup>. Other habitats with high species diversity, have also been documented shallower than 1000 m on several locations around Svalbard, including the Yermak plateau. These habitats are inhabited by large, upraised species with little to no mobility, and are therefore easily damaged by bottom contact fishing gear<sup>52-54</sup>. Regulations were changed in 2019, banning bottom trawling below 800 m in the protection zone around Svalbard. The Yermak Plateau itself is shallower than 800 m and here the protected area is delineated by coordinates instead of depth<sup>55</sup>.

This area is not yet widely used by the fishery industry and the regulation has no time limit. However, reduction in sea ice cover in the northern Barents Sea, makes it possible for fisheries to expand northwards, where bottom contact gear may cause great damage in these remote deep-sea habitats<sup>56</sup>. Four large areas (Map: [Plan og sjøareal \(fiskeridir.no\)](https://www.fiskeridir.no/plan-og-sjoreal), map layer "verneområder – bunnhabitat, green areas on the map) are designated as so called "new fishing areas". In these areas, fishing activity is only allowed if a special permit has been applied for and granted. Ten areas (Map: [Plan og sjøareal \(fiskeridir.no\)](https://www.fiskeridir.no/plan-og-sjoreal), map layer "verneområder – bunnhabitat, red areas on the map) are permanently closed, which means that all bottom contact fishing gear is prohibited.

There is a lack of knowledge about these ecosystems and the biodiversity, both in the pelagic zone and especially in the deep-sea. The deep sea constitutes 95% of the ocean and is one of the least explored biomes on the planet, and estimates suggest that only 5% is studied so far<sup>57,58</sup>. Although once thought to be lacking in biological life and diversity, it is now known that biodiversity in these habitats rivals or exceeds that of coastal ecosystems<sup>59</sup> and given the lack of exploration, these areas may contain a vast number of new and undiscovered species. High diversity and abundance of benthic species like sponges, sea pens, cauliflower corals and sea lilies are documented around Svalbard<sup>54</sup> and Rybakova et al.<sup>60</sup> observed that Arctic deep-sea megafauna was largely endemic.

On the Arctic Mid-Ocean Ridge (AMOR) that stretches over 4000 km north of the Arctic Circle, several active and non-active deep-sea hydrothermal vents are found. Some of them are shallow vent systems, like the Seven Sisters (130 m) and on the Mohns and Knipovich Ridges deeper vent systems like Fåvne (3000 m), Loki's Castle (2400 m) and Jøtul (3000 m) are found. Hydrothermal vents are considered vulnerable biodiversity hotspots with high genetic diversity. Many of the species living on and around these vents are endemic, adapted to an extreme and highly varying environment<sup>61</sup>. Data from Arctic vents suggests they are inhabited by endemic and specialized fauna that depends on microbial symbiosis<sup>62–64</sup>.

Deep-sea sponge aggregations and coral gardens are found in several protected bottom areas and modelling has predicted that these occur over large part of the mid-Atlantic Ridge<sup>65–67</sup>. Deep-sea sponge aggregations and coral gardens are considered threatened by the OSPAR-commission<sup>68</sup> and is listed as “near threatened” on the Norwegian Red List for Nature types<sup>69,70</sup>.

These protected bottom habitats partly overlap with several SVO-areas. The SVO's are highly productive areas, important spawning grounds for many commercially important species and feeding areas for seabirds<sup>71</sup>. Several Red Listed deepwater and cartilaginous fish are found here, like blue ling (EN), golden redfish (EN), basket Shark (EN), and porbeagle (VU)<sup>72</sup>. Such highly productive areas are extremely important feeding areas for many whales like the blue whale (VU), fin whale, common mink whale and northern bottlenose whale<sup>71</sup>. Some of these SVO's are also very important for arctic endemic species like the rare bowhead whale (EN) and regionally stationary species like the hooded seal (EN)<sup>71</sup>.

Several issues were identified with the potential OECM status of Protected Bottom Habitats:

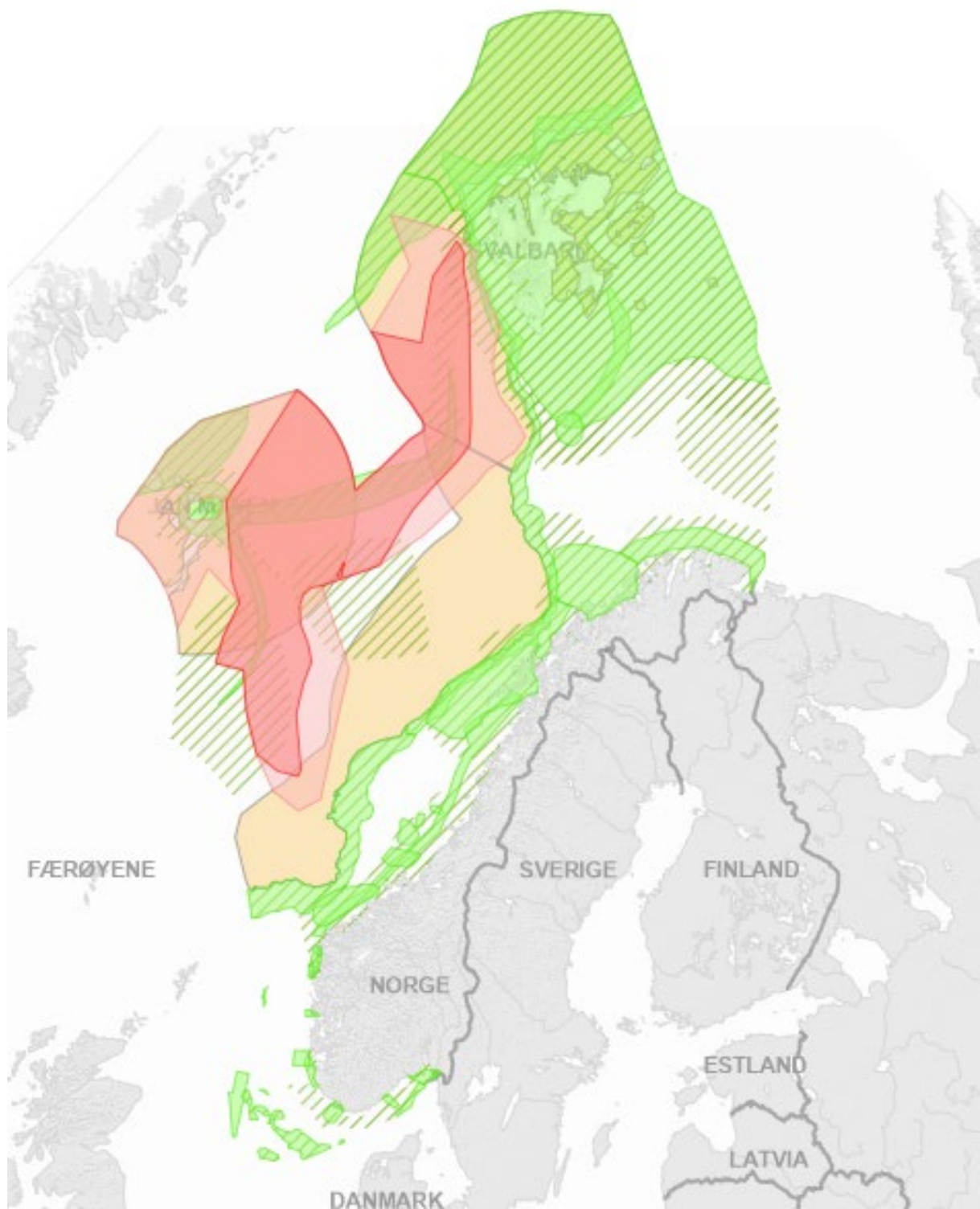
- 1) **Some of these areas overlap with existing PA's** around Svalbard that are already reported to the WDPA.
- 2) **There are some petroleum facilities** overlapping with parts of these areas and several facilities in proximity and thus the potential for low likelihood, but high consequence, environmentally damaging events. Furthermore, there are continually new exploration, drilling and resources being defined within the area (see <https://www.sodir.no/en/whats-new/news/>).
- 3) **Deep-Sea mining.** During the last years there has been an increasing political and economic interest in deep-sea mining of rare earth metals and minerals in Norway. Polymetallic nodules, seafloor massive sulfide deposits at hydrothermal vents, and cobalt rich crusts is seen as potential new sources<sup>61,73</sup>.

In June 2023, Norwegian government announced that they are considering opening for deep-sea-mining in large parts of these protected bottom areas<sup>74</sup>. Deep-sea-mining is expected to have similarities to open-cut mining on land where ore is removed 20-30 meters down into the seabed<sup>75</sup>. Several inter-related environmental impacts from deep-sea mineral mining are identified: i) Destruction of habitat and life-supporting substrates resulting in mortality of fauna and flora, ii) sediment plumes swirled up from mining impacting species and habitats, iii) exposure of seabed life to toxic metals released during mining operations, iv) harm to genetic connectivity between different populations of deep-sea animals, v) habitat alteration and fragmentation through sediment, light and noise disturbances, vi) impacts to primary production in the water column and food webs, vii) impacts to ecosystem functions through disruption of key processes, and viii) alteration of large-scale cycles including carbon, nutrients and trace metals<sup>76,77</sup>. There is no doubt that deep-sea mining will have a destructive impact on biodiversity and deep-sea ecosystems. It will probably take many hundreds of years for sediments to build up so that they again can be colonized by benthos<sup>61,78</sup>.

The Norwegian government regulates how marine areas are utilized and the Mineral Activity Act regulates where on the Norwegian continental shelf mining activities can occur and who is allowed to conduct the activity<sup>79</sup>. Marine ecosystems have no obvious physical boundaries and disturbances can easily cross ecological and jurisdictional boundaries. Deep-sea mining activities beyond national jurisdiction are regulated by the International Seabed Authority (ISA), but a legal framework is not fully developed and there are uncertainties on if and how national and global guidelines will align<sup>80</sup>.

To date, twenty-four countries around the world have announced their support for a moratorium on deep-sea mining (Deep Sea Conservation Coalition). Despite the absence of internationally regulations and a strong signal to pause or ban these activities, on January 9, 2024 the Norwegian parliament voted in favor of opening vast areas for deep-sea mining activities<sup>81</sup>. Following this, on the 7th of February 2024, the European Parliament also voted in favor of Resolution B9-0095/2024, that raises concerns regarding Norway's decision to opening for deep-sea mining activities.

Thus, protected bottom habitats currently: 1) Overlap with some already reported protected areas; 2) Have only a single vertically zoned regulation in place that protects a subset of biodiversity (no bottom trawling according to depth and specific area), and; 3) Clearly overlap and are adjacent with, areas designated to be opened for deep-Sea mining exploration (Fig. 2). They therefore cannot be considered as OECMs under a number of criteria including: 1) that their regulatory framework is in essence but a single, vertically zoned regulation prohibiting one form of fishing and; 2) The fact that there can be no serious prospect for long term *in situ* conservation in an area to be opened up for, or directly or in-directly impacted by, deep-sea mining activities. Also encapsulating the regulatory framework uncertainty in this instance, according to the IUCN: “*a site experiencing severe, immediate threats to its biodiversity value which **cannot be addressed by management***” and “*a site which is subject to environmentally damaging industrial-scale activities, whether the environmentally damaging activities take place inside or outside the site*” are unlikely to be an OECM<sup>5</sup>. Due to these factors, protected bottom habitats were not considered to meet OECM criteria and not considered further.



**Figure 2.** Demonstration of the overlaps and adjacency between current protected bottom habitats (orange fill), SVOs (current: solid-green, and newly proposed: line-green fill) and areas opened for deep sea mineral exploration and exploitation (light red: the entire exploration area, dark red: open to deep sea mining).

### 3.4 Svalbard - Prohibition on fishing in the fishing protection zone and territorial waters

With the exception of trawling for shrimps and scallop dredging, no harvesting of living marine resources is allowed in these areas (map: [Plan og sjøareal \(fiskeridir.no\)](#), map layer: fiskeri-reguleringer: Svalbard – Forbud mot fiske i fiskevernsonen og territorialfarvann, regulation: Forskrift om gjennomføring av fiske, fangst og høsting av villlevende marine ressurser (høstingsforskriften) § 58) :

- a) Within 20 nm of the Maritime border ("grunnlinje") around Bjørnøya
- b) Within 15 nm of the Maritime border on the west side of Spitsbergen from Sørkapp to 77° 30' N
- c) Within 20 nm of the Maritime border on the west side of Spitsbergen north of 77° 30' N and west of 14° E

All of these areas partly overlap with several PA's (Bjørnøya nature reserve, South Spitsbergen National Park, Forlandet National Park and Northwest Spitsbergen National Park) already reported to the WDPA. They also overlap with SVO's and are highly productive areas with unique biotopes. High diversity and abundance of benthic species like sponges, sea pens, cauliflower corals and sea lilies are documented around Svalbard<sup>54</sup> and many of them are endemic<sup>60</sup>. It is important spawning and nursery ground for many fish species, and highly important breeding, feeding and molting areas for seabirds, including the only known breeding site for sabine gull (EN)<sup>71</sup>. For several of the seabird species that breed on Svalbard, the population here makes up more than 25 percent of the European population, e.g., northern fulmar, little auk, glaucous gull (VU) and thick-billed murre (VU)<sup>82</sup>. These areas are important for many arctic endemic marine mammals, but also extremely important feeding areas for migrating whales. It is also home to the world's northernmost population of harbor seals<sup>83</sup>. The bottom habitats in these areas are also protected by regulations prohibiting fishing with bottom contact gear, except areas where such gear is regularly used, or if special permit is granted by the regulator<sup>55</sup>.

During the last decade there has been little shrimp trawling and scallop dredging activity inside these areas. However, these regulations do not prohibit such activities, and the fishery activities may change in the future. There is also intense fishing activity, including bottom trawling, right outside these areas and in some part also inside, especially around Bear Island (map of fishery intensity: [Plan og sjøareal \(fiskeridir.no\)](#), map layer: Fiskeriaktivitet). Bottom trawling causes resuspension of large amounts of sediments that may cause negative effects in many, especially filter feeding organisms. Corell et al.<sup>84</sup> found that bottom trawling increased turbidity up to 3 km away from the trawl track and that trawl-suspended sediments can impact habitats and species far from the trawling grounds.

According to IUCN: "a site which is subject to environmentally damaging industrial-scale activities, whether the environmentally damaging activities take place inside or outside the site" are unlikely to be an OECM<sup>7</sup>. Due to overlaps with already reported PAs and SVOs and potential impacts from bottom dredging fisheries, these areas were not considered further.

