

# Second Nordic Forum on Climate Change in Fisheries and Aquaculture



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This publication is also available online in a web-accessible version at:

<https://pub.norden.org/temanord2024-530>





# Executive summary

The Nordic Marine Think Tank re-joined ICES for a second collaboration to host the Nordic Forum on Climate Change in Fisheries and Aquaculture. The forum was held in Bergen, Norway, 30 November 2023.

The primary aim of this forum was to serve as a platform for stakeholders encompassing the fisheries, aquaculture, scientific, and policymaking realms to engage in substantive dialogues about their role in climate change and the co-existence with offshore wind. Its overarching goal was to foster the exchange of ideas and insights towards active mitigation of the impact of these critical sectors on climate change. Recognizing climate change as a pervasive global challenge necessitating concerted efforts across the maritime industry, the forum endeavors to galvanize actionable solutions that promote harmonious co-existence of sustainable offshore activities across diverse sectors.

Key outcomes of the workshop encompassed a thorough examination of primary concerns regarding offshore wind initiatives from the fishing industry's perspective. Discussions ranged from wind park design considerations to exploring avenues for fishing representatives and practitioners to participate in Marine Spatial Planning. Moreover, critical research inquiries delved into methodologies for assessing the impact of offshore wind farms, alongside strategies for collaborative engagement with governmental energy, fishing, and environmental agencies to establish regulatory frameworks and foster cross-sectoral cooperation in addressing knowledge gaps. Additionally, the workshop deliberations encompassed the ethical dimensions, deep-sea technology applications, and the utility of digital twins in advancing sustainable, transdisciplinary offshore development, in collaboration with other maritime sectors.

Emerging priorities for future endeavors include fostering enhanced industry-research dialogues on wind park design and data acquisition, as well as forging new consortia to spearhead future proposals for EU and Research Council of Norway funding. These initiatives aim to drive pragmatic and strategic co-existence initiatives between offshore wind entities and fishing stakeholders. The Nordic Marine Think Tank and ICES reaffirm their steadfast commitment as collaborative partners in advancing public discourse on offshore marine spatial planning and conducting research to bolster sustainable exploitation of resources from our Ocean.

# Expert group information

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Expert group name	Workshop of the Second Nordic Climate Change Forum for Fisheries and Aquaculture (WKNCCFFA2)
Expert group cycle	NA
Year cycle started	2023
Reporting year in cycle	1/1
Chair(s)	Dorothy J. Dankel, Norway  Lisa Pfeiffer, USA/Denmark
Meeting venue(s) and dates	30 November 2023, Vestlandssalen, Bergen, Vestland County, Norway (70 participants, including 5 online participants)

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# 1. Setting the Scene

The Nordic Marine Think Tank and the International Council for the Exploration of the Sea (ICES) hosted the second Nordic Climate Change Forum for Fisheries and Aquaculture in Bergen 30 November 2023. The theme of the session was "Dealing with maritime space and user conflicts in a new era of offshore wind". The workshop was moderated by NMTT Chair Dorothy Dankel assisted by ICES representative Lisa Pfeifer. The workshop was made possible by financing from the Nordic Council of Ministers and was generously aided by facilities made available from the regional authorities of Vestland County Council in Bergen.

The event opened with a welcome from the Vestland fylkeskommune Deputy County Mayor Stian Jean Opedal Davies, who used the building, Vestlandshuset, as an example of how things can be done differently – it is built using sustainable methods and materials, and the roof is covered in solar panels. The Chair of the Nordic Marine Think Tank, Dorothy Dankel, the NOAA Fisheries and ICES Offshore Wind liaison, Lisa Pfeiffer, and the Chair of the ICES Science Committee, Jörn Schmidt, welcomed everybody and gave a brief history of the event<sup>[1]</sup> and the hosting institutions.



**Figure 2:** Deputy County Mayor of Vestland County, Stian Jean Opedal Davies, welcomes the workshop participants in "Vestlandssalen." Photo by Andrea Magugliani.



