

Ecosystem Status Summary

What is the Ecosystem Status Summary?

This ecosystem status summary gives an easy-to-access description of the current state and recent changes in the different components of the Norwegian Sea ecosystem while briefly discussing possible causes and consequences of these changes. It is updated annually and targets a wide audience including scientists, academics, decision-makers and the public.

How is it organised?

The summary is divided into three sections.

<p>Highlights</p> 	<p>Provide short statements about of the long-term developments in the ecosystem and the major changes observed recently in ocean climate, phytoplankton, zooplankton, pelagic fish, seabirds, and marine mammals.</p>
<p>Graphical Summary</p> 	<p>Provides condensed information on each ecosystem component - ocean climate, phytoplankton, zooplankton (biomass and distribution), pelagic fish (biomass and distribution), seabirds, and marine mammals. It summarizes overall trends, recent changes, the level of certainty in the observed changes, and the potential ecological or fisheries-related implications of these changes.</p>
<p>Extended summary</p> 	<p>Provides detailed information on each ecosystem component including illustrations. This section is based on peer-reviewed research. It describes current status and recent changes, and the possible reasons for these changes. The sections of the extended summary highlight how physical changes, biological processes, and human activities are connected.</p>

What information can you expect from it?

The ecosystem status summary provides a concise yet comprehensive overview of the Norwegian Sea ecosystem, including long-term trends and recent changes in ocean climate, plankton, pelagic fish, seabirds, and marine mammals. It combines highlights, tables, and detailed analyses to understand the drivers and the consequences of observed trends and recent changes in the state of the ecosystem. This document forms an up-to-date knowledge base to inform scientists, academics, decision-makers and the public about relevant ecosystem information for the Norwegian Sea.

Can it be useful to you?

The ecosystem status summary is useful if you are looking for an entry point to quickly understand the current status of the Norwegian Sea ecosystem, and how it has changed in the past. It helps understand how the different components of the system are connected, why changes are occurring, and what are their ecological and fisheries implications. The document relies on peer-reviewed science and on ecological indicators that are regularly updated. It constitutes a reliable and up-to-date source of information.

Ecological forecasts

What is an ecological forecast?

An ecological forecast is a prediction about the future state of an ecosystem. This prediction is for the near future (days to years) and can be compared to observations. An ecological forecast is for an ecosystem what a weather forecast is for the weather.

How does it work?

Ecological forecasts rely on three pillars: Data, Models, and Evaluation. The data provide the ground truthing. The models provide the ability to predict. The evaluation provides a way to identify useful and performant forecasts.

DATA	MODEL	EVALUATION
		
Repeated measurements of ecosystem properties. Data are available soon after observation. Data uncertainties are quantified.	A numerical model that can predict ecosystem properties in the near future. It is supported by causal understanding. It can be revised.	A method to assess the performance of the forecasts. Forecasts are evaluated against null models, against new observations, and for well-specified objectives.

Candidates for ecological forecasts in the Norwegian Sea

We have some understanding of processes that connect ocean circulation, plankton, and fish in the Norwegian Sea that could be used for forecasting¹. We know that the influx of subarctic waters from the East Icelandic Current to the southern Norwegian Sea affects the abundance of calanoid copepods, which are important food for herring. This, in turn, affects the feeding migration of Atlanto-Scandian herring. There are repeated observations of currents, plankton, and herring biomass available. A candidate for ecological forecast can be the prediction of herring spatial distribution and recruitment based on ocean circulation, 1-2 yr in advance.

Can it be useful to you?

Anticipating future ecological changes is important to take informed decisions, whether as a manager, fisher, adviser, conservation ecologist, etc. By engaging into discussions about forecasting, you can gain knowledge about forecasts, understand how they work and how reliable they are. You can help frame the next generation of forecasts products that best suit your needs.

¹ Kristiansen et al. 2019. <https://linkinghub.elsevier.com/retrieve/pii/S096706371830102X>,
 Kristiansen et al 2022. <https://www.frontiersin.org/articles/10.3389/fmars.2022.823006/full>
 Eliassen et al 2021 <https://www.frontiersin.org/articles/10.3389/fmars.2021.778725/full>