### 3.5 Kelp harvesting and Reference areas

Kelp forests are among the highest productive ecosystems on the planet providing feeding areas for seabirds and mammals<sup>85,86</sup>, creating important and diverse habitats for a wide range of fish species<sup>87</sup>, and provide a variety of ecosystem services<sup>88</sup>.

Annually, 160 000 tons of the canopy-forming kelp *Laminaria hyperborea*, is harvested in Norway, mainly for the extraction of alginate. Kelp is harvested using industrial trawling methods leading to temporary loss of entire alga stands in a 4-meter-wide track<sup>89</sup>. In harvested areas, feeding and nursery grounds of coastal predatory fish are removed, which in turn may lead to negative effects

on local food webs including top predators such as seabirds. Lorentsen et al.<sup>86</sup> found that kelp harvesting affected fish abundance and diminished seabird foraging efficiency.

The management of kelp harvesting is area-based where allocated harvesting areas are open for one year with a fallow period of four years to allow recovery<sup>90</sup>. Inside areas opened for harvesting, 28 reference areas are established where kelp and seaweed harvesting are prohibited. Re-establishing of kelp communities may occur within the harvesting cycle, but studies indicates that kelp-associated assemblages (epiphytes), needs minimum eight years to recolonize<sup>89</sup>.

Due to their productivity, kelp forests are regarded as important areas for costal fisheries, and the regulations in both harvested and reference areas does not prohibit other fishing activities.

Although harvesting is prohibited inside the reference areas, protecting this valuable ecosystem, these areas are not protected from any other human activities. In relation for reference areas to be considered as an OECM “conservation measures targeting single species or subsets of biodiversity should not allow the broader ecosystem to be compromised”<sup>5</sup>.

Kelp harvesting areas and reference areas therefore do not meet the criteria and cannot be reported as OECM's.

### **3.6 Conservation zones in Tvedestrand municipality**

In 2012, Tvedestrand municipality designated 15% of its coastal areas to protection, four conservation zones and one no take zone which is the only no take zone anywhere in Norway. In the no take zone, all types of fishing are prohibited, and this area is surrounded by conservation zones only allowing hook-and-line type fishing gear<sup>91</sup>. The no take zone provides full protection for fish and crustaceans assemblages and is an important research area that enables studying the effects of protection on multiple species. Several studies from these sites have documented positive effects on lobster, brown trout, and several species of wrasses<sup>30,32,92</sup>.

In Kvastadkilen, it is only forbidden to harvest European flat oysters, with no other regulations this area cannot be considered an OECM according to IUCN: “OECMs are expected to achieve the conservation of nature as a whole, rather than only selected elements of biodiversity. The CBD definitions of ‘biodiversity’ and ‘*in situ* conservation’ clearly recognize that a single species can only exist *in situ* as part of an interconnected web with other species and the abiotic environment. Therefore, conservation measures targeting single species or subsets of biodiversity should not allow the broader ecosystem to be compromised”<sup>7</sup>.

Although the Tvedestrand coastal areas would otherwise be likely to meet OECM criteria , these protection regulations expired 31.12.2023, and thus will not achieve sustained long-term outcomes. The areas therefore cannot be reported as an OECM.

### **3.7 A Comment on other area-based fisheries management measures**

Over the last decades Norwegian fisheries management regime has developed a comprehensive set of management measures. Many of these can contribute to achievement of several GBF Targets concerned with sustainable resource use (i.e. GBF targets 5, 9 & 10), but most of them do not achieve their objectives through *in-situ* conservation of biodiversity that are consistent with GBF Target 3.

Fisheries management measures may include closing fishing of specific depleted commercial fish species, forbidding the use of certain habitat-damaging or non-selective gear types, gear bans only protecting parts of the water column, or areas closed certain times of year when vulnerable species

are present at vulnerable life stages. Apart from these measures they generally allow all other non-prescribed fishery and non-fishery activities. The aim of implementing these measures is to ensure that specific fisheries are sustainably managed.

GBF targets 5, 9 & 10 were created to ensure a focus on sustainable wild species management, harvesting and sustainability in agriculture, aquaculture, fisheries, and forestry. The main difference between GBF Targets 5, 9 & 10 and Target 3 is that Target 3 sites are achieving the *in-situ* conservation of nature as a whole and cannot be compromised by allowed uses. In the context of the GBF and 2030 goals, other area-based fisheries management measures not further reviewed in this report as they do not meet the IUCN OECM criteria and should rather be reported by other GBF Targets are:

- Sørlandsleia – Ban on harvesting European flat oysters
- Lobster maximum size restricted areas
- Fjordlinjer, Kysttorskregulering
- Cod fishing – Prohibited area from Telemark county to the Swedish border
- Begrensninger i bruk av småmasket trål (Restrictions on the use of small-mesh trawls)
- Henningsværboxen (The Henningsvær box)
- Nasjonale laksefjorder (National Salmon Fjords)
- Forbud mot tråling i territorialfarvannet (The ban on trawling in territorial waters)
- Stengte gytefelt jan- april, Mandal-svenskegrensen (Spawning ground closures)
- Fiskeforbud Borgundfjorden (The fishing ban in Borgundfjorden)

### 3.8 Marine Important Bird and Biodiversity Areas (IBAs)

Important Bird and Biodiversity Areas (IBAs) are sites identified as globally important for the conservation of bird populations based on internationally agreed criteria. Each IBA is scored against indicators of the state of populations and/or their habitat, the pressure (threats) impacting the population and/or the habitat and the response (action) taken to conserve important populations and/or habitats (BirdLife International).

Population status of seabirds can provide important insights on the state of the marine environment and seabirds are considered indicators or sentinels of ocean health<sup>93,94</sup>. Human activities and climate change have profound effects on marine ecosystems. A comprehensive study of different seabird species, both in the northern and southern hemisphere, found that species in the northern hemisphere exhibited greater signs of stress and reduced breeding success. Species that mainly feed on fish were found to be most vulnerable, and species mainly foraging in the surface were more susceptible to breeding failures than deep-diving birds<sup>95</sup>.

When designing area-based management measures, Marine protected areas (MPA's) or OECM's, the outcome will be most effective if they include a species' most important area. Marine IBA's can be used as a tool to identify where these important areas are <sup>96,97</sup>.

There are 36 marine IBA's on and around the mainland of Norway and 12 on Svalbard, registered to the BirdLife International data zone. All the IBA's on Svalbard and 23 of mainland IBA's overlaps with Protected areas already reported to the WDPA. Of the remaining 13 IBA's, only one of them does not overlap at all with other PA's, with the others partly overlapping with existing PA's already reported. Parts of the sites outside the PA's could potentially become OECM's as in initial assessment - However, regulations that apply in these IBA's only gives seasonal protection to seabirds on breeding sites (i.e. land) with no other regulations that applies to the sea area. Due to large overlaps with existing PA's and lack of management mechanisms below the waters surface, these areas were not considered further.

### 3.9 Particularly valuable and vulnerable areas

Particularly valuable and vulnerable areas (in Norwegian “Særlig Verdifulle og Sårbare Områder” SVO’s – hereafter SVO’s) have been identified for Skagerrak and the North Sea, the Norwegian Sea, and the Barents Sea and are included in Norwegian management plans for these areas<sup>98–100</sup> (Meld. St. 37 (2012-2013), Meld. St. 35 (2016-2017), Meld. St. 10 (2010-2011)). SVO’s are areas of significant importance for biological diversity and highlight areas in which areas to exercise caution.

After their initial inception, the Norwegian parliament saw the need for an integrated ocean management plan and during this work it became clear that all the SVO’s should be re-evaluated (St. 20 (2019–2020))<sup>101</sup>. In the new environmental value assessment, an expert group used seven criteria defined in the UN Convention on Biological Diversity (CBD) to assess ecologically and biologically significant areas (EBSAs)<sup>71</sup>. After the re-evaluation, 19 SVO-areas are identified which are fewer than before, but now covers larger areas, approximately 55% of Norwegian waters, compared to previously 42%<sup>102</sup>.

Identification of SVOs is not a management measure in itself as it has no legal status or frameworks that regulates commercial activities, however there are various sectoral authorities responsible for implementing environmental management measures<sup>101</sup>. Frameworks for specific activities is a political process where impact on and risk to the environment is balanced against the benefit to society by allowing economic activity. In Meld. St. 21 (2023-2024)<sup>102</sup> it is stated that: “impact on important environmental values in the individual SVOs must be considered, but at the same time stricter frameworks than necessary, must not be implemented to safeguard economic values in the fields of petroleum, CO<sub>2</sub>-storage, offshore wind, deep-sea mineral mining, fisheries, aquaculture and shipping”.

SVO’s cover enormous areas both within Norwegian territorial waters and outside in the exclusive economic zone. In many of them there is extensive commercial industrial activity, including several petroleum fields and some of Norway’s most important and most used fishing areas. The Nature Diversity act applies to all activities and industries and sets requirements to preserve biological diversity. Through this law, vulnerable and important areas can be designated MPA’s or OECM’s. However, it does not yet have law-based jurisdiction outside Norwegian territorial waters.

For a site to be considered as an OECM according to IUCN, management mechanisms must exist to address and effectively mitigate pressures on biodiversity values and have the capacity to respond to possible future treats. A site which is subject to environmentally damaging industrial-scale activities, are also unlikely to be an OECM<sup>7</sup>. Due to lack of regulations and impacts from industrial-scale activities, these areas were not considered further.



## 4 Discussion

In this report we identify the marine areas - not already reported as protected areas to the IUCN - that currently qualify to be reported as OECMs in Norway according to the criteria defined in the IUCN site-level tool for identifying OECMs. These marine areas were assessed in consideration of **current** geographical boundaries and regulatory frameworks and of plausible or demonstrable threats to effective long-term, *in-situ* biodiversity conservation in the areas. There were eight different specific marine management area types evaluated: 1) Lobster Reserves, 2) Coral Reef Protected Areas, 3) Protected Bottom Habitats, 4) The Svalbard Protection Zone and Territorial Waters, 5) Kelp Harvesting and Reference Areas, 6) Tvedestrand municipality conservation zones, 7) Important Bird Areas, and 8) Particularly valuable and vulnerable areas. We also examined ten other area-based fisheries management measures that may qualify. We found that 25 specific lobster reserves and four coral reef protected areas are likely to comply with IUCN OECM criteria. We further find that all other marine area types and definable sites within, as they are currently geographically defined and regulated, do not comply with IUCN OECM criteria.

There were three main reasons that, singularly or in combination, excluded most current marine area types and sites as complying with IUCN OECM criteria. These were, with brief explanation:

**1) Geographical boundaries that overlap with already reported protected areas:**

This point is a technicality. The first criterion in the IUCN site level assessment tool for identifying OECMs is that *the site is not a protected area*. This is a seemingly simple criterion; however, it becomes problematic in combination with Criterion 3: *That an area is geographically defined*. Since we could only sensibly assess areas that are already geographically defined within current regulatory frameworks, the fact that many of these areas overlapped with protected areas became problematic. If an area complies with all other IUCN OECM criteria, then the part of the area outside the protected area may be a potential OECM<sup>7</sup>. However, to comply with Criterion 3, this would require redefinition of site boundaries to exclude overlaps with protected areas. If a candidate area satisfies all other IUCN OECM criteria, this is a straight-forward procedure.

**2) Regulations of a limited timeframe and/or that only ameliorate one specific type of threat to a single species / subset of biodiversity (e.g. vertical zonation, single species fisheries management etc):**

There were many examples (e.g. multiple lobster reserves and the Tvedestrand conservation zone), where the regulatory framework likely to result in positive *in-situ* biodiversity conservation outcomes was of a limited (i.e. short-term) timeframe. This is clearly incompatible with IUCN OECM Criterion 7, that regulations are in place long-term (for the foreseeable future) and ruled these areas out from further consideration.

There were also many area types where regulations only targeted a single species or subset of biodiversity (area-based fisheries management, Kelp harvesting and reference areas, protected bottom habitats), where there was insufficient regulation to prevent "... *the broader ecosystem to be compromised*"<sup>5</sup>. These areas were also deemed to not comply with OECM criteria, due to a regulatory framework that does not sufficiently mitigate or prevent other impacts - apart from the ones the specific regulation addresses - likely to compromise ecosystem-wide long-term biodiversity conservation. In the context of marine regulations protecting one habitat in the water column (e.g. protected bottom habitats) - the IUCN explicitly does not recommend and has a "*strong presumption against vertical zoning of OECMs*"<sup>5</sup>.

**3) The likelihood of environmental damage from industrial-scale activities inside and outside the area.**

In most areas that only ameliorate one specific type of threat to a single species / subset of biodiversity it was also clear that there were ongoing or nascent threats that would "*allow the broader ecosystem to be compromised*"<sup>5</sup> by "*environmentally damaging industrial-scale activities... inside or outside the area*"<sup>7</sup>. Obvious examples of such threats include large swathes of the protected bottom habitat area open to exploration for deep sea mining and the lack of regulation and buffer zones for certain types of industrial fishing in and around The Svalbard Protection Zone.

## 4.1 Differences in conclusions regarding potential Norwegian OECM's

In October 2023, authors from the Norwegian Institute of Marine Research and the Norwegian Government Directorate of Fisheries released a report that reviewed area-based fisheries management measures and their potential contribution to the conservation of marine nature as OECMs (Hoel *et al.* 2023)<sup>14</sup>. This report applied an assessment based on a form assessing fisheries regulations against [OECM criteria from the International Council for the Exploration of the Sea \(ICES\)'s OECM workshop ICES-IUCN WKTOPS in 2021](#). This approach used a three-tiered ranking for area-based fisheries management measures where color categories expressing compliance status are used: Green: Clearly satisfying OECM criteria; Yellow: Can satisfy OECM criteria with some regulatory changes and; Red: Does not satisfy OECM criteria. A key difference in our methods is that we applied the recently published framework in the IUCN site-assessment tool rather than the ICES workshop form. One of the main outcomes of these different approaches is that the ICES system appraises regulations, thereby not necessarily being site-specific and its yellow category revolves around hypothetical regulatory changes that are not currently in place. The IUCN site-level assessment tool, as the name implies, is meant to be applied at the specific site level and is binary in that sites either do or do not comply with OECM criteria.