**Figure 3:** Participants in the newly opened Vestlandssalen in downtown Bergen (not shown: online participants). Photo by Andrea Magugliani.

1. Report of the Inaugural Joint ICES-NMTT Workshop launching the Nordic Climate Change Forum for Fisheries and Aquaculture (WKNCCFFA) found here: [https://ices-library.figshare.com/articles/report/Joint\\_ICES-NMTT\\_Workshop\\_launching\\_the\\_Nordic\\_Climate\\_Change\\_Forum\\_for\\_Fisheries\\_and\\_Aquaculture\\_WKNCCFFA/19248953](https://ices-library.figshare.com/articles/report/Joint_ICES-NMTT_Workshop_launching_the_Nordic_Climate_Change_Forum_for_Fisheries_and_Aquaculture_WKNCCFFA/19248953)











**Figure 9:** Rita Bouman discusses the many ethical dimensions of co-existence in offshore areas. Photo by Andrea Magugliani.

Currently, there's a lack of fair representation in offshore wind decisions, partly due to the absence of robust process guidelines, impacting both current and future representation in the decision-making process. This issue of mis- or underrepresentation must be acknowledged and rectified. Bouman emphasized the need to question the value of nature and human wellbeing, and the role of money within these contexts. Effective technology should maximize benefits while distributing burdens equitably, incorporating environmental considerations and ensuring the rights and freedoms associated with its usage.

The social dynamics surrounding offshore wind projects are deeply rooted in normative principles, but there's a clash between concepts of nature and justice. For example, who has the moral authority to make decisions about where and how to build new wind parks? How is this authority related to power? Who's views matter? Addressing these normative issues early in the process is crucial for the successful design and implementation of offshore wind projects.

## 2. Experiences and Expectations of Offshore Co-existence with Fisheries and other Maritime Sectors

The Nordic Marine Think Tank invited governance representatives from Sweden and Norway to present current experiences with offshore co-existence, followed by a debate with other Nordic agencies and fisher organizations.

### 2.1 Proposal for amended Swedish marine spatial plans

*Per Olsson, Unit Director, Marine Spatial Planning, The Swedish Agency for Marine and Water Management*



**Figure 10:** Graphical summary of Per Olsson's talk. Illustration by Håvard Legreid.

In 2022, Sweden finalized its first maritime spatial plans, which designated areas for offshore wind production to meet climate and energy targets. However, updates are necessary to increase energy production, aiming to raise production from 30 to 90 TWh, with an additional 200 TWh needed by 2050 to meet demand.

The task is to identify ways to boost energy production while considering co-existence between wind power and other interests. Currently, 53 areas are proposed, each facing various conflicts. The process to revise the marine spatial plan must be completed by December 2024, involving two consultation processes before presenting the final proposal to the government for approval.

The proposed Swedish marine spatial plan will prioritize marine energy extraction while making adjustments for areas of high natural value and use. The plan involves expanding proposed areas or introducing supplementary areas to accommodate increased energy extraction.

For the Gulf of Bothnia, which is a UNESCO heritage site and supports small-scale fisheries, 11 proposed energy areas and 11 alternatives are being considered. Despite some conflicts, there are ample opportunities for bottom-fixed foundations and grid connections.

In the Baltic Sea, extensive national defense interests, shipping, fishing, and high natural values present challenges. Six proposed energy areas with 18 alternatives are being evaluated, although grid connections and military interests pose uncertainties.

Skagerrak and Kattegat, known for their high natural values for recreation and tourism, face conflicts due to extensive commercial fishing. The impact assessment considers environmental, social, and economic factors, including effects on bird migration routes, marine mammal habitats, fish spawning, and commercial fisheries.

A significant learning from the Swedish maritime spatial planning exercises is the main conflicts with fisheries, particularly regarding new floating structures that hinder fish trawling and vice versa. Efforts are ongoing to address these conflicts with the fishing industries.







Christopher Harman highlighted the Norwegian offshore wind cluster's support for offshore wind but raised questions about data responsibility and trustworthiness in decision-making processes.