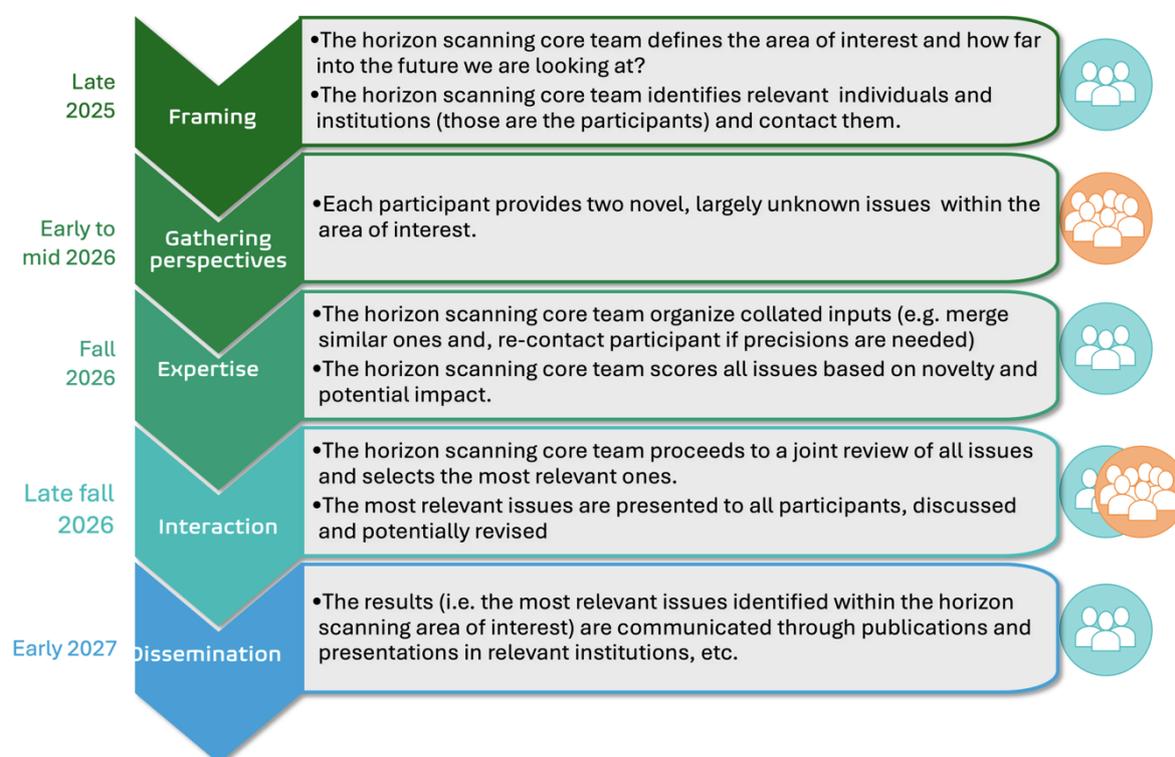
Horizon scanning

What is horizon scanning?

Horizon scanning is a systematic process for identifying emerging trends, opportunities, and threats that are not yet widely recognized or not yet on policy agendas. Horizon scanning is useful to anticipate future challenges and inform strategic decision-making. A horizon scanning is planned to support the Integrated Ecosystem Assessment for the Norwegian Sea.

How does it work?

A core team of scientists will organise the horizon scanning and will coordinate interactions among participants. Based on multiple participant's knowledge and perspectives, horizon scanning will identify emerging issues in the Norwegian Sea. The horizon scanning steps are provided below:



horizon scanning core team, participants outside the core team

Why should you participate?

Your perspective about the future is unique, built on a unique expertise and experience of the Norwegian Sea. The Horizon scanning provides a way to highlight important challenges that you see coming.

You will gain knowledge from other experts (manager, fisher, adviser, conservation ecologist, etc.) about emerging issues relevant for the Norwegian Sea.

Data use and protection: participants' names, contact and any other personal information will be protected and only accessible to the Horizon Scanning core team. Unless requested otherwise by the participants, their participation will be anonymised when disseminating the results.

IEA-explorer

What is the IEA-explorer?

The IEA-explorer is an interactive web-based tool. It is designed to visualise and download ecological time series that describe the past and current state of the Norwegian Sea ecosystem. The IEA explorer is currently a prototype.

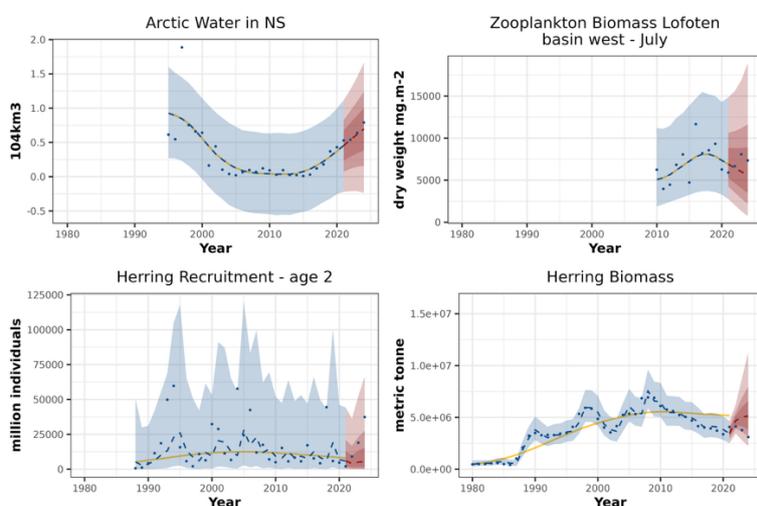
How does it work?

The screenshot shows the IEA Explorer interface. On the left is a map of the Norwegian Sea with latitude and longitude coordinates. Below the map are 'Select Categories' checkboxes for Climate, Ecological, Pressure, and Sector - Activity - Economy. On the right is a table of data series with columns for 'Full name', 'Unit', and 'Source'. A search bar and a 'Show 15 entries' dropdown are at the top right. Two series are selected: 'Zooplankton Biomass Lofoten basin west - July' and 'Herring Recruitment - age 2'.