Because we used the IUCN site-level assessment binary framework, rather than a ranking criterion, we only considered and compared with our findings what Hoel *et al.* (2023)<sup>14</sup> concluded to meet the OECM criteria (their Green category). Their conclusions and our conclusions align when it comes to lobster areas with the strictest regulation. There is also some overlap when it comes to coral reef protection areas, although we found only coral reef areas with the strictest regulations (regulatory frameworks (b) & (c) – see section 3.2) likely to meet OECM criteria, but Hoel *et al.* (2023) found that coral reef areas under the least stringent regulatory (Framework (a) – see section 3.2) were also likely OECMs. The largest differences in conclusions between results concern these authors finding that waters around Svalbard and the bottom protection on vulnerable bottom habitat areas meet OECM criteria, whereas we did not. Generally, the main basis of differences in our conclusions appears to lie in the fact that Hoel *et al.* consider that “*a number of regulations in Norwegian fisheries contribute to the preservation of nature and biological diversity, by limiting the effects of fisheries on nature*”<sup>14</sup> and hence, the report seems to primarily focus on fisheries regulations and fisheries related impacts. The methodology of aggregating areas according to fishery regulations generally is incongruent with the notion of site-level assessment advocated by the IUCN. However, we also experienced the necessity of regulation level aggregation of areas prior to any specific site assessment: both to initially appraise if the necessary regulatory framework exists and also in the case where areas under specific regulations are extremely large, and hence site-level assessment impossible. The necessity for site-level assessment is that local contexts for area use, regulations and potential impacts can and should be considered where possible.

Below we examine the key differences between our conclusions compared with Hoel *et al.* (2023)<sup>14</sup>. Beforehand it is important to acknowledge that these authors recognize and comment on the issue of areas overlapping with already reported protected areas – they generally have a statement that these overlapping areas cannot be considered/reported as OECMs.

### 4.1.1 Svalbard - Prohibition on fishing in the Fish Protection Zone and territorial waters

Our conclusion that these waters do not qualify currently as OECMs are based on:

- 1) That the areas overlap with currently reported protected areas (PAs);
- 2) That there are destructive industrial fishing practices (shrimp trawling and scallop dredging) permitted in these waters – despite the fact that little of this activity currently occurs, the regulatory framework in place to prevent future fishing in this area is discretionary, and;
- 3) On balance, there are likely impacts from bottom trawl fisheries operating on the borders of these areas.

Hoel *et al.* (2023) on the other hand consider that the areas outside of currently reported PAs and outside of “*traditional fishing areas*”, qualify as OECMs, on the basis that:

- 1) Permitted fisheries are currently limited in activity and “*there is no reasons...to believe that shrimp trawling and shell scraping will expand geographically in the area*”<sup>14</sup>, and that even potential expansion of such fisheries should be considered in light of the fact that because of other fishing regulations (fishing to protect vulnerable ecosystems), bottom gear must not be used in areas it isn’t normally used in without obtaining special permission first.
- 2) Aside from fisheries, there are few activities in the area with potential to degrade biological diversity.

We consider there to be three main issues with the general premise of these conclusions and point 1 in particular, leading to our different conclusion:

- a) To avoid confusion, it is important to note to that when Hoel *et al.* (2023) refer to “*traditional fishing areas*”, “*traditional fishing*” in this context refers to industrial fishing with modern equipment, rather than, for example, indigenous fishing areas or practices as the term is more commonly used. As far as we can tell, there is no working definition of “*traditional fishing areas*” and they are not geographically defined (apart from the anecdotal definition in the report of “*from the map of fishing activity we see that there are traditional fishing areas outside the baseline and inside in the Fish Protection Zone at the mouth of Isfjorden and Kongsfjorden*”). This poses the problem that “*traditional fishing areas*” can be assigned this status reasonably *ad hoc* (e.g. by examining the fishing activity map on any given day and defining these areas by noting any previous/existing patters of activity), in addition to the fact that because they are not currently geographically defined, by definition, the potential OECM area cannot (currently) be either.
- b) Hoel *et al.* (2023) conclude these, as yet not geographically defined areas meet OECM status “... *on the condition that no permission is granted for any applications for fishing inside the zone*”. We note here that it is interesting that this proviso alone did not relegate the area to their yellow category (“*yellow - Can satisfy OECM criteria with some regulatory changes*”). What is clear from this proviso is that under current regulations, environmentally damaging industrial activities *may* be permissible and that whether they are or not is a matter of discretion for the regulator. This violates the premise of criterion 7 in the IUCN site level assessment tool – that “*A site... has a secure legal or other form of recognition, that cannot easily be reversed or eliminated*”<sup>7</sup>. We consider that simply expecting a regulatory body to not grant permission for an otherwise permissible activity into the long-term future is improbable given institutional cultures and political dynamics/influence. Particularly given very recent suggestions to open new fishing areas within the zone<sup>103</sup>.
- c) These authors do not consider at all any potential impact of the considerable industrial activities outside the borders of these areas, whereas we would consider, for example, a buffer zone for the bottom trawling activities occurring on the border of these areas to be a relevant compromise here.

#### 4.1.2 Bottom protection on vulnerable bottom habitat areas

Our conclusion that these waters do not qualify currently as OECMs are based on:

1. That the areas overlap with currently reported protected areas (PAs);
2. That the areas have only a single, vertically zoned regulation in place that protects a subset of biodiversity (no bottom trawling according to depth and specific area), and;
3. That the areas clearly overlap and are adjacent with, areas opened for deep-sea mining exploration and exploitation (Fig. 2).

Hoel *et al.* (2023) conclude that these enormous areas meet all OECM criteria and this appears to be based solely on the restriction of fishing with bottom gear and an analysis stating (via translation) that: “*The regulation has no time limit, but the area covered may change as knowledge becomes available species diversity in the areas is improved and if relevant fisheries are developed. In that case, boundaries and area must be defined as OECM is adjusted. There is currently little other activity that affects biodiversity in the areas*”<sup>14</sup>.

Here we are at a loss to see how these notions comply with OECM criteria for several reasons:

- a) Such a regulatory framework is one that is vertically zoned and only protects a subset of biodiversity from a single form of damaging activity (bottom fishing). This again highlights the IUCNs “*strong presumption against vertical zoning of OECMs*”<sup>5</sup> for obvious reasons.
- b) Similar to Svalbard waters, “new fishing areas” can be defined and permitted to be operated in by the regulator *ad hoc*, following application by proponents. In such new fishing areas, the restriction on bottom fishing is lifted. Further,
- c) The notion that, presumably as a result of (b) areas “*may be changed ... if relevant fisheries are developed... and OECMs adjusted*” obfuscates the entire premise of area-based, long-term *in situ* biodiversity conservation implicit with OECMs. Such a notion implies that as soon as there is a perceived requirement for industrial activity in an OECM, the OECM status of an area can simply be quickly revoked and the area subject to damaging industrial activity (i.e. the ‘box on a map’ redrawn). This fundamentally violates multiple basic principles underlying the OECM concept – there is clearly no plausible mechanism or commitment of long-term *in situ* biodiversity conservation of an area under such a framework.
- d) It is puzzling that the “current” status of activity in an area is used as a premise to assess the viability long-term *in situ* biodiversity conservation for the area into the future. Nowhere is this more apparent in general than in point (c) above, or specifically due to the fact the enormous swathes of these areas overlap and are adjacent with, areas opened for deep-sea mining exploration and exploitation, as of January 9, 2024<sup>81</sup>. While we acknowledge that the decision to open areas to for deep-sea mining exploration and exploitation was made by the Norwegian Parliament after the publication of Hoel *et al.* in October 2023, we also note that these plans were well known since January 2021 and specifically documented with geographical information since June 2023.

## 4.2 Recommendations and Conclusions

### 4.2.1 Areas that comply with OECM criteria

As of the current situation in Norway, we conclude that the areas complying with OECM criteria are:

- Twenty-five lobster reserves (Fig. 1, Appendix I) with the strictest level of protection, and,
- Four coral reef reserves not already reported as, or overlapping with, protected areas (Høla, Midsundrevet, Straumsneset and Nakken v/Huglo). See Appendix I.

### 4.2.2 Areas that could comply with OECM criteria in the event of definition/regulatory changes

It was beyond the terms of reference of this report to comprehensively evaluate what changes are required to shift area types and sites currently not complying with OECM criteria toward compliance. However, we did note some obvious changes in specific circumstances that would shift the “*Svalbard - Prohibition on fishing in the Fish Protection Zone and territorial waters*” area towards compliance in our opinion. These are:

1. That a working definition to the industrial fishing areas (so-called “traditional fishing areas”) is developed and these areas geographically defined. This would facilitate geographic definition of the other parts of this area in relation to these.
2. That given geographically defined “traditional fishing areas” and the current borders of this area, that buffer zones are established around these to mitigate the likely negative impact of industrial fishing practices, such as bottom trawling, occurring close to area borders.
3. That the regulations are changed within these areas such that fishing within the zone is simply prohibited, rather than potentially permitted after application to the regulator.
4. After points 1-3, that areas not overlapping with PAs have the geographic boundaries of the OECM redefined to exclude areas already reported as a PA. This should be a straightforward procedure.

### 4.2.3 A final note on current official positions on OECMs in Norway

We note that in 2022 and 2023, the Ministry of Industry and Fisheries has reported to the Norwegian parliament<sup>104,105</sup> that:

*“Norway has protected approximately 44 percent of Norwegian sea area with so-called effective area-based measures such as coral protection and bans on bottom fishing”.*

This statement was changed in the 2024 report<sup>106</sup> to:

*“In 2023, the Institute of Marine Research evaluated all regulations based on the CBD's "OECM criteria", and thus Norway has protected approximately 44 percent of Norwegian marine areas with so-called effective area-based measures from the fisheries management.”*

We question the veracity of these statements, given the information presented in this report.

Given this position, it is appropriate to call attention to an opinion piece by then Norwegian Prime Minister, Erna Solberg in the flagship natural sciences journal *Nature*, in December 2020<sup>107</sup>. In this piece, Prime Minister Solberg discusses the importance of scientific evidence and international cooperation for sustainable ocean use. Specifically, it was noted that without effective international cooperation “... *planning will be ad hoc and ineffective, as we have seen in marine sanctuaries that are ‘paper parks’. These are marked as protected on a map but in fact are not.*” We cannot help but note the strong irony of this signal on the international stage from the top Norwegian government official, while the Norwegian Government Ministry of Industry and Fisheries considers enormous areas, non-compliant with OECM criteria, to be *bona fide* OECMS – the very definition of “paper parks” decried by then Prime Minister Solberg.

We call upon the Norwegian government to revisit their position on marine OECMs and bring them into alignment with the CBD definitions and guiding principles.

## 5 References

1. IPBES. Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. <https://zenodo.org/records/6417333>.
2. Tittensor, D. P. *et al.* A mid-term analysis of progress toward international biodiversity targets. *Science* **346**, 241–244 (2014).
3. Maxwell, S. L. *et al.* Area-based conservation in the twenty-first century. *Nature* **586**, 217–227 (2020).
4. Cook, C. N. Progress developing the concept of other effective area-based conservation measures. *Conservation Biology* *n/a*, e14106.
5. IUCN WCPA Task Force on OECMs. Recognising and Reporting Other Effective Area-Based Conservation Measures. (IUCN, International Union for Conservation of Nature, 2019). doi:10.2305/IUCN.CH.2019.PATRS.3.en.
6. FAO. A Handbook for Identifying, Evaluating and Reporting Other Effective Area-Based Conservation Measures in Marine Fisheries. (FAO, Rome, Italy, 2022). doi:10.4060/cc3307en.
7. Jonas, H. D., MacKinnon, K., Marnewick, D. & Wood, P. Site-Level Tool for Identifying Other Effective Area-Based Conservation Measures (OECMs) : First Edition. (IUCN, 2023). doi:10.2305/WZJH1425.
8. Alves-Pinto, H. *et al.* Opportunities and challenges of other effective area-based conservation measures (OECMs) for biodiversity conservation. *Perspectives in Ecology and Conservation* **19**, 115–120 (2021).
9. Claudet, J. *et al.* Avoiding the misuse of other effective area-based conservation measures in the wake of the blue economy. *One Earth* **5**, 969–974 (2022).
10. C-NLOPB Releases Results for 2018 Calls for Bids. C-NLOPB <https://www.cnlopb.ca/news/nr20181107/>.
11. To Reach Conservation Goals, Fishery Managers Must Avoid Creative Accounting. <https://pew.org/3ON6uCb> (2023).
12. Oceana Canada calls on the government to say no to oil and gas leases in the Northeast Newfoundland Slope Conservation Area. Oceana Canada <https://oceana.ca/en/press-releases/oceana-canada-calls-government-say-no-oil-and-gas-leases-northeast/>.
13. Miljødepartementet, K. Meld. St. 29 (2020–2021). Regjeringa.no <https://www.regjeringen.no/nn/dokumenter/meld.-st.-29-20202021/id2843433/> (2021).
14. Hoel, A. H. *et al.* Other Effective Area-Based Conservation Measures – Oecms: Other Effective Area-Based Conservation Measures. <https://www.hi.no/hi/nettrapporter/rapport-fra-havforskningen-2023-45> (2023).
15. Kleiven, A. R. *et al.* Technological creep masks continued decline in a lobster (*Homarus gammarus*) fishery over a century. *Sci Rep* **12**, 3318 (2022).
16. Knutsen, J. A., Agnalt, A. L., Moland Olsen, E., Knutsen, H. & Moland, E. Hummer (Eng: Lobster). *Kyst og Havbruk*. Institute of Marine Research, Norway 90–91 (2007).
17. Tandberg, A. H. S. *et al.* Krepssdyr: Vurdering Av Hummer *Homarus Gammarus* for Norge. Rødlista for Arter 2021. Artsdatabanken. <http://www.artsdatabanken.no/lister/rodlisteforarter/2021/14133> (2021).
18. Pettersen, A. R., Moland, E., Olsen, E. M. & Knutsen, J. A. Lobster Reserves in Coastal Skagerrak – An Integrated Analysis of the Implementation Process. in *Integrated Coastal Zone Management* 178–188 (John Wiley & Sons, Ltd, 2009). doi:10.1002/9781444316285.ch14.
19. Forskrift om høsting av hummer. Forskrift Om Høsting Av Hummer (FOR-2021-12-23-3890). (2021).
20. Ønsker at flere kommuner etablerer nye fredningsområder for hummer. Fiskeridirktoratet <https://www.fiskeridir.no/Fritidsfiske/Arter/Hummarfiske/Fredings-og-bevaringsomraade/OEnsker-at-flere-kommuner-etablerer-nye-fredningsomraader-for-hummer>.
21. Manzetti, S. & Stenersen, J. H. V. A critical view of the environmental condition of the Sognefjord. *Marine Pollution Bulletin* **60**, 2167–2174 (2010).
22. Marint vern - Miljødirektoratet. Miljødirektoratet/Norwegian Environment Agency <https://www.miljodirektoratet.no/ansvarsomrader/vernet-natur/marint-vern/>.
23. Moland, E. *et al.* Activity patterns of wild European lobster *Homarus gammarus* in coastal marine reserves: implications for future reserve design. *Marine Ecology Progress Series* **429**, 197–207 (2011).