Antonio Aguera Garcia discussed the potential for co-existence between low-trophic aquaculture and offshore wind, emphasizing the need to assess conflicts and plan accordingly.

Questions from the audience touched on topics such as the reef effect of wind farms, the availability of scientific knowledge, and the importance of coordinated research on long-term effects and operation and maintenance. The discussion concluded with reflections on the possibilities and challenges of co-existence between human activities and marine environments, emphasizing the need for caution and consideration of potential environmental impacts.



**Figure 16:** The first panel debate. Photo by Andrea Magugliani.



**Figure 17:** During this workshop, artist Håvard Legreid sketched the discussion which the participants could view in real-time on a screen in the front of the room. The result can be seen in the graphical workshop abstract in Figure 1. Photo by Andrea Magugliani.

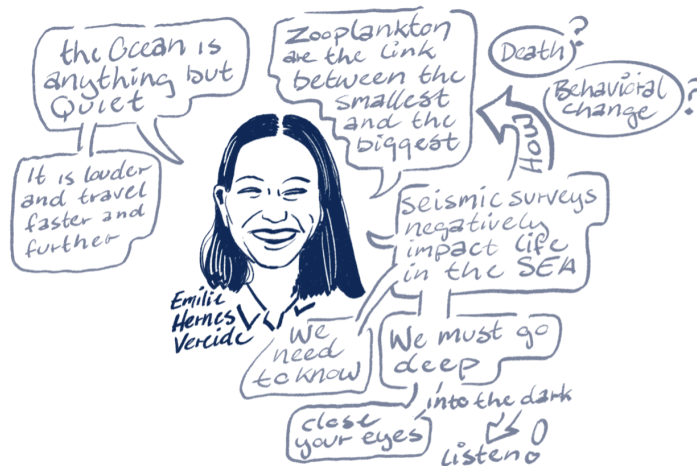
# 3. Ecosystem Monitoring of Offshore Wind and Marine Spatial Planning

In this next group of speakers, after the lunch break, we focused on monitoring the offshore sectors and their impact on the marine environment as well as the role of monitoring and the process of Marine Spatial Planning.

## 3.1 Special guest performance: "Anthropogenic underwater sound and zooplankton"

*Emilie Hernes Vereide, PhD candidate, University of Oslo/Institute of Marine Research, Bergen*

Winner of the Researcher Grand Prix Bergen scientific public speaking event 2023.



**Figure 18:** Graphical summary of Emilie Vereide's talk. Illustration by Håvard Legreid.

Emilie Hernes Vereide's research focuses on the impact of anthropogenic sound on marine life, particularly zooplankton, which serve as a crucial link between the smallest organisms and the largest species in the ocean. One prevalent source of underwater noise today is seismic surveys, where seismic air guns are used to penetrate the seabed. While it's well-known that seismic surveys affect fish and marine mammals, the impact on species that cannot swim away remains uncertain due to contradictory research findings. Laboratory studies attempt to replicate seismic noise, while field studies involve conducting seismic surveys at sea. These studies suggest that zooplankton may be affected by sound and seismic surveys, potentially resulting in mortality, particularly at close distances. However, the behavioral and movement patterns of zooplankton change under the influence of sound.

Understanding how sound affects species that passively float in the water is essential to comprehending marine life's experience of their environment. Echolocation, where sound functions as vibrating particles and pressure waves, plays a crucial role in how marine animals perceive and are affected by sound underwater. While most research indicates that seismic surveys may not have a significant lethal impact on zooplankton, there's a need to delve deeper into how these surveys affect marine life, especially over the long term. Since fish and other marine life depend on zooplankton, it's imperative that we understand these consequences before continuing to exploit the ocean's resources. Listening more attentively to the ocean's signals is crucial for better stewardship of marine ecosystems.



**Figure 19:** Emilie Vereide with an engaging scientific monologue on the impact of anthropogenic (human-induced) underwater sound to the marine environment. Photo by Andrea Magugliani.