Full name	Unit	Source
<input type="checkbox"/> Zooplankton Biomass Norwegian basin east - May	dry weight mg.m-2	
<input type="checkbox"/> Zooplankton Biomass Norwegian basin west - May	dry weight mg.m-2	
<input type="checkbox"/> Zooplankton biomass 4 polygons combined - July	dry weight mg.m-2	
<input type="checkbox"/> Zooplankton biomass Lofotofen basin east - July	dry weight mg.m-2	
<input checked="" type="checkbox"/> Zooplankton Biomass Lofoten basin west - July	dry weight mg.m-2	
<input type="checkbox"/> Zooplankton Biomass Norwegian basin east - July	dry weight mg.m-2	
<input type="checkbox"/> Zooplankton Biomass Norwegian basin west - July	dry weight mg.m-2	
<input checked="" type="checkbox"/> Herring Recruitment - age 2	million individuals	ICES Working Group on Widely Distributed Stocks. ICES advice 2023, Table 10.
<input type="checkbox"/> Blue whiting Recruitment - age 1	million individuals	ICES Working Group on Widely Distributed Stocks. ICES advice 2023, Table 10.
<input type="checkbox"/> Mackerel Recruitment - age 2	million individuals	ICES Working Group on Widely Distributed Stocks. ICES advice 2023, Table 10.

When opening the IEA-explorer¹ one can select the time-series of interest. These are grouped in 4 categories: climate, ecological, pressures, and sector-activity-economy. Each selected time-series can be plotted or downloaded.

What does the output mean?



Time-series are represented on standard graphs that visualise the original observations (blue dots), the underlying trend (yellow line), and the forecast intervals for recent years (red bands). Forecast bands represent what would be expected if the dynamics in recent years resembled that of the past. This is useful to alert about recent changes that depart from what would have been expected.

Can it be useful to you?

Studying the state of the ecosystem over multiple decades is important to identify dominant signals in ecosystem changes, and to interpret recent changes. With the IEA-explorer, you can quickly browse through past and recent changes of multiple facets of the Norwegian Sea ecosystem.

¹ https://tanguygen.shinyapps.io/shiny_wginor/

IEA-Oracle

What is the IEA-Oracle?

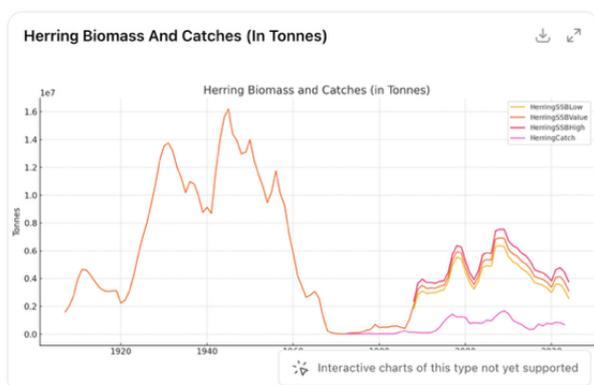
The IEA-Oracle is an AI-based tool. It relies on the large language model behind ChatGPT (OpenAI's GPT-5 as of August 2025). It is designed to provide accurate and reliable information about the past and current state of the Norwegian Sea ecosystem, based on the reported work done by the ICES WGINOR¹ working group. The current IEA-Oracle is a prototype.

How does it work?

The IEA-Oracle is accessible from the web: <https://chatgpt.com/g/g-HR32DzhpM-wginor-iea-oracle>. Like any other GPTs, the IEA-Oracle is addressed by asking questions in plain language (English or other). The key feature of the IEA-Oracle is that it will systematically prioritise information that originates from the ICES WGINOR group over any other type of information. This information is contained in the ICES WGINOR reports 2021-2025 and in an Excel document that compiles the WGINOR time series. The IEA-Oracle is instructed to answer only questions that are relevant to the Norwegian Sea and that can be addressed from this knowledge base.

What outputs can you expect?

Plot the data series for herring biomass and catches



Here is the complete plot for the data series on **herring biomass and catches** (in tonnes), using only variables that contain actual data:

You can expect to obtain text or graphical outputs. For example, if one asks for a summary of the current state of the Norwegian Sea ecosystem, the IEA-Oracle will return a text describing the main feature of the ecosystem based on the results from the most recent WGINOR report. Another example, if one asks for a plot of the herring biomass and catches, the IEA-Oracle will return a time-series plot of the relevant variables for the Norwegian Spring Spawning herring stock which is located in the Norwegian Sea.

Can it be useful to you?

The IEA-Oracle offers access to the work of the WGINOR group, without the need for reading the group reports or downloading the relevant data. It is useful as an AI assistant that can read through those reports and datasets and provide answers that are tailored to your need and in your preferred language. It's a fast and flexible way to access WGINOR work and results. Like all GPTs, the IEA-Oracle is not always correct, and it is the information in the source document that one should rely on.

¹ Working Group on the Ecosystem Assessments of the Norwegian Sea (WGINOR) of the International Council for the Exploration of the Sea (ICES)