24. Husa, V., Steen, H. & Sjøtun, K. Historical changes in macroalgal communities in Hardangerfjord (Norway). *Marine Biology Research* (2014).
25. Taranger, G. L., Boxaspen, K. K., Madhun, A. S. & Svåsand, T. Risk assessment – environmental impacts of Norwegian aquaculture. *Extracts from: Fisken og Havet* 99 (2010).
26. Azad, A. M. *et al.* Spatial distribution of mercury in seawater, sediment, and seafood from the Hardangerfjord ecosystem, Norway. *Science of The Total Environment* **667**, 622–637 (2019).
27. Moland, E. *et al.* Lobster and cod benefit from small-scale northern marine protected areas: inference from an empirical before–after control-impact study. *Proceedings of the Royal Society B: Biological Sciences* **280**, 20122679 (2013).
28. Knutsen, J. A. *et al.* Lobster reserves as a management tool in coastal waters: Two decades of experience in Norway. *Marine Policy* **136**, 104908 (2022).
29. Sørдалen, T. K., Halvorsen, K. T. & Olsen, E. M. Protection from fishing improves body growth of an exploited species. *Proceedings of the Royal Society B: Biological Sciences* **289**, 20221718 (2022).
30. Halvorsen, K. T. *et al.* Impact of harvesting cleaner fish for salmonid aquaculture assessed from replicated coastal marine protected areas. *Marine Biology Research* **13**, 359–369 (2017).
31. Moland, E. *et al.* Restoration of Abundance and Dynamics of Coastal Fish and Lobster Within Northern Marine Protected Areas Across Two Decades. *Frontiers in Marine Science* **8**, (2021).
32. Nillos Kleiven, P. J. *et al.* Fishing pressure impacts the abundance gradient of European lobsters across the borders of a newly established marine protected area. *Proceedings of the Royal Society B: Biological Sciences* **286**, 20182455 (2019).
33. Ferter, K. *et al.* Integrating complementary survey methods to estimate catches in Norway’s complex marine recreational hook-and-line fishery. *ICES Journal of Marine Science* **80**, 107–121 (2023).
34. Järnegren, J. & Kutti, T. *Lophelia Pertusa* in Norwegian Waters. *What Have We Learned since 2008?* 40 s. (Norsk institutt for naturforskning, 2014).
35. Husebø, Å., Nøttestad, L., Fosså, J. H., Furevik, D. M. & Jørgensen, S. B. Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* **471**, 91–99 (2002).
36. Costello, M. J. *et al.* Role of cold-water *Lophelia pertusa* coral reefs as fish habitat in the NE Atlantic. in *Cold-Water Corals and Ecosystems* (eds. Freiwald, A. & Roberts, J. M.) 771–805 (Springer, Berlin, Heidelberg, 2005). doi:10.1007/3-540-27673-4\_41.
37. Kutti, T., Bergstad, O. A., Fosså, J. H. & Helle, K. Cold-water coral mounds and sponge-beds as habitats for demersal fish on the Norwegian shelf. *Deep Sea Research Part II: Topical Studies in Oceanography* **99**, 122–133 (2014).
38. Tandberg, A. H. S. & Mortensen, P. Koralldyr: Vurdering Av Øyekorall *Desmophyllum Pertusum* for Norge. *Rødlista for Arter 2021*. <http://www.artsdatabanken.no/lister/rodlisteforarter/2021/5718> (2021).
39. Roberts, J. M. *Cold-Water Corals: The Biology and Geology of Deep-Sea Coral Habitats*. (Cambridge University Press, 2009).
40. Fosså, J. H., Mortensen, P. B. & Furevik, D. M. The deep-water coral *Lophelia pertusa* in Norwegian waters: distribution and fishery impacts. *Hydrobiologia* **471**, 1–12 (2002).
41. Buhl-Mortensen, L. *et al.* Impacts of Fisheries and Aquaculture on Sediments and Benthic Fauna: Suggestions for New Management Approaches. vol. 2 (2014).
42. Buhl-Mortensen, P. Coral reefs in the Southern Barents Sea: habitat description and the effects of bottom fishing. *Marine Biology Research* **13**, 1027–1040 (2017).
43. Armstrong, C. W. & van den Hove, S. The formation of policy for protection of cold-water coral off the coast of Norway. *Marine Policy* **32**, 66–73 (2008).
44. Fosså, J. H. & Skjoldal, H. R. Conservation of cold-water coral reefs in Norway. in *Handbook of Marine Fisheries and Management* (2009).
45. Buhl-Mortensen, P. *et al.* Effects of Fisheries on Deepwater Gorgonian Corals in the Northeast Channel, Nova Scotia. *American Fisheries Society Symposium* vol. 41 (2005).
46. Stone, R. P., Masuda, M. M. & Karinen, J. F. Assessing the ecological importance of red tree coral thickets in the eastern Gulf of Alaska. *ICES Journal of Marine Science* **72**, 900–915 (2015).

47. Larsson, A. I. & Purser, A. Sedimentation on the cold-water coral *Lophelia pertusa*: Cleaning efficiency from natural sediments and drill cuttings. *Marine Pollution Bulletin* **62**, 1159–1168 (2011).
48. Liefmann, S., Järnægren, J., Johnsen, G. & Murray, F. Eco-physiological responses of cold-water soft corals to anthropogenic sedimentation and particle shape. *Journal of Experimental Marine Biology and Ecology* **504**, 61–71 (2018).
49. Gates, A. R. & Jones, D. O. B. Recovery of Benthic Megafauna from Anthropogenic Disturbance at a Hydrocarbon Drilling Well (380 m Depth in the Norwegian Sea). *PLOS ONE* **7**, e44114 (2012).
50. Kutti, T. *et al.* Fish farm effluents cause metabolic depression, reducing energy stores and growth in the reef-forming coral *Lophelia pertusa*. *Aquaculture Environment Interactions* **14**, 279–293 (2022).
51. Forskrift om fiske med bunnredskap i NØS mv. Forskrift Om Regulering Av Fiske Med Bunnredskap i Norges Økonomiske Sone, Fiskerisonen Rundt Jan Mayen Og i Fiskevernsonen Ved Svalbard. FOR-2011-07-01-755. (2011).
52. Buhl-Mortensen, L., Ellingsen, K. E., Buhl-Mortensen, P., Skaar, K. L. & Gonzalez-Mirelis, G. Trawling disturbance on megabenthos and sediment in the Barents Sea: Chronic effects on density, diversity, and composition. 98-114 (2016) doi:10.1093/icesjms/fsv200.
53. Jørgensen, L. L., Planque, B., Thangstad, T. H. & Certain, G. Vulnerability of megabenthic species to trawling in the Barents Sea. *ICES Journal of Marine Science* **73**, i84–i97 (2016).
54. Jørgensen, L. L. *et al.* Impact of multiple stressors on sea bed fauna in a warming Arctic. *Marine Ecology Progress Series* **608**, 1–12 (2019).
55. Endr. i forskrift om forskrift om fiske med bunnredskap i NØS mv. Forskrift Om Endring i Forskrift Om Regulering Av Fiske Med Bunnredskap i Norges Økonomiske Sone, Fiskerisonen Rundt Jan Mayen Og i Fiskevernsonen Ved Svalbard. FOR-2019-03-29-416. (2019).
56. Jørgensen, L. L., Bakke, G. & Hoel, A. H. Responding to global warming: New fisheries management measures in the Arctic. *Progress in Oceanography* **188**, 102423 (2020).
57. Levin, L. Sustainability in Deep Water: The Challenges of Climate Change, Human Pressures, and Biodiversity Conservation. *Oceanography* **32**, 170–180 (2019).
58. Danovaro, R. *et al.* Ecological variables for developing a global deep-ocean monitoring and conservation strategy. *Nat Ecol Evol* **4**, 181–192 (2020).
59. R. Hessler, R. & L. Sanders, H. Faunal diversity in the deep-sea. *Deep Sea Research and Oceanographic Abstracts* **14**, 65–78 (1967).
60. Rybakova, E., Kremenetskaia, A., Vedenin, A., Boetius, A. & Gebruk, A. Deep-sea megabenthos communities of the Eurasian Central Arctic are influenced by ice-cover and sea-ice algal falls. *PLOS ONE* **14**, e0211009 (2019).
61. Van Dover, C. L. *et al.* Scientific rationale and international obligations for protection of active hydrothermal vent ecosystems from deep-sea mining. *Marine Policy* **90**, 20–28 (2018).
62. Ramirez-Llodra, E. *et al.* Benthic Communities on the Mohn's Treasure Mound: Implications for Management of Seabed Mining in the Arctic Mid-Ocean Ridge. *Frontiers in Marine Science* **7**, (2020).
63. Pedersen, R. B. *et al.* Fagutredning Mineralressurser i Norskehavet Landskapstrekk, Naturtyper Og Benthiske Økosystemer. <https://www.regjeringen.no/no/dokumenter/horing-konsekvensutredning-pa-norsk-kontinentalsokkel/id2937810/?expand=horingsnotater> (2022).
64. Eilertsen, M. H. *et al.* Diversity, habitat endemism and trophic ecology of the fauna of Loki's Castle vent field on the Arctic Mid-Ocean Ridge. *Sci Rep* **14**, 103 (2024).
65. Roberts, E. M. *et al.* Oceanographic setting and short-timescale environmental variability at an Arctic seamount sponge ground. *Deep Sea Research Part I: Oceanographic Research Papers* **138**, 98–113 (2018).
66. Meyer, H. K., Roberts, E. M., Rapp, H. T. & Davies, A. J. Spatial patterns of arctic sponge ground fauna and demersal fish are detectable in autonomous underwater vehicle (AUV) imagery. *Deep Sea Research Part I: Oceanographic Research Papers* **153**, 103137 (2019).
67. Burgos, J. M. *et al.* Predicting the Distribution of Indicator Taxa of Vulnerable Marine Ecosystems in the Arctic and Sub-arctic Waters of the Nordic Seas. *Frontiers in Marine Science* **7**, (2020).
68. OSPAR Agreement 2008-07. Descriptions of habitats on the OSPAR List of threatened and/or declining species and habitats.



69. Buhl-Mortensen, P. Korallrev, Marint Dypvann. Norsk Rødliste for Naturtyper 2018. Artsdatabanken. <https://artsdatabanken.no/RLN2018/3> (2018).
70. Buhl-Mortensen, P. & Rapp, H. T. Svampspikelbunn i Barentshavet Sør, Marint Dypvann. Norsk Rødliste for Naturtyper 2018. Artsdatabanken. <https://artsdatabanken.no/RLN2018/10> (2018).
71. Eriksen, E., van der Meeren, G. I., Nilsen, B. M., von Quillfeldt, C. H. & Johnsen, H. Særlig verdifulle og sårbare områder (SVOer) i norske havområder – miljøverdi. En gjennomgang av miljøverdier og grenser i eksisterende SVO og forslag til nye områder. 308 <https://www.hi.no/templates/reporteditor/report-pdf?id=45755&11100145> (2021).
72. Artsdatabanken. Norsk Rødliste for Arter 2021. <http://www.artsdatabanken.no/lister/rodlisteforarter/2021/> (2021).
73. Petersen, S. *et al.* News from the seabed – Geological characteristics and resource potential of deep-sea mineral resources. *Marine Policy* **70**, 175–187 (2016).
74. Olje- og energidepartementet. Meld. St. 25 (2022–2023). Regjeringa.no <https://www.regjeringen.no/nn/dokumenter/meld.-st.-25-20222023/id2985856/> (2023).
75. Olje- og energidepartementet. Konsekvensutredning for mineralvirksomhet på norsk kontinentalsokkel. Regjeringen.no <https://www.regjeringen.no/no/aktuelt/sender-kons/id2937834/> (2022).
76. Fauna & Flora International (FFI). An Assessment of the Risks and Impacts of Seabed Mining on Marine Ecosystems. [www.fauna-flora.org](http://www.fauna-flora.org) (2020).
77. van der Meeren, T. *et al.* Innspill til høring - Forslag til program for konsekvensutredning for mineralvirksomhet på norsk sokkel. 42 (2021).
78. Gollner, S. *et al.* Resilience of benthic deep-sea fauna to mining activities. *Marine Environmental Research* **129**, 76–101 (2017).
79. Havbunnsministeren. Lov Om Mineralvirksomhet På Kontinentalsokkelen. LOV-2019-03-22-7. (2019).
80. Thompson, K. F., Miller, K. A., Currie, D., Johnston, P. & Santillo, D. Seabed Mining and Approaches to Governance of the Deep Seabed. *Frontiers in Marine Science* **5**, (2018).
81. Energidepartementet. Norway gives green light for seabed minerals. Government.no <https://www.regjeringen.no/en/aktuelt/norway-gives-green-light-for-seabed-minerals/id3021433/> (2024).
82. Strøm, H. *et al.* Population status and trend of the threatened ivory gull *Pagophila eburnea* in Svalbard. *Endangered Species Research* **43**, (2020).
83. Hamilton, C.D. *et al.* Marine mammal hotspots in the Greenland and Barents Seas. *Marine Ecology Progress Series* **659**, 3–28 (2021).
84. Corell, H., Bradshaw, C. & Sköld, M. Sediment suspended by bottom trawling can reduce reproductive success in a broadcast spawning fish. *Estuarine, Coastal and Shelf Science* **282**, 108232 (2023).
85. Bjørge, A. *et al.* Habitat use and diving behaviour of harbour seals in a coastal archipelago in Norway. in *Developments in Marine Biology* vol. 4 211–223 (Elsevier, 1995).
86. Lorentsen, S.-H., Sjøtun, K. & Grémillet, D. Multi-trophic consequences of kelp harvest. *Biological Conservation* **143**, 2054–2062 (2010).
87. Norderhaug, K. M., Christie, H., Fosså, J. H. & Fredriksen, S. fish–macrofauna interactions in a kelp (*Laminaria hyperborea*) forest. *Journal of the Marine Biological Association of the United Kingdom* **85**, 1279–1286 (2005).
88. Vilalta-Navas, A. *et al.* A mass-balanced food web model for a kelp forest ecosystem near its southern distributional limit in the northern hemisphere. *Food Webs* **17**, e00091 (2018).
89. Steen, H., Moy, F. E., Bodvin, T. & Husa, V. Regrowth after kelp harvesting in Nord-Trøndelag, Norway. *ICES Journal of Marine Science* **73**, 2708–2720 (2016).
90. Forskrift om høsting av tang og tare. FOR-1995-07-13-642. (1995).
91. Forskrift Om Bevaringssoner i Tvedestrand Kommunes Sjøområder, Agder. (2022).
92. Thorbjørnsen, S. H. *et al.* Potential of a no-take marine reserve to protect home ranges of anadromous brown trout (*Salmo trutta*). *Ecology and Evolution* **9**, 417–426 (2019).