### 3.6 Handling complexity, co-existence and collaboration using digital twins: Visual evidence and data driven decisions on dynamic data models

*Eirik Solberg and Håvard Legreid, Digital Tvilling*



**Figure 26:** Graphical summary of the talk by Digital Tvilling. Illustration with self portrait by Håvard Legreid.

A digital twin is essentially a digital representation of some aspect of the real world upon which we can build and interact. It typically takes the form of a visual representation, such as a map, with various layered elements. During the presentation, a current digital twin map was showcased by Eirik Solberg and Håvard Legreid, demonstrating features like oil and gas platforms, ships, and production areas. While digital twin technology relies on digital tools, humans are still responsible for their development, which can introduce errors in data input. These digital twin maps contain vast amounts of data and can be utilized for prediction and forecasting purposes.

Digital twinning enables functionalities like flow balance and analytics dashboards, including real-time mapping and control towers. It allows for the integration of different data sources to create a unified and evidence-based understanding for improved decision-making. A critical aspect of digital twins is their ability to attribute properties to both entities and relationships, facilitating the integration of diverse datasets. Moreover, digital twins serve as visual tools for fostering dialogue around cooperation, co-existence, and prediction scenarios. When exploring scenarios, digital twinning aids in evaluating trade-offs and facilitates discussions concerning various options.





**Rita Vasconcellos L. d'Oliveira Bouman** from **SINTEF Ocean** highlighted the need for ethical considerations and stakeholder engagement in decision-making processes. She emphasized the importance of understanding stakeholders' aspirations and concerns before presenting plans and suggested creating a platform for stakeholders to express their concerns. Rita also connected the theme of power asymmetries among offshore industries with data variability:

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*If data is not there or difficult to acquire, then the power dynamic changes. When we talk about people, like fishermen, and using their knowledge, we are taking their knowledge so we need to give something back as well. It has to be a sharing process. There is inherently a power imbalance between quantitative data and qualitative data, because the former is much more available and “easier” to obtain.*

**Marloes Kraan** from **Wageningen University Research** (NL) and co-Chair of ICES expert group WGSOCIAL contributed to the plenary discussion by highlighting the need for a comprehensive understanding of social impact assessments, in addition to ecological and economic assessments. She noted that while there is clarity on what constitutes ecological and economic impact assessments, the same cannot be said for social impact assessments. Marloes emphasized the importance of maintaining a strong fishing industry, particularly in Norway, contrasting it with the Netherlands where economic considerations often outweigh other factors. She raised concerns about the diminishing presence of fisheries in the crowded European space and emphasized the need to address this issue. Marloes also discussed the challenge of incorporating qualitative data into decision-making processes, suggesting that engaging with fishers could provide valuable insights. However, she noted that relying on fishers' input for decision-making could potentially diminish their influence in the political process.

**Sigrid Eskeland Schütz** from the **University of Bergen** underscored the importance of visualizing impacts and scenarios in offshore development. Sigrid noted: “I need to understand the real world and challenges, and try to disseminate knowledge on fairness across the offshore sectors.” Sigrid also discussed the importance of wind farms to open for early engagement of fishers in offshore wind park development:

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*A wind park project is usually initially designed in detail and is very rigid and doesn't allow for a lot of input, so the flexibility of the initial stages in a project development is also very important to lay a foundation for co-existence.*

A Professor of Law, Schütz added that adaptation is crucial in addressing the challenges of offshore wind energy development, requiring a reevaluation of methods to expedite processes and reduce costs. Safety emerges as a significant concern in this transition, particularly as offshore wind presents distinct safety challenges compared to other industries. Collaboration with experienced researchers in offshore wind is prioritized to mitigate risks effectively. However, despite efforts, some offshore workers remain hesitant to transition due to safety apprehensions. Meanwhile, there is a recognized need for a deeper understanding of real-world challenges and the aforesaid commitment to disseminate this knowledge to foster fairness in decision-making processes.

**Jörn Schmidt** from **ICES** discussed ICES's role as a trusted broker for scientific information and emphasized collaboration across disciplines and countries.

The discussion addressed issues of data access, funding for impact assessments, and the incorporation of climate change impacts into marine spatial planning. The panel reflected on the challenges and opportunities presented by offshore wind development, with commitments to further dialogue, engagement, and ethical considerations in future endeavors.



## 4. Closing of workshop and policy recommendations

In closing the workshop, Dorothy Dankel highlighted the excitement surrounding the phase ahead, emphasizing the convergence of various stakeholders, data, and knowledge. She announced plans to compile the insights gathered during the workshop into a comprehensive report for submission to ICES, with dissemination at the ICES Workshop to develop guidelines on how to approach the ecological, economic, and social trade-offs between offshore renewable energy developments (wind farms) and fisheries (WKWIND) 29 April – 2 May 2024.



**Figure 29:** Closing of the workshop by (from left) Lisa Pfeiffer, ICES, Dorothy Dankel, NMTT, and Jörn Schmidt, ICES. Photo by Andrea Magugliani.



**Figure 30:** Participants at the workshop in the Vestlandssalen meeting room November 30, 2023 in the Vestland Fylkeskommune in Bergen, Norway. Photo by Andrea Magugliani.

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3. **Credible Integration of Fishing Stakeholders in Marine Spatial Planning:** This policy recommendation involves integrating fishing stakeholders into the process of marine spatial planning for offshore wind development. Government agencies and industry consortia should actively engage with fishing communities to understand their concerns, priorities, and needs regarding offshore wind projects. By incorporating input from fishing stakeholders into the planning and decision-making process, policymakers can promote pragmatic and strategic co-existence initiatives that minimize conflicts between offshore wind entities and fishing interests. This approach can help ensure the sustainable exploitation of marine resources while supporting the growth of the offshore wind industry.
















# Annex 2: Workshop booklet



 **NORDIC MARINE  
THINK TANK**

 **ICES  
CIEM** International Council for  
the Exploration of the Sea  
Conseil International pour  
l'Exploration de la Mer

**Nordic Marine  
Think Tank and ICES  
Joint Workshop**

Norway  
30th of November  
2023

Second Nordic Climate Change Forum for Fisheries  
and Aquaculture:

Dealing with Maritime Space and User Conflicts in a New Era of Offshore Wind

## WELCOME

### Second Nordic Marine Think Tank and ICES Forum: Advancing Climate-Resilient Fisheries and Aquaculture

Welcome to the Second Nordic Marine Think Tank (NMTT) and ICES Forum! We are thrilled to have you join us for this pivotal gathering dedicated to advancing climate-resilient practices within the fisheries and aquaculture sectors in the Nordic region.

#### BACKGROUND

Building upon the resounding success of the inaugural Nordic Marine Think Tank and ICES "Nordic Climate Change Forum for Fisheries and Aquaculture" (WKNCCFFA), this second edition of the NMTT & ICES Forum continues the crucial dialogue initiated by diverse stakeholders, policymakers, scientists, and industry experts. The aim is to confront the multifaceted challenges posed by climate change within the fisheries and aquaculture sectors.

#### KEY INSIGHTS FROM THE PREVIOUS FORUM

- **Shift Towards Aquaculture:** Acknowledgement of the inevitable rise of aquaculture as a primary source of future seafood.
- **Standardization of CO2 Measurements:** Recognizing the need for unified protocols to measure CO2 emissions.
- **Research Emphasis:** Highlighting the necessity for further research on value chain dynamics and consumer acceptance of new species.
- **Policy Frameworks:** Stressing the urgency for dedicated climate change policies within the fisheries and aquaculture sectors.

#### YOUR ROLE AT THE FORUM

As a participant, your valuable insights and expertise will contribute significantly to shaping actionable strategies that address climate challenges in the Nordic fisheries and aquaculture sectors. Engage in dialogue, share experiences, and collaborate to pave the way for a sustainable and adaptive future.