93. Gagne, T. O., Hyrenbach, K. D., Hagemann, M. E. & Van Houtan, K. S. Trophic signatures of seabirds suggest shifts in oceanic ecosystems. *Science Advances* **4**, eaao3946 (2018).
94. Velarde, E., Anderson, D. W. & Ezcurra, E. Seabird clues to ecosystem health. *Science* **365**, 116–117 (2019).
95. Sydeman, W. J. *et al.* Hemispheric asymmetry in ocean change and the productivity of ecosystem sentinels. *Science* **372**, 980–983 (2021).
96. Lascelles, B. G. *et al.* Applying global criteria to tracking data to define important areas for marine conservation. *Diversity and Distributions* **22**, 422–431 (2016).
97. Waliczky, Z. *et al.* Important Bird and Biodiversity Areas (IBAs): their impact on conservation policy, advocacy and action. *Bird Conservation International* **29**, 199–215 (2019).
98. Miljøverndepartementet. Meld. St. 10 (2010–2011). Regjeringen.no <https://www.regjeringen.no/no/dokumenter/meld-st-10-2010-2011/id635591/> (2011).
99. Miljøverndepartementet. Meld. St. 37 (2012–2013). Regjeringen.no <https://www.regjeringen.no/no/dokumenter/meld-st-37-20122013/id724746/> (2013).
100. miljødepartementet, K. Meld. St. 35 (2016–2017). Regjeringen.no <https://www.regjeringen.no/no/dokumenter/meld.-st.-35-20162017/id2547988/> (2017).
101. miljødepartementet, K. Meld. St. 20 (2019–2020). Regjeringen.no <https://www.regjeringen.no/no/dokumenter/meld.-st.-20-20192020/id2699370/> (2020).
102. miljødepartementet, K. Meld. St. 21 (2023–2024). Regjeringen.no <https://www.regjeringen.no/no/dokumenter/meld.-st.-21-20232024/id3032474/> (2024).
103. Zimmermann, F. *et al.* Survey of Iceland scallop beds north of Svalbard - Survey number 2022839. Survey of Iceland scallop beds north of Svalbard - Survey number 2022839 (2023).
104. Meld. St. 8 (2021–2022). Regjeringa.no <https://www.regjeringen.no/nn/dokumenter/meld.-st.-8-20212022/id2903591/> (2022).
105. Meld. St. 11 (2022–2023). Regjeringa.no <https://www.regjeringen.no/nn/dokumenter/meld.-st.-11-20222023/id2965906/> (2023).
106. fiskeridepartementet, N. Meld. St. 10 (2023–2024). Regjeringa.no <https://www.regjeringen.no/nn/dokumenter/meld.-st.-10-20232024/id3028775/> (2024).
107. Solberg, E. Norway's Prime Minister: Ocean science can boost jobs and wellbeing. *Nature* **588**, 9–9 (2020).

## Appendix I – Scoring of Individual Sites and Areas According to the IUCN Site-Level Assessment tool

Stabsete/Svetlingene (Egersund municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			
3	The site is a geographically defined area	Y	2.94 km <sup>2</sup> , not in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available at: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge <sup>2-4</sup> . Shell sand and Kelp forest are registered <sup>5,6</sup> . Kelp forests are highly productive systems that provide a home for a huge variety of different species. Shell sand acts as spawning and nursery grounds for several species of fish and large crustaceans use shell sand banks for breeding, molting and to find food <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. This reserve is located within a kelp harvest area. The management of kelp harvesting is area-based where allocated harvesting areas are open for one year with a fallow period of four years to allow recovery <sup>8</sup> . IMR is regularly monitoring kelp harvesting fields and found that kelp density was low and kelp vegetation underdeveloped in this field <sup>9</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	<i>In situ</i> conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup>

8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>2</sup>
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Oslo (inner Oslofjord)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			
3	The site is a geographically defined area	Y	9.60 km <sup>2</sup> , in network with other lobster reserves (potential OECMs). This site also includes Kavringen nature reserve, Bleikøya nature reserve and Galteskjær biotope protection area (Seabird reserves). Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobster are based on local knowledge and surveys conducted by Marinreparatørene. However, there are few lobsters in the area and few places with suited habitat <sup>16</sup> . This site is also part of national important cod spawning ground (IMR, map: fiskeridir.no). However, beach-sein surveys from inner Oslofjord have not reported any cod the last few years <sup>17</sup> . Includes breeding sites for herring gull (VU), lesser black-backed gull, common gull (VU) and common eider (VU) <sup>18-20</sup> . Several locally important soft-bottom areas inside this site <sup>21</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Physical disturbances, overfishing, eutrophication, and environmental toxins are huge threats in this area and the inner Oslofjord is classified as having “poor ecological status”. Parts of this area is a closed basin with low O <sub>2</sub> concentrations on depths below 23 m. The seafloor is covered with anthropogenic material and litter. The benthic fauna is in moderate to poor conditions in the inner Oslofjord, Oslo havn and Bunnefjorden <sup>22,23</sup> . To improve the state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> . There are also several restoration projects going on to improve and re-establish marine biological diversity <sup>25</sup> . Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway <sup>26</sup> , there is

			now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve <sup>27</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area and from 01.01 – 30.04 all fishing activities in this area are prohibited.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28,29</sup>  In the seabird reserves a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07) <sup>30-32</sup>
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>33</sup>

Drøbaksundet (Asker and Frogn municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			
3	The site is a geographically defined area	Y	0.84 km <sup>2</sup> , not in network with other potential OECMs or MPAs. This site also includes Småskjæret wildlife protected area and Storskjær nature reserve. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no.
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge and surveys conducted by Marinreparatørene <sup>34</sup> . This site is also part of a locally important cod spawning ground (IMR, map: fiskeridir.no). At this site there is a sill that separates inner and outer Oslofjord. Beach-sein surveys from inner Oslofjord have not reported any cod the last few years, and only a few individuals outside this sill <sup>17</sup> . There is documented a rich flora and fauna on and around the “Drøbaksjetty” inside

			<p>this reserve. Rich communities with current-adapted species are found here. The strong and regular current in this area provides food and oxygen and prevents sedimentation. The lush kelp forest found around the jetty is rarely seen in other parts of Oslofjorden<sup>35</sup>. Includes breeding sites for Common gull (VU), Black-headed gull (CR), Herring gull (VU) and Lesser black-backed gull<sup>20,36,37</sup>.</p>
5	Institutions or mechanisms exist to govern and manage the site	Y	<p>Physical disturbances, overfishing, eutrophication, and environmental toxins are huge threats in this area and classified as having “moderate” ecological status<sup>38</sup>. Negative trend in macroalgal growth reported, which likely is caused by darker coastal water, as a result of eutrophication<sup>22</sup>. To improve state of the environment in Oslofjorden, an action plan has been developed<sup>24</sup>. Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway<sup>26</sup>, there is now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve<sup>27</sup>.</p>
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	<p>Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves<sup>10–13</sup>. This lobster reserve was established in 2021, but already shows positive effects on local lobster demography<sup>39</sup>. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species<sup>10,11</sup>. There is also a year around ban on fishing cod in this area and from 01.01 – 30.04 all fishing activities in this area are prohibited.</p>
7	In situ conservation of important biodiversity values is expected to be for long term	Y	<p>Fishing regulations are law bound and long-term<sup>14,28,29</sup></p> <p>In the seabird reserves a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07)<sup>40,41</sup>.</p>
8	Governance and management arrangements address equity considerations	Y	<p>Fishing is regulated by the Marine Resource Act<sup>15</sup>, but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered<sup>42</sup>.</p>

Langåra (Asker municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			
3	The site is a geographically defined area	Y	1.97 km <sup>2</sup> , in network with other lobster reserves (potential OECMs). Includes Terneholmen nature reserve. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobster and suited habitat are based on local knowledge and surveys conducted by Marinreparatørene <sup>43</sup> . This site is also part of a national important cod spawning ground (IMR, map: fiskeridir.no). However, beach-sein surveys from inner Oslofjord have not reported any cod the last few years <sup>17</sup> . Includes breeding sites for Herring gull (VU) <sup>20,44</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Physical disturbances, overfishing, eutrophication and environmental toxins are huge threats in this area and is classified as having “moderate” ecological status <sup>23</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> . Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway <sup>26</sup> , there is now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve <sup>27</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area and from 01.01 – 30.04 all fishing activities in this area are prohibited.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28,29</sup>  In the seabird reserves a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07) <sup>45</sup>

8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .
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Son (Vestby municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			
3	The site is a geographically defined area	Y	1.57 km <sup>2</sup> , in network with other potential OECMs or MPAs. Includes Nordre Sauholmen bird sanctuary. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters are based on local knowledge. Several regionally important eelgrass beds are reported inside this site <sup>46</sup> . Larger eelgrass beds are uncommon and is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> . Includes breeding sites for Black-headed gull (CR), Common gull (VU) and Common tern (EN) <sup>47</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Physical disturbances, overfishing, eutrophication and environmental toxins are huge threats in this area and is classified as having "moderate" ecological status and "poor" chemical status <sup>48</sup> . The invasive species <i>Gracilaria vermiculophylla</i> is found growing on the eelgrass <sup>49</sup> . This is a fast-growing species that can reduce growth and survival of eelgrass <sup>50</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> . Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway <sup>26</sup> , there is now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve <sup>27</sup> .



6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28,29</sup> .  In the seabird reserves a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07) <sup>51</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Mossesundet (Moss municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			
3	The site is a geographically defined area	Y	5.47 km <sup>2</sup> , in network with other potential OECMs or MPAs. Includes Eggholmen nature reserve. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters are based on local knowledge. Several nationally and regionally important eelgrass beds are registered <sup>52</sup> . Larger eelgrass beds are uncommon and is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> . Locally important soft-bottom areas are also registered inside this site <sup>53</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> . This site is also part of a locally important cod spawning ground (IMR, map: fiskeridir.no). Surveys from outer Oslofjord shows a drastic decline in cod population and has only found a few individuals during the fieldwork period the last years <sup>17</sup> . Includes breeding sites for Black-headed gull (CR), Common gull (VU), Common tern (EN) and Common eider (VU) <sup>54</sup> .

5	Institutions or mechanisms exist to govern and manage the site	Y	Physical disturbances, overfishing, eutrophication, and environmental toxins are huge threats in this area and is classified as having “moderate” ecological status and “poor” chemical status <sup>55</sup> . Ephemeral macroalgae were found in the meadows <sup>56</sup> . Dense aggregations of ephemeral algae is linked to eutrophication and may negatively affect eelgrass by reduced growth and increased mortality <sup>57,58</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> . Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway <sup>26</sup> , there is now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve <sup>27</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area and from 01.01 – 30.04 all fishing activities in this area are prohibited.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28,29</sup>  In the seabird reserves a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07) <sup>59</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Sandefjordsfjorden (Sandefjord municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup>
Full assessment			

3	The site is a geographically defined area	Y	1.53 km <sup>2</sup> , not in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters are based on local knowledge. Locally important soft-bottom areas are also registered inside this site <sup>60</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Physical disturbances, eutrophication and environmental toxins are huge threats in this area and is classified as having “moderate” ecological status and “poor” chemical status <sup>61</sup> . The inner part of this fjord has been one of the most polluted fjords in Norway considering environmental toxins in sediments. Through a clean-up project (Renere Sandefjordsfjord) contaminated sediments were dredged and deposited in a seabed landfill in the middle of the fjord. In addition, more than 1 km <sup>2</sup> has been covered up. Monitoring shows no sign of decreased environmental toxins. Benthic fauna has started to recolonize the seabed <sup>62</sup> . In 2018, divers in Sandefjord also put out “lobster houses” and already on year after, they found large lobsters using these artificial houses <sup>63</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Sanvigdalsfjorden (Kristiansand municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA, however part of this reserve is inside Oksøy-Ryvingen protected landscape area which is reported to WDPA (IUCN V). Only the part of the reserve outside Oksøy-Ryvingen can be reported as an OECM.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	2.98 km <sup>2</sup> , partly overlaps with Oksøy-Ryvingen protected landscape area. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters are based on local knowledge. This area is also an important overwintering area for many seabirds <sup>64,65</sup> . Several smaller but locally important eelgrass beds are registered <sup>66</sup> . Eelgrass beds is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. The maritime activity in this area has been high for many years. Kristiansand municipality has previously reported high levels of environmental toxins. The cause is uncertain, but likely from diffuse runoff from different port activities and boat traffic. The inner parts of Sanvigdalsfjorden are classified as having "good" ecological status but "poor" chemical status. The outer parts have "moderate" ecological status and "poor" chemical status <sup>67</sup> . All municipalities must have a waste plan for ports that receive waste from leisure boats <sup>68</sup> . All the coastal municipalities connected to this fjord must also develop an action plan to reduce pollution <sup>69</sup> . Controls are conducted by the State Governor. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway <sup>26</sup> , there is now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve <sup>70</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on

			fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Karlsvigodden (Tønsberg municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	2.08 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. Important soft-bottom areas are also registered inside this site <sup>71</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .

7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Mulodden (Holmestrand municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	0.88 km <sup>2</sup> , boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. This site is also part of a locally important cod spawning ground (IMR, map: fiskeridir.no)
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Physical disturbances, overfishing, eutrophication, and environmental toxins are huge threats in this area is classified as having "moderate" ecological status and "poor" chemical status <sup>72</sup> . This site is also part of a locally important cod spawning ground (IMR, map: fiskeridir.no). Surveys from outer Oslofjord shows a drastic decline in cod population and has only found a few individuals during the fieldwork period the last years <sup>17</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on

			fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Skallefjorden and part of Blindleia (Lillesand municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.74 km <sup>2</sup> , not in network with other potential OECMs or MPAs. boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters are based on local knowledge. Several smaller but locally important eelgrass beds are registered <sup>73</sup> . Eelgrass beds is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> . This site also includes a regionally important cod spawning area (IMR, map: fiskeridir.no)
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. The company Green Bay has cleaned this reserve for lost fishing gear to reduce ghost-fishing inside the reserve. In parts of this site no fishing is allowed between 01.01 – 30.04 to protect cod in the spawning period.

6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,29</sup>
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Kleppeskjær (Lindesnes municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.30 km <sup>2</sup> , not in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Since 2011, IMR has monitored the lobster population in this area. In 2013 the lobster reserve was implemented, and the catch of lobster pr. trap (CPUE) is now significantly higher than in the control areas <sup>74</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster <sup>74</sup> . Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .



7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>75</sup> .

Bastøy (Horten municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA, however part of this reserve is inside Buvika/Rødskjær nature reserve which is reported to WDPA (IUCN IA). Only the part of the reserve outside this nature reserve can be reported as an OECM.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> . Important habitat for many bird species.
Full assessment			
3	The site is a geographically defined area	Y	3.20 km <sup>2</sup> , in network with other potential OECMs or MPAs. Partly overlaps with Buvika/Rødskjær nature reserve. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters are based on local knowledge. Important resting and feeding area for many bird species and harbor seals, breeding area for Great cormorants (NT) <sup>76,77</sup> . Several nationally important eelgrass beds <sup>78</sup> . Larger eelgrass beds are uncommon and is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> . Important soft-bottom areas are also registered inside this site <sup>79</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Physical disturbances, overfishing, eutrophication, and environmental toxins are huge threats in this area and is classified as having "moderate" ecological status and "poor" chemical status <sup>80</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> .

6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .  In the nature reserve a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07) <sup>81</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>75</sup> .

Byfjorden/Grisefjorden (Flekkefjord municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.65 km <sup>2</sup> , not in network with other potential OECCMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	U	Presence of lobsters and suited habitat are based on local knowledge. This site also includes a nationally important cod spawning area (IMR, map: fiskeridir.no). Several smaller but locally important eelgrass beds are registered <sup>82</sup> . Eelgrass beds is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> . These eelgrass beds were registered in 2009, and since then the seabed has been covered with sand as part of a restoration project and these habitats are likely not there anymore.
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.

			This fjord system has suffered a long-lasting input of inorganic and organic contaminants due to industrial activities and input of municipal waste. Between 12 and 20 m the water is anoxic, and the sediments consists of black sludge smelling of sulphide <sup>83,84</sup> . To reduce contamination and potential risks for the ecosystem, several restoration projects was initiated in August 2018. This included dredging of bottom sediments and covering the seabed with sand to isolate any residual of contamination
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	U	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . However, with anoxic conditions between 12 and 20 m this site might not be the best habitat for lobsters and many other marine species.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>85</sup> .

Sparholmene (Kvitsøy municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	0.57 km <sup>2</sup> , partly overlap with SVO, nearby Heglane and Eime wildlife protected area. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. Large shell sand deposits and kelp forest are registered <sup>86,87</sup> . Kelp forests are highly productive systems that provide a home for a huge variety of different species. Shell sand acts as spawning and nursery grounds for several species of fish and large crustaceans use shell sand

			banks for breeding, molting and to find food <sup>7</sup> . This site which partly overlaps with Boknafjorden and Jærstrendene SVO is also an important feeding and breeding area for many seabirds and harbor seals <sup>88</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Monitoring of lobster population is conducted by local fishers in collaboration with IMR. A local organization is also running a lobster hatchery and put out fry in the reserve to help increase the lobster population (Kvitsøy municipality). This site is inside kelp harvesting fields <sup>9</sup> . In harvested areas, feeding and nursery grounds of coastal predatory fish are removed, which in turn may lead to negative effects on local food webs including top predators such as seabirds. Lorentsen et al. <sup>89</sup> found that kelp harvesting affected fish abundance and diminished seabird foraging efficiency. The management of kelp harvesting is area-based where allocated harvesting areas are open for one year with a fallow period of four years to allow recovery <sup>8</sup> . Fishing gear used to harvest kelp is not allowed inside the lobster reserve, but there are no regulations outside the reserve.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>90</sup> .

Nesoddtangen (Nesodden municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	2.05 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge and surveys conducted by Marinreparatørene. Since 2017, Marinreparatørene has monitored this site and reported increasing lobster population inside the reserve compared to control areas <sup>16</sup> . This site is also part of national important cod spawning ground (IMR, map: fiskeridir.no). However, beach-sein surveys from inner Oslofjord have not reported any cod the last few years <sup>17</sup> . A smaller locally soft bottom area is also registered <sup>91</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Physical disturbances, overfishing, eutrophication, and environmental toxins are huge threats in this area and is classified as having “moderate” ecological status and “poor” chemical status. The benthic fauna is in moderate to poor conditions in the inner Oslofjord, Oslo havn and Bunnefjorden <sup>22,23</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> . Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . Marinreparatørene has reported an increase in lobster population inside this reserve compared to control areas. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area and from 01.01 – 30.04 all fishing activities in this area are prohibited.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28,29</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest

		organizations and other interested parties has been considered <sup>42</sup> .
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Valberg (Kragerø municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.57 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. Monitoring is conducted by Kragerø Maritime Camp School and has shown positive results compared to control sites <sup>92</sup> . Several important eelgrass beds <sup>93,94</sup> and soft bottom areas <sup>95</sup> are registered. Eelgrass beds is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide. Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Eutrophication and environmental toxins are threats in this area and is classified as having “moderate” ecological status and “poor” chemical status. In the inner parts of the fjord the water becomes anoxic between 9 and 14 m, and the sediments consists of black sludge smelling of sulphide <sup>96</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . Citizen science projects has reported positive effects on lobster population inside this reserve <sup>92</sup> . Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . Ther is also a year around ban on fishing cod in this area.

7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Stauper (Tønsberg municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	6.61 km <sup>2</sup> , in network with other potential OECMs or MPAs. Langskjærene nature reserve lies inside this reserve and is reported to WDPA (IUCN IA). Area with overlap cannot be reported as an OECM. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. Includes breeding area for Black guillemot (NT) <sup>97</sup> . Locally important soft-bottom areas are reported <sup>98</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . Citizen science projects has reported positive effects on lobster population inside this reserve <sup>92</sup> . Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .

8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .
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Risør (Risør municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	0.61 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge <sup>99</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Monitoring of lobster population is conducted by local fishers in collaboration with IMR.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . Local fishers have also reported positive effects on lobster population inside the reserve. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .



Gåsøya (Bærum municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> . Important area for seabirds.
Full assessment			
3	The site is a geographically defined area	Y	4.53 km <sup>2</sup> , in network with other potential OECMs or MPAs. This site includes Mellemskjær nature reserve (IUCN IA) and Terneskjær nature reserve (IUCN IA). Areas with overlap cannot be reported as OECM. Boundaries delineated by several GPS-coordinates Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge and surveys conducted by marinreparatørene <sup>100</sup> . This site is also part of national important cod spawning ground (IMR, map: fiskeridir.no). However, beach-sein surveys from inner Oslofjord have not reported any cod the last few years <sup>17</sup> . Includes breeding sites for herring gull (VU), common eider (VU) Lesser black-backed gull. There are also a few breeding black-headed gull (CR) and Common tern (EN) <sup>20</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Physical disturbances, overfishing, eutrophication and environmental toxins are huge threats in this area and is classified as having “moderate” ecological status <sup>23</sup> . To improve state of the environment in Oslofjorden, an action plan has been developed <sup>24</sup> . Implemented fishing regulations are law bound and long-term. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Populations of many seabird species is declining and based on studies conducted by BirdLife Norway <sup>26</sup> there is now an ongoing local hearing to expand the period where there is a ban on all traffic on land and sea inside the reserve <sup>27</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area and from 01.01 – 30.04 all fishing activities in this area are prohibited.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28,29</sup> .  In the seabird reserves a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 15.07) <sup>101,102</sup> .

8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .
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Indre Larviksfjorden (Larvik municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.82 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates Map available: fiskeridir.no, naturbase.no.
4	The site is <i>confirmed</i> to support important biodiversity values	U	Presence of lobsters and suited habitat are based on local knowledge.
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Physical disturbances, overfishing, eutrophication, and environmental toxins are threats in this area and ecological status is classified as "moderate" based on visibility depth and nitrate. The content of organic carbon in the sediment is high and corresponded to "very poor" conditions, and during sampling it was noted that the sediment smelled of hydrogen sulphide (H <sub>2</sub> S). The oxygen content of the bottom water was high at the time of sampling, corresponding to very good status. Soft-bottom fauna and phosphor cons. Classified as good, Chl a ammonium and total nitrogen classified as very good. Chemical status is classified as very poor due to excesses of several substances, e.g. PAH compounds and TBT <sup>103</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area.

7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Malmøya (Larvik municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA. Partial overlap with Malmøya natur reserve reported to WDPA (IUCN IA). Areas with overlap cannot be reported as OECM. Partial overlap with Ytre Oslofjord SVO, not reported to WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.38 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. Some locally important soft-bottom areas are registered <sup>104</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> . This site partly overlaps with Ytre Oslofjord SVO which also is important feeding and breeding area for many seabirds and harbor seals <sup>88</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Physical disturbances, overfishing, eutrophication, and environmental toxins are threats in this area and ecological status is classified as “moderate” based on visibility depth and nitrate. The content of organic carbon in the sediment is high and corresponded to “very poor” conditions, and during sampling it was noted that the sediment smelled of hydrogen sulphide (H <sub>2</sub> S). The oxygen content of the bottom water was high at the time of sampling, corresponding to very good status. Soft-bottom fauna and phosphor cons. Classified as good, Chl a ammonium and total nitrogen classified as very good. Chemical status is classified as very poor due to excesses of several substances, e.g. PAH compounds and TBT <sup>103</sup> .

6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in this area.
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Hetta (Larvik municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA. Overlaps with Ytre Oslofjord SVO, not reported to WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	1.38 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. This site overlaps with Ytre Oslofjord SVO which also is important feeding and breeding area for many seabirds and harbor seals <sup>88</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on

			fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in part of this reserve (see map: fiskeridir.no).
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Kjørtingen (Larvik municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> .
Full assessment			
3	The site is a geographically defined area	Y	0.22 km <sup>2</sup> , in network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	U	Presence of lobsters and suited habitat are based on local knowledge. A smaller, locally soft-bottom area is registered <sup>105</sup> . Soft-bottom areas are important source of food for many bird and fish species <sup>7</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10–13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> . There is also a year around ban on fishing cod in part of this reserve (see map: fiskeridir.no).

7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14,28</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>42</sup> .

Stavanger og Hundvåg (Stavanger municipality)			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Lobster reserve, not reported to the WDPA. Includes Little Marøy nature reserve, reported to WDPA (IUCN IA). Areas with overlap cannot be reported as OECM.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Lobsters, listed as VU on the Norwegian Red List for species <sup>1</sup> . Breeding area for seabirds.
Full assessment			
3	The site is a geographically defined area	Y	23.16 km <sup>2</sup> and is the largest lobster reserve so far. In network with other potential OECMs or MPAs. Boundaries delineated by several GPS-coordinates Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Presence of lobsters and suited habitat are based on local knowledge. It has also been a popular site to fish different wrasse. This site is also part of a cod spawning area (IMR, map: fiskeridir.no. Several important eelgrass beds <sup>106</sup> , kelp forest and shell sand deposits are registered which creates varied and important habitat for a variety of species. Kelp forests are highly productive systems that provide a home for a huge variety of different species. Shell sand acts as spawning and nursery grounds for several species of fish and large crustaceans use shell sand banks for breeding, molting and to find food. Eelgrass beds is home to many specialized species. They are highly productive areas, nursery and feeding grounds for a range of species and are considered important marine ecosystems worldwide <sup>7</sup> . It is an important feeding, resting and overwintering area for seabirds <sup>107</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	Implemented fishing regulations are law bound and long-term. All but hook-and-line type fishing gear and purse seines, is prohibited. Control and surveillance conducted by the Directorate of Fisheries together with the coast guard and the Norwegian nature surveillance. Fishing, pollution, and toxic sediments from industry are huge treats in this area <sup>108,109</sup> reduce contamination and potential risks for the ecosystem, parts of the seabed in this area were covered up to isolate any residual of

			contamination <sup>110</sup> . In this area the invasive species <i>Didemnum vexillum</i> is found in large quantities <sup>111</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Implementation of these regulations has shown positive effects on lobster and wrasse populations in other lobster reserves <sup>10-13</sup> . There are no studies on effects from this site, and expected biodiversity outcomes is based on studies from other lobster reserves with the same regulations. Traps used to catch lobster is also used to catch crab, therefore several crab species is also benefitting from gear restrictions, although this is not reported. Restrictions on fishing gear will likely also give partial protection for other species <sup>10,11</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term <sup>14</sup> .  In the nature reserve a ban on all traffic on land and at sea inside the reserves are seasonal (15.04 – 01.08) <sup>112</sup> .
8	Governance and management arrangements address equity considerations	Y	Fishing is regulated by the Marine Resource Act <sup>15</sup> , but the Directorate of Fisheries has encouraged municipalities to participate in the process of establishing lobster reserves. Local open hearings have been held and input from interest organizations and other interested parties has been considered <sup>113</sup> .

Hola			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Coral reef protected area, not reported to WDPA. Inside Lofoten til Tromsøflaket SVO, not reported to WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Cold water coral reefs are complex and important habitats, promoting high diversity of invertebrates <sup>114,115</sup> and fish species <sup>116-118</sup> .
Full assessment			
3	The site is a geographically defined area	Y	Demarcations: straight lines drawn between several GPS-coordinates. Not in network with other potential OECMs or MPAs. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	This site is a biological hot spot with more than 300 D. <i>pertusum</i> ( <i>L. pertusa</i> ) (NT) reefs, and it is a very important spawning area for the North Atlantic cod <sup>119</sup> . Hola holds a genuine collection of elongated coral reefs of various shapes and an extraordinary geology. In addition, one of the coral reefs at this site is continuously monitored and has nationally importance for research <sup>120</sup> . This site is also important spawning areas for the Northeast Arctic saithe, Northeast Arctic haddock, Atlantic herring, Norway pout, and the endangered Golden redfish (IMR, map: fiskeridir.no) <sup>121</sup> . This site is also inside Lofoten til Tromsøflaket SVO and is important feeding and overwintering areas for many marine mammals and seabirds <sup>88</sup> .