NORDIC MARINE THINK TANK AND ICES JOINT WORKSHOP

## JOIN THE DISCUSSION

The Second NMTT Forum promises to be a dynamic platform fostering collaboration, knowledge exchange, and actionable outcomes. Together, let's chart a course toward a resilient and thriving marine ecosystem.

#### STAY CONNECTED, BE A NMTT MEMBER!

Through a membership in the Nordic Marine Think Tank, and through your participation in the Nordic Forum for Climate Change in Fisheries and Aquaculture, you will connect with fellow participants, access resources, and continue the dialogue beyond the event through our dedicated networking channels.

Membership information is found here:

<https://www.nmtt.org/membership>

We look forward to your active participation and invaluable contributions at the Second Nordic Marine Think Tank Forum, as we collectively strive for a more sustainable and productive future for our marine ecosystems.

On behalf of the NMTT Board,  
**Dorothy Dankel, Chair**  
Carl-Christian Schmidt, Vice-Chair



NORDIC MARINE THINK TANK AND ICES JOINT WORKSHOP

## Nordic Marine Think Tank and ICES Joint Workshop

Second Nordic Climate Change Forum for Fisheries and Aquaculture:

Dealing with Maritime Space and User Conflicts in a New Era of Offshore Wind

Agenda is subject to changes

Norway 30th of November 2023

#### PLACE

Vestlandshuset, Vestlandssalen, Vestre Strømkaien 13, 5008 Bergen

09.30-10.00	Coffee and mingling	
10.00-10.10	Opening and Welcome from VestlandFylkeskommune and Bergen Municipality	Fylkesordfører, Bergen Kommune
10.10-10.20	Introduction and overview of NMTT/ICES Joint Workshop objectives and expectations	Dorothy Dankel, Chair, Nordic Marine Think Tank, Lisa Pfeiffer, NOAA Fisheries and ICES Offshore Wind liaison, Jörn Schmidt, Chair, Science Committee, International Council for the Exploration of the Seas
<b>Setting the Scene: Offshore wind outlook</b>		
10.20-10.40	Overview of offshore wind technology and the political ambitions for offshore wind in the EU - and Norway	Finn Gunnar Nielsen, Professor Emeritus Univ. of Bergen, Bergen Offshore Wind Center
10.00-10.10	Being a trusted facilitator: Positioning fisheries, biodiversity and offshore wind debates in the Northeast coast of USA.	Kanae Tokunaga, Gulf of Maine Research Institute
10.55-11.15	Offshore wind in a Social-Ecological-Technical and Ethical system: Preparing for an ethical dialogue in a Nordic context	Rita Vasconcellos L. d'Oliveira Bouman, SINTEF Ocean& FME NorthWind, Norwegian Research Center on Wind Energy

11.15-11.30	Per Olsson, Unit director, marine spatial planning, Havs- och vattenmyndigheten, Sweden, Kari Mannbjørn Mortensen, Head of Energy, Department, Environment Agency, Faroe Islands	
<b>Ecosystem Monitoring of Offshore Wind</b>		
11.30-11.40	ICES Research Roadmap for Offshore Wind	Lisa Pfeiffer, ICES Expert in Residence
11.40-11.50	Current experiences and research needs for ecosystem monitoring of offshore wind parks	Anne Christine Utne Palm, Institute of Marine Research, Bergen, Norway
11.50-12.00	State-of-the-art offshore monitoring technology	Kai Stoltz, GCE Ocean Technology
12.00-13.00	Lunch, sponsored by the Nordic Council of Ministers	
<b>Expectations of Offshore Co-existence with Fisheries and other Maritime Sectors</b>		
13.00-13.15	The Norwegian cross-Directorate marine spatial planning experience	Paul Oma (TBC), Directorate of Fisheries, Norway
13.15-13.45	Mia Hegli, Pelagisk Forening, Niels-Herman Oxholm Johansen, Danmarks Fiskeriforening/Producent Organisasjon, Christopher Harman, Norwegian Offshore Wind Cluster	
13.45-14.00	Bringing Marine Spatial Planning processes into a Nordic context: What do we need to know?	Sigrid Eskeland Schütz, Faculty of Law, University of Bergen
13.45-14.00	The use of Digital Twins in Marine Spatial Planning: Leveraging ICES data for collaborative scenario planning	Filip Åblom, Digital Tving
14.30-14.45	Coffee Break	
14.45-15.20	Roundtable Discussion and Commitments from Nordic Leaders	
	Geir Huse, Research Director, Institute of Marine Research, Jonny Lokey, Pelagisk Forening, ++ Pending Invitations to OED, KLD and NFD, ++	
15.20-15.30	Closing of Workshop and Next Steps	Dorothy Dankel, NMTT



## Project Showcase

**WindSys: Funded by Research Council of Norway**

The WindSys project investigates the impact of Equinor's Hywind Tampen, the world's largest floating wind farm, on the marine ecosystem, particularly focusing on pelagic fish stocks like herring and mackerel. Led by Karen de Jong of the Institute of Marine Research, the project involves multiple partners and stakeholders across Norway and other countries. It aims to understand how these floating wind turbines affect pelagic fish behavior, studying whether they act as fish aggregating devices and increase fish stocks. The project uses innovative observation platforms with echo sounders, cameras, and sensors to gather data on fish, seabird interactions, noise, and upwelling. By developing models based on their findings, the project aims to aid in planning future offshore wind farms while considering environmental impact and fisheries co-existence.



NORDIC MARINE THINK TANK AND ICES JOINT WORKSHOP

**OLAMUR: Funded by European Union grant no. 1011094065**

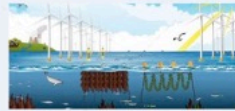
### Offshore Low-trophic Aquaculture in Multi-Use scenario Realization in North and Baltic sea

OLAMUR is a four-year EU-funded project aiming to bring together multi-use low-trophic aquaculture (MU-LTA) related key sectors, to demonstrate sustainable commercial solutions for both the North and the Baltic Sea.



#### What is marine multi use?

Marine multi-use is a relatively young concept, involving the integration of aquaculture farms into an ocean space occupied by another sector, such as wind farms.



There are 3 pilot demonstration sites planned where seaweed and blue mussels will be grown within windfarms (A and B) and in the vicinity of a trout farm (MTA C-site).

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**Knowledge acquisition for Co-existence between the fisheries and offshore wind industries: Funded by Fiskeri- og havbruksnæringens forskningsfinansiering (FHF)**

The project, led by Anne Christine Utne Palm of the Institute of Marine Research, delves into the complex relationship between the fishing industry and offshore wind development in Norwegian waters. Through extensive interviews with fishermen, industry stakeholders, and an in-depth review of literature and media sources, it identifies crucial knowledge gaps in understanding the effects of offshore wind farms on fisheries and the marine environment. The report highlights uncertainties about the impact of wind farms on various aspects, including substrate changes, noise, electromagnetic effects, and alterations in fish behavior and populations.



There's a call for comprehensive, long-term studies encompassing multiple seasons to assess these impacts accurately. Additionally, it emphasizes the importance of considering historical fishing data and the ecological significance of specific areas, such as sandeel fields, when planning wind farm locations. The project underscores the necessity of early dialogue and collaboration between the energy sector, marine researchers, and fishermen to ensure sustainable co-existence and informed decision-making in future offshore wind development. Key knowledge gaps include understanding long-term ecosystem changes, effects on pelagic fish, the impact of continuous noise from wind farms, and the electromagnetic effects on marine life and migration routes.

NORDIC MARINE THINK TANK AND ICES JOINT WORKSHOP

## Notes

This is how I will share my learnings with my colleagues/ company after the summit:

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NORDIC MARINE THINK TANK AND ICES JOINT WORKSHOP





# Nordic Marine Think Tank and ICES Joint Workshop



**NORDIC MARINE  
THINK TANK**



**ICES  
CIEM**

International Council for  
the Exploration of the Sea

Conseil International pour  
l'Exploration de la Mer

NORDIC MARINE THINK TANK AND ICES JOINT WORKSHOP