5	Institutions or mechanisms exist to govern and manage the site	Y	A major threat to these cold-water coral reefs is bottom contact fishing gear. The implemented fishing regulations are law bound and long-term. All use of fishing gear that are dragged along the bottom, as well as gillnets, long-lines and traps is prohibited. However, bottom trawling is occurring right outside the protected area. Bottom trawling causes resuspension of large amounts of sediments and may cause smothering of organisms. Studies has shown that <i>D. pertusum</i> ( <i>L. pertusa</i> ) handles light sediment loads, but polyps start to die if they are covered by thicker sediments <sup>122</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Research from other coral protected areas with the same regulations has shown higher species richness and abundance inside the PA compared to areas impacted by fishing activities. The average fish density was higher in the intact coral habitats and recovery of <i>D. pertusum</i> ( <i>L. pertusa</i> ) were seen after 10 years of protection <sup>123</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term. It is forbidden to intentionally destroy coral reefs, and special care must be taken if bottom trawling activities occur in areas with known coral reefs. Fishers that come across coral reefs and get coral bycatch, must stop fishing and move away from the site <sup>28</sup> . There are special regulations inside coral protected areas <sup>124</sup> .
8	Governance and management arrangements address equity considerations	Y	Local hearings have been held and input from interest organizations and other interested parties has been considered <sup>125</sup> .

Midsundrevet			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Coral reef protected area, not reported to WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Cold water coral reefs are complex and important habitats, promoting high diversity of invertebrates <sup>114,115</sup> and fish species <sup>116-118</sup> .
Full assessment			
3	The site is a geographically defined area	Y	Demarcations: straight lines drawn between several GPS-coordinates. Not in network with other potential OECMs or MPAs. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Several colonies of both white and orange <i>D. pertusum</i> ( <i>L. pertusa</i> ) (NT) on approx. 80 m depth. Several individuals of <i>Paragorgia arborea</i> (NT) is also documented on this site. Smaller colonies of <i>D. pertusum</i> is also growing on the walls. On the walls, many types of hard-bottom sponge aggregations and crinoids were found. On the seabed, larger occurrences of sea cucumbers, deeplet sea anemones ( <i>Bolocera tuedidae</i> ) and <i>Pandalus</i> spp. were observed in



			addition to scattered occurrences of <i>Virgularia mirabilis</i> and <i>Funiculina quadrangularis</i> <sup>120,126</sup> . This site is also part of a locally important cod spawning area (IMR, map: fiskeridir.no). This area is also an important area for seabirds and otters <sup>127</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	A major threat to these cold-water coral reefs is bottom contact fishing gear. The implemented fishing regulations are law bound and long-term. All use of fishing gear that are dragged along the bottom, as well as gillnets, long-lines and traps is prohibited. There is a quarry (Norsk Stein AS) nearby and there has been concerns that emissions and diffuse runoff will negatively affect organisms in this area. Surveys conducted in 2014 showed little to no sedimentation on corals in this area <sup>126</sup> .
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Research from other coral protected areas with the same regulations has shown higher species richness and abundance inside the PA compared to areas impacted by fishing activities. The average fish density was higher in the intact coral habitats and recovery of <i>D. pertusum</i> ( <i>L. pertusa</i> ) were seen after 10 years of protection <sup>123</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term. It is forbidden to intentionally destroy coral reefs, and special care must be taken if bottom trawling activities occur in areas with known coral reefs. Fishers that come across coral reefs and get coral bycatch, must stop fishing and move away from the site <sup>28</sup> . There are special regulations inside coral protected areas <sup>124</sup> .
8	Governance and management arrangements address equity considerations	Y	Local hearings have been held and input from interest organizations and other interested parties has been considered <sup>125</sup> .

Straumsneset			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Coral reef protected area, not reported to WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Cold water coral reefs are complex and important habitats, promoting high diversity of invertebrates <sup>114,115</sup> and fish species <sup>116–118</sup> .
Full assessment			
3	The site is a geographically defined area	Y	Demarcations: straight lines drawn between several GPS-coordinates. Map available: fiskeridir.no, naturbase.no
4	The site is <i>confirmed</i> to support important biodiversity values	Y	Larger occurrences of <i>D. pertusum</i> ( <i>L. pertusa</i> ) (VU) colonies growing on the steep walls (wall reef). Larger occurrences of <i>Madrepora oculata</i> is also registered. Wall reefs are not well represented or documented, and this reef

			is located inside a fjord isolated from other reefs in the open ocean <sup>120</sup> . Rich communities of associated megafauna, including the bivalve <i>Acesta excavata</i> , sponges <i>Geodia</i> sp. and <i>Mycale lingua</i> , and octocorals <i>Paragorgia arborea</i> , <i>Primnoa resedaeformis</i> , <i>Paramuricea placomus</i> , and <i>Anthothela grandiflora</i> is also found here <sup>128</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	A major threat to these cold-water coral reefs is bottom contact fishing gear. The implemented fishing regulations are law bound and long-term. All use of fishing gear that are dragged along the bottom, as well as gillnets, long-lines, traps and all other hook and line fishing gear is prohibited. There are two fish farms approx. 1.6 km from this site and emissions of inorganic nutrients and organic materials from nearby fish farms can negatively affect corals <sup>129</sup> . However, Juva et al. <sup>128</sup> reported that these coral habitats were in good condition.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Research from other coral protected areas with the same regulations has shown higher species richness and abundance inside the PA compared to areas impacted by fishing activities. The average fish density was higher in the intact coral habitats and recovery of <i>D. pertusum</i> ( <i>L. pertusa</i> ) were seen after 10 years of protection <sup>123</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term. It is forbidden to intentionally destroy coral reefs, and special care must be taken if bottom trawling activities occur in areas with known coral reefs. Fishers that come across coral reefs and get coral bycatch, must stop fishing and move away from the site <sup>28</sup> . There are special regulations inside coral protected areas <sup>124</sup> .
8	Governance and management arrangements address equity considerations	Y	Local hearings have been held and input from interest organizations and other interested parties has been considered <sup>125</sup> .

Nakken v/Huglo			
No.	Criteria	Response (Y, N, U)	Justification
Screening assessment			
1	The site is not a protected area (PA)	Y	Designation: Coral reef protected area, not reported to WDPA.
2	There is a reasonable likelihood that the site supports important biodiversity values	Y	Cold water coral reefs are complex and important habitats, promoting high diversity of invertebrates <sup>114,115</sup> and fish species <sup>116–118</sup> .
Full assessment			
3	The site is a geographically defined area	Y	Demarcations: straight lines drawn between several GPS-coordinates. Map available: fiskeridir.no, naturbase.no

4	The site is <i>confirmed</i> to support important biodiversity values	Y	Bank reef with particularly many live <i>D. pertusum</i> (L. <i>pertusa</i> ) (VU) on depths between 200-220 m <sup>120</sup> . Rich communities of associated megafauna, including the bivalve <i>Acesta excavata</i> , sponges <i>Geodia</i> sp. and <i>Mycale lingua</i> , and octocorals <i>Paragorgia arborea</i> , <i>Primnoa resedaeformis</i> , <i>Paramuricea placomus</i> , and <i>Anthothela grandiflora</i> is also found here <sup>128</sup> .
5	Institutions or mechanisms exist to govern and manage the site	Y	A major threat to these cold-water coral reefs is bottom contact fishing gear. The implemented fishing regulations are law bound and long-term. All use of fishing gear that are dragged along the bottom, as well as gillnets, long-lines, traps and all other hook and line fishing gear is prohibited.
6	Governance and management of the site achieve or are expected to achieve the <i>in situ</i> conservation of important biodiversity values	Y	Research from other coral protected areas with the same regulations has shown higher species richness and abundance inside the PA compared to areas impacted by fishing activities. The average fish density was higher in the intact coral habitats and recovery of <i>D. pertusum</i> (L. <i>pertusa</i> ) were seen after 10 years of protection <sup>123</sup> .
7	In situ conservation of important biodiversity values is expected to be for long term	Y	Fishing regulations are law bound and long-term. It is forbidden to intentionally destroy coral reefs, and special care must be taken if bottom trawling activities occur in areas with known coral reefs. Fishers that come across coral reefs and get coral bycatch, must stop fishing and move away from the site <sup>28</sup> . There are special regulations inside coral protected areas <sup>124</sup> .
8	Governance and management arrangements address equity considerations	Y	Local hearings have been held and input from interest organizations and other interested parties has been considered <sup>125</sup> .

## Appendix I References

1. Tandberg, A. H. S. *et al.* *Krepsdyr: Vurdering av hummer Homarus gammarus for Norge. Rødlista for arter 2021. Artsdatabanken.* <http://www.artsdatabanken.no/lister/rodlisterforarter/2021/14133> (2021).
2. Høring - Forslag til fredningsområder for hummer i Eigersund kommune. 9 (2021).
3. Kleiven, A. R. SVAR – HØRING – FORSLAG TIL FREDNINGSSOMRÅDER FOR HUMMER I EIGERSUND KOMMUNE.
4. Kristiansen, K. R. Uttale til høring av fredningsområder for hummer ved Sundsgapsholmen, Svåholmen eller Sabbsete og Svettingene, i Eigersund kommune.
5. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00102233>.
6. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00102260>.
7. Direktoratet for naturforvaltning. Kartlegging av marint biologisk mangfold. DN Håndbok 19-2001 Revidert 2007. (2007).
8. Forskrift om høsting av tang og tare. *Forskrift om høsting av tang og tare. FOR-1995-07-13-642.* (1995).
9. Steen, H. *Tilstandsvurdering av Høstefelt for Stortare i Rogaland og Vestland i 2021.* 25 <https://www.hi.no/templates/reporteditor/report-pdf?id=48098&62625541> (2021).
10. Moland, E. *et al.* Lobster and cod benefit from small-scale northern marine protected areas: inference from an empirical before–after control-impact study. *Proc. R. Soc. B Biol. Sci.* **280**, 20122679 (2013).
11. Moland, E. *et al.* Restoration of Abundance and Dynamics of Coastal Fish and Lobster Within Northern Marine Protected Areas Across Two Decades. *Front. Mar. Sci.* **8**, (2021).
12. Knutsen, J. A. *et al.* Lobster reserves as a management tool in coastal waters: Two decades of experience in Norway. *Mar. Policy* **136**, 104908 (2022).
13. Sørvalen, T. K., Halvorsen, K. T. & Olsen, E. M. Protection from fishing improves body growth of an exploited species. *Proc. R. Soc. B Biol. Sci.* **289**, 20221718 (2022).

14. *Forskrift om fredningsområder for hummer. FOR-2006-07-06-883.* (2006).
15. *Havressurslova. Lov om forvaltning av villlevende marine ressurser. LOV-2008-06-06-37.* (2009).
16. *Marinreparatørene. Hummerfredning i Oslo, utredning og forslag.* (2021).
17. *Espeland, S. H. & Knutsen, H. Rapport fra høstundersøkelsene med strandnot i indre og ytre Oslofjord 2022.* <https://www.hi.no/templates/reporteditor/report-pdf?id=70265&27772645> (2023).
18. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=VV00001616>.
19. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=VV00002792>.
20. *Fylkesmannen i Oslo og Akershus. Forvaltningsplan for sjøfuglreservatene i Oslo og Akershus.* <https://www.statsforvalteren.no/siteassets/fm-oslo-og-viken/miljo-og-klima/rapporter/miljovernavdelingen-i-oslo-og-akershus-rapporter/2012-forvaltningsplan-for-sjofuglreservatene.pdf> (2011).
21. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=BM00044501>.
22. *Salt rapport nr 1036. Kunnskapsstatus Oslofjorden.* <https://www.miljodirektoratet.no/globalassets/publikasjoner/m1556/m1556.pdf> (2019).
23. *Staalstrøm, A. et al. Undersøkelse av hydrografiske og biologiske forhold i Indre Oslofjord Årsrapport 2021. 98* (Norsk institutt for vannforskning, 2022).
24. *Miljødirektoratet. Helhetlig plan for Oslofjorden. Ren og rik Oslofjord med et aktivt friluftsliv.* (2019).
25. *Rinde, E. et al. Reetablering av biologisk mangfold i Oslos urbane sjøområder. 68* (Norsk institutt for vannforskning, 2019).
26. *Helberg, M., Molværsmyr, S. & Ranke, P. S. Variasjon i hekketidspunkt for ærfugl, måker og terner fra Svenskegrensen til og med Agder i perioden 2013-2022. 24.*
27. *Høring - Utvidelse av perioden med ferdselsforbud i verneområder for sjøfugl langs kysten i Oslo og Viken.*
28. *Høstingsforskriften. Forskrift om gjennomføring av fiske, fangst og høsting av villlevende marine ressurser. FOR-2021-12-23-3910.* (2022).
29. *Forskrift om forbud mot fiske i gytefelt for torsk. FOR-2019-03-25-321.* (2019).
30. *Forskrift om Galteskjær biotopvernområde. Forskrift om Verneplan for Oslofjorden – delplan sjøfugl. Vedlegg 59. Vern av Galteskjær biotopvernområde, Oslo kommune, Oslo. FOR-2009-06-19-767.* (2009).
31. *Forskrift om naturreservat, Oslo. Forskrift om fredning av Kavringen naturreservat, Oslo kommune, Oslo. FOR-1978-12-15-22.* (1979).
32. *Forskrift om Bleikøya naturreservat. Forskrift om supplerende vern for Oslofjorden, delplan Oslo og Akershus – Vedlegg 19 – Bleikøya naturreservat, Oslo kommune, Oslo. FOR-2008-06-27-685.* (2008).
33. *Høring, hummerfredningsområde i Oslo kommune.* (2022).
34. *Marinreparatørene. Hummerfredning i Asker syd (gamle Røyken og Hurum kommuner) utredning og forslag.* (2021).
35. *Walday, M. Biologiske registreringer på Drøbakgrunnen og jeteen ved hjelp av ROV i forbindelse med en utvidelse av skipsleden over Drøbakterskelen. 31* (Norsk institutt for vannforskning, 2002).
36. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=VV00002790>.
37. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=VV00000768>.
38. *Fagerli, C. W. et al. ØKOKYST – DP Skagerrak. Årsrapport 2018.* (Norsk institutt for vannforskning, 2019).
39. *Vold, M. Short-term effects of a marine sanctuary on the local lobster population in the Oslo fjord, Norway.* (Norwegian University of Life Sciences, Ås, 2022).
40. *Forskrift om Småskjær fuglefredningsområde. Forskrift om Verneplan for Oslofjorden – delplan sjøfugl. Vedlegg 56. Fredning av Småskjær fuglefredningsområde, Frogn kommune, Akershus. FOR-2009-06-19-764.* (2009).
41. *Forskrift om naturreservat, Hurum. Forskrift om fredning av Storskjær naturreservat, Hurum kommune, Buskerud. FOR-1978-12-15-42.* (1979).
42. *Ønsker at flere kommuner etablerer nye fredningsområder for hummer. Fiskeridirektoratet* <https://www.fiskeridir.no/Fritidsfiske/Arter/Hummarfiske/Frednings-og-bevaringsomraade/OEsker-at-flere-kommuner-etablerer-nye-fredningsomraader-for-hummer>.
43. *Marinreparatørene. Hummerfredning i Asker kommune, utredning og forslag.* (2020).
44. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=VV00001631>.
45. *Forskrift om naturreservat, Asker. Forskrift om fredning av Terneholmen naturreservat, Asker kommune, Akershus. FOR-1978-12-15-26.* (1979).
46. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=BM00058873>.
47. *Naturbase faktaark.* <https://faktaark.naturbase.no/?id=VV00002798>.
48. *VannNett-Portal.* <https://vann-nett.no/portal/#/waterbody/0101020300-2-C>.

49. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00058873>.
50. Martínez-Lüscher, J. & Holmer, M. Potential effects of the invasive species *Gracilaria vermiculophylla* on *Zostera marina* metabolism and survival. *Mar. Environ. Res.* **69**, 345–349 (2010).
51. Forskrift om Nordre Sauholmen fuglefredningsomr. *Forskrift om Verneplan for Oslofjorden – delplan sjøfugl. Vedlegg 62. Fredning av Nordre Sauholmen fuglefredningsområde, Vestby kommune, Akershus. FOR-2009-06-19-770.* (2009).
52. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00058889>.
53. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00080724>.
54. Naturbase faktaark. <https://faktaark.naturbase.no/?id=VV00000802>.
55. VannNett-Portal. <https://vann-nett.no/portal/#/waterbody/0101020400-3-C>.
56. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00058889>.
57. Hauxwell, J., Cebrián, J., Furlong, C. & Valiela, I. Macroalgal Canopies Contribute to Eelgrass (*Zostera Marina*) Decline in Temperate Estuarine Ecosystems. *Ecology* **82**, 1007–1022 (2001).
58. Holmer, M. & Nielsen, R. M. Effects of filamentous algal mats on sulfide invasion in eelgrass (*Zostera marina*). *J. Exp. Mar. Biol. Ecol.* **353**, 245–252 (2007).
59. Forskrift om Eggholmen naturreservat. *Forskrift om Verneplan for Oslofjorden – delplan sjøfugl. Vedlegg 88. Fredning av Eggholmen naturreservat, Moss kommune, Østfold. FOR-2009-06-19-796.* (2009).
60. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00078627>.
61. VannNett-Portal. <https://vann-nett.no/portal/#/waterbody/0101040200-1-C>.
62. COWI. *Renere Sandefjordsfjord: Årsrapport overvåking av Sandefjordsfjorden i 2022.* [https://www.sandefjord.kommune.no/\\_f/p1/i569d4fa2-92ac-4dd3-bb18-ee043f0e6058/rapport\\_sandefjordsfjorden\\_2022\\_v2.pdf](https://www.sandefjord.kommune.no/_f/p1/i569d4fa2-92ac-4dd3-bb18-ee043f0e6058/rapport_sandefjordsfjorden_2022_v2.pdf) (2023).
63. Hummer flytter inn – Fjorden. <https://www.fjorden.org/2019/12/02/hummer-flytter-inn/>.
64. Fylkesmannen i Aust- og Vest-Agder. *Forvaltningsplan for sjøfuglreservatene i Vest-Agder. Rapport 3/2017.* (2017).
65. Olsen, K. & Helberg, M. *Overvåking av hekkende sjøfugl i Vest-Agders sjøfuglreservater 2017 – 2018.* (2018).
66. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00044079>.
67. VannNett-Portal. <https://vann-nett.no/portal/#/waterbody/0130000200-2-C>.
68. Forurensningsforskriften. *Forskrift om begrensning av forurensning. FOR-2004-06-01-931.* (2004).
69. VannNett-Portal. <https://vann-nett.no/portal/#/measuredetails/5103-2057-M>.
70. Høring - Utvidelse av perioden med ferdselsforbud i sjøfuglreservater og nasjonalparker for sjøfugl - Agder. (2023).
71. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00044536>.
72. VannNett-Portal. <https://vann-nett.no/portal/#/waterbody/0101021000-2-C>.
73. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00076257>.
74. Espeland, S., Kleiven, A., Sannaes, H. & Nillos-Kleiven, P. *AKTIV FORVALTNING AV MARINE RESSURSER - LOKALT TILPASSET FORVALTNING: LINDESNES Effekter på hummer i Klippeskjær bevaringsområde.* (2019). doi:10.13140/RG.2.2.25025.20325.
75. Kleiven, A. R., Bodvin, T. & Espeland, S. H. *Forslag til etablering av bevaringszone for hummer i Lindesnes.* [http://www.nfsf.no/dokumenter/130623\\_Vedlegg.pdf](http://www.nfsf.no/dokumenter/130623_Vedlegg.pdf).
76. Skagerrak Forlag og Fylkesmannen i Vestfold. *Natur i Vestfold - veiviser til naturvernområdene og Færder nasjonalpark.* (2014).
77. Naturbase faktaark. <https://faktaark.naturbase.no/?id=VV00000627>.
78. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00058859>.
79. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00061222>.
80. VannNett-Portal. <https://vann-nett.no/portal/#/waterbody/0101020200-2-C>.
81. Forskrift om naturreservat, Borre. *Forskrift om fredning for Buvika/Rødskjær naturreservat, Borre (Horten) kommune, Vestfold. FOR-1981-10-02-4746.* (1981).
82. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00057785>.
83. COWI. *TILTAKSPLANER FOR LOGA, GRISEFJORDEN OG TJØRSVÅGBUKTA I FLEKKEFJORD KOMMUNE.* (2014).
84. COWI. *Fjordundersøkelse Flekkefjord 2019.* (2019).
85. Høring, fredningsområder for hummer i Flekkefjord kommune. (2018).
86. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00102550>.
87. Naturbase faktaark. <https://faktaark.naturbase.no/?id=BM00102606>.
88. Eriksen, E., van der Meeren, G. I., Nilsen, B. M., von Quillfeldt, C. H. & Johnsen, H. *Særlig verdifulle og sårbare områder (SVOer) i norske havområder – miljøverdi. En gjennomgang av miljøverdier*

- og grenser i eksisterende SVO og forslag til nye områder. 308  
<https://www.hi.no/templates/reporteditor/report-pdf?id=45755&11100145> (2021).
89. Lorentsen, S.-H., Sjøtun, K. & Grémillet, D. Multi-trophic consequences of kelp harvest. *Biol. Conserv.* **143**, 2054–2062 (2010).
  90. Høring - Forslag om nytt fredningsområde for hummer ved Sparholmane i Kvitsøy kommune. (2017).
  91. Naturbase faktaark Nesodden. <https://faktaark.naturbase.no/?id=BM00044471>.
  92. Karlsen, E. Hummer forvaltning - Kragerø kommune. <https://www.kragero.kommune.no/tjenester/areal-bygg-bolig-eiendom-og-miljo/miljo-og-friluftsliv/hummer-forvaltning/>.
  93. Naturbase faktaark Kragerø. <https://faktaark.naturbase.no/?id=BM00076001>.
  94. Naturbase faktaark Ytre Karlstadkilen. <https://faktaark.naturbase.no/?id=BM00076003>.
  95. Naturbase faktaark Øygardenbukta. <https://faktaark.naturbase.no/?id=BM00080852>.
  96. COWI. *UNDERSØKELSE, RISIKOANALYSE OG TILTAKSPLAN FOR KALSTADKILEN, KRAGERØ KOMMUNE, 2018*. (2019).
  97. Naturbase faktaark Langskjærene naturreservat. <https://faktaark.naturbase.no/?id=VV00001595>.
  98. Naturbase faktaark Stauper. <https://faktaark.naturbase.no/?id=BM00078772>.
  99. Hedberg, G. Viktige hummerreservat. *Fiskeribladetfiskaren* (2010).
  100. Marinreparatørene. *Utredning, Fredningsområder for hummer, Bærum Kommune*. (2023).
  101. Forskrift om naturreservat, Bærum. *Forskrift om fredning av Terneskjær naturreservat, Bærum kommune, Akershus. FOR-1978-12-15-32*. (1979).
  102. Forskrift om naturreservat, Bærum. *Forskrifter om fredning for Mellemskjær naturreservat i Bærum kommune, Akershus. FOR-1978-12-15-31*. (1979).
  103. Borgersen, G. *Undersøkelse av bløtbunnsfauna i Vestfold og Telemark i 2020*. 21 (Norsk institutt for vannforskning, 2021).
  104. Naturbase faktaark Malmøya. <https://faktaark.naturbase.no/?id=BM00078575>.
  105. Naturbase faktaark Kjørtingen. <https://faktaark.naturbase.no/?id=BM00078377>.
  106. Naturbase faktaark Sandøyane. <https://faktaark.naturbase.no/?id=BM00128464>.
  107. Naturbase faktaark Litle Marøy naturreservat. <https://faktaark.naturbase.no/?id=VV00001736>.
  108. Stavanger havn: Opprydding i forurenset sjøbunn - Miljødirektoratet. *Miljødirektoratet/Norwegian Environment Agency* <https://www.miljodirektoratet.no/ansvarsomrader/vann-hav-og-kyst/forurenset-sjobunn/stavanger-havn/>.
  109. Knag, A. C., Kvalø, S. E., Torvanger, R. & Alme, Ø. *Miljøundersøkelse kystvann, Stavangerhalvøya 2017*. (2018).
  110. Multiconsult. *Overvåkingsplan etter tildekking av forurenset sjøbunn i Bangavågen*. (2022).
  111. Har du hørt om "havnespy"? Den fryktede arten finnes nå i Stavanger. *Statsforvalteren i Rogaland* <https://www.statsforvalteren.no/nb/Rogaland/Miljo-og-klima/Frammande-arter/marint-frammande-arter/har-du-hort-om-havnespy-den-fryktede-arten-finnes-na-i-stavanger/>.
  112. Forskrift om naturreservat, Stavanger. *Forskrift om fredning for Litle Marøy naturreservat, Stavanger kommune, Rogaland. FOR-1982-05-07-837*. (1982).
  113. Høring, forslag til hummerfredningsområder i Stavanger kommune. (2023).
  114. Buhl-Mortensen, P. & Fosså, J. Species diversity and spatial distribution of invertebrates on Lophelia reefs in Norway. *Proc. 10th Int. Coral Reef Symp.* (2006).
  115. Henry, L.-A. & Roberts, J. M. Biodiversity and ecological composition of macrobenthos on cold-water coral mounds and adjacent off-mound habitat in the bathyal Porcupine Seabight, NE Atlantic. *Deep Sea Res. Part Oceanogr. Res. Pap.* **54**, 654–672 (2007).
  116. Husebø, Å., Nøttestad, L., Fosså, J. H., Furevik, D. M. & Jørgensen, S. B. Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* **471**, 91–99 (2002).
  117. Costello, M. J. *et al.* Role of cold-water Lophelia pertusa coral reefs as fish habitat in the NE Atlantic. in *Cold-Water Corals and Ecosystems* (eds. Freiwald, A. & Roberts, J. M.) 771–805 (Springer, 2005). doi:10.1007/3-540-27673-4\_41.
  118. Kutti, T., Bergstad, O. A., Fosså, J. H. & Helle, K. Cold-water coral mounds and sponge-beds as habitats for demersal fish on the Norwegian shelf. *Deep Sea Res. Part II Top. Stud. Oceanogr.* **99**, 122–133 (2014).
  119. Bøe, R. *et al.* Cold-water coral reefs in the Hola glacial trough off Vesterålen, North Norway. *Geol. Soc. Lond. Mem.* **46**, 309–310 (2016).
  120. Fosså, J. H., Kutti, T., Buhl-Mortensen, P. & Skjoldal, H. R. *Vurdering av norske korallrev*. 65 S. <https://imr.brage.unit.no/imr-xmlui/handle/11250/2374385> (2015).
  121. Husa, V. *et al.* *MARINBIOLOGISK MANGFOLD I ANDFJORDEN MARINE VERNEOMRÅDE*. (2020). doi:10.13140/RG.2.2.12782.23362.

122. Larsson, A. I. & Purser, A. Sedimentation on the cold-water coral *Lophelia pertusa*: Cleaning efficiency from natural sediments and drill cuttings. *Mar. Pollut. Bull.* **62**, 1159–1168 (2011).
123. Buhl-Mortensen, P. Coral reefs in the Southern Barents Sea: habitat description and the effects of bottom fishing. *Mar. Biol. Res.* **13**, 1027–1040 (2017).
124. Forskrift om beskyttelse av korallrev. *Forskrift om beskyttelse av korallrev mot ødeleggelse som følge av fiskeriaktivitet. FOR-2016-01-08-8.* (2016).
125. HØRING, GJENNOMGANG AV OMRÅDER FOR BESKYTTELSE AV KORALLREV. (2015).
126. DNV-GL. *Undersøkelser av kaldtvannskoraller i Sandsfjorden. Rapportnr.2014-0703.* <https://www.statsforvalteren.no/siteassets/fm-rogaland/dokument-fmro/miljo/rapportar/rapport-2014-0703-dnv-undersoking-kaldtvannskoraller-sandsfjorden.pdf> (2014).
127. Naturbase faktaark Kjølvikskorpa naturreservat. <https://faktaark.naturbase.no/?id=VV00000820>.
128. Juva, K., Kutti, T., Chierici, M., Dullo, W.-C. & Flögel, S. Cold-Water Coral Reefs in the Langenuen Fjord, Southwestern Norway—A Window into Future Environmental Change. *Oceans* **2**, 583–610 (2021).
129. Kutti, T. *et al.* Fish farm effluents cause metabolic depression, reducing energy stores and growth in the reef-forming coral *Lophelia pertusa*. *Aquac. Environ. Interact.* **14**, 279–293 (2022).