

Offshoreaktivitet og sjøfugl

Roel May

Med bidrag fra: Tycho Anker-Nilssen, Manuel Ballesteros, Vegard Sandøy Bråthen, Lila Buckingham, Kim Magnus Bærum, Signe Christensen-Dalsgaard, Line Cordes, Emma Critchley, Nina Dehnhard, Matthew Grainger, Frank Hanssen, Christoffer Høyvik Hilde, Kate Layton-Matthews, Anna Nilsson, Øyvind Skarsgård Nyheim, Diego Pavón-Jordán, Tone Kristin Reiertsen, Frode Thomassen Singsaas, Christophe Sauser, Graeme Shannon, Jennifer Stien, Hallvard Strøm, Arnaud Tarroux, Beate Zein

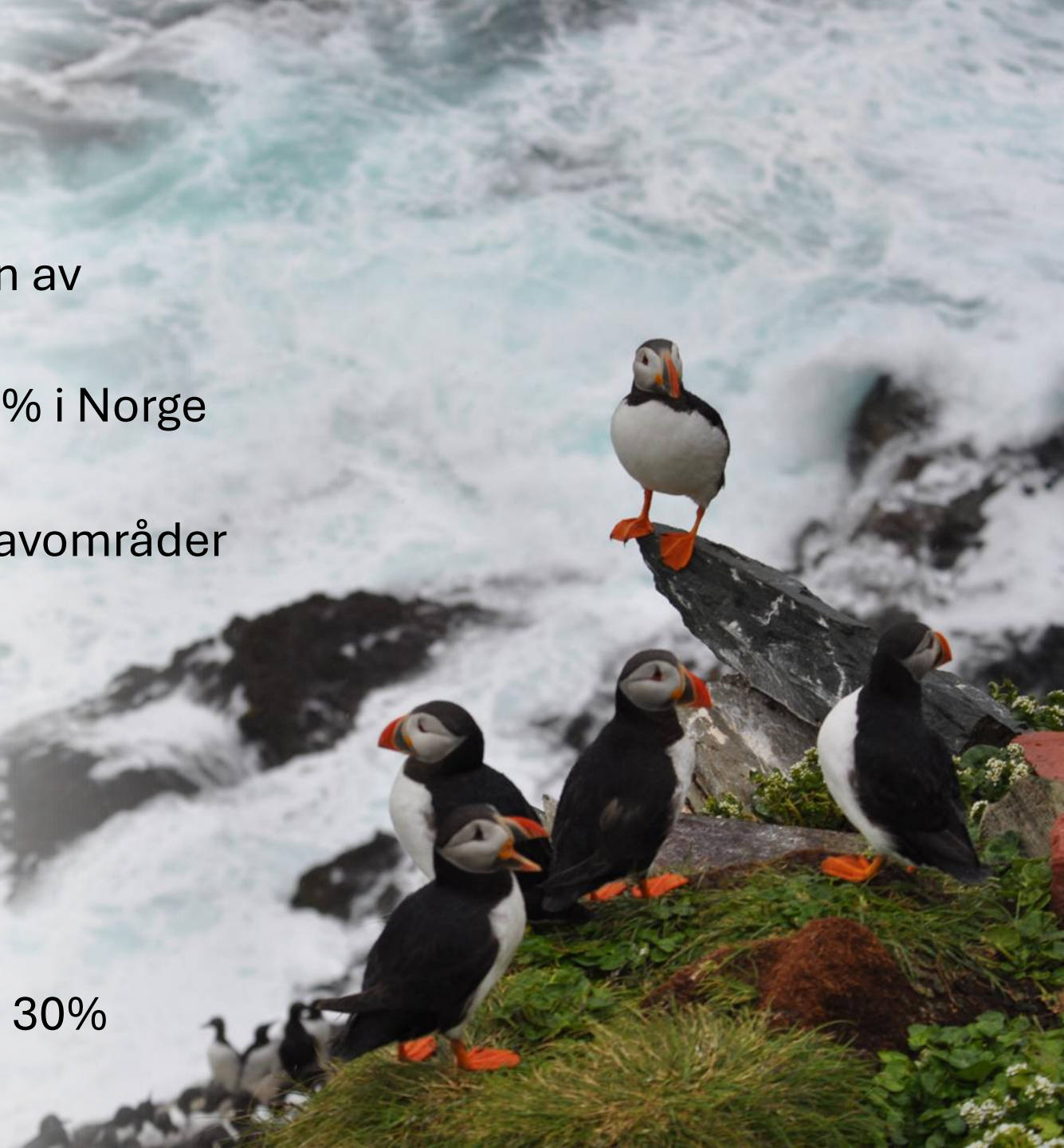


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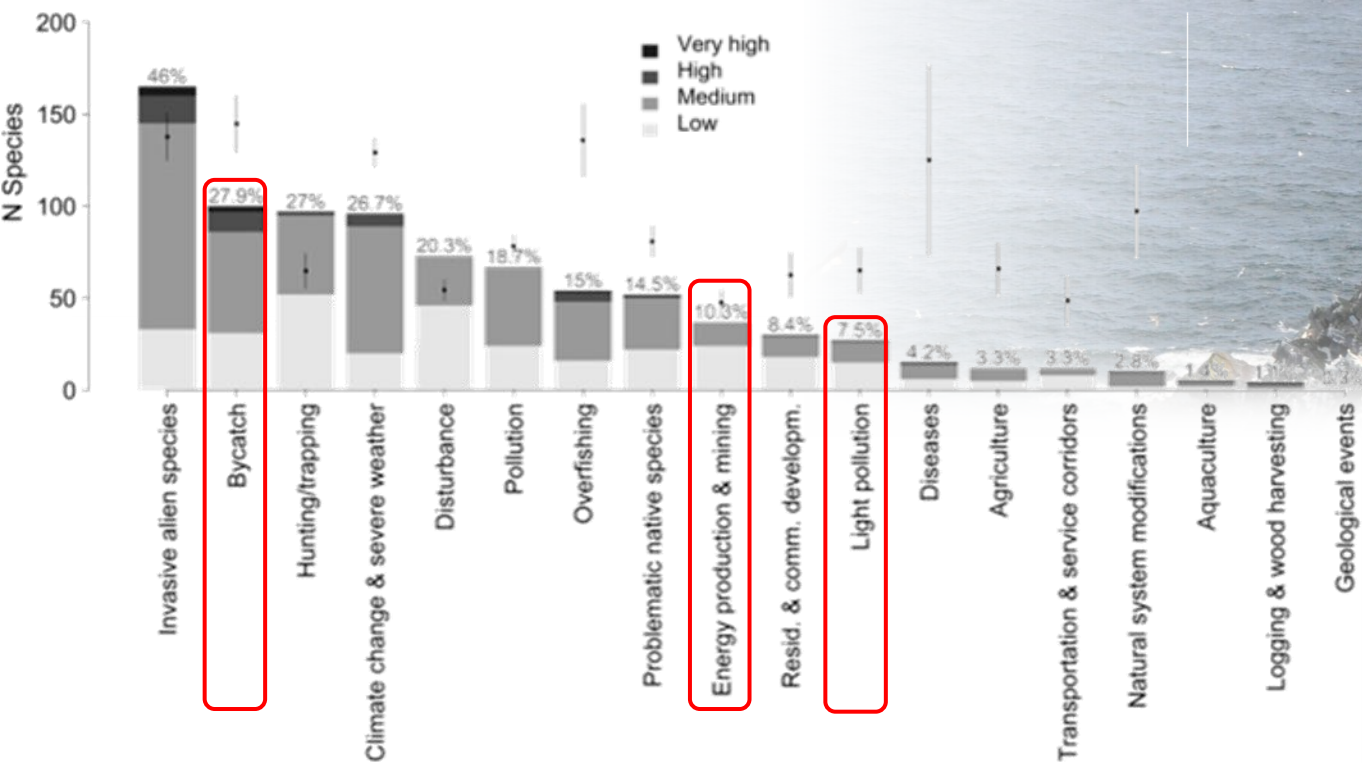
Norwegian Institute for Nature Research

Et hav av sjøfugl

- Sjøfugler er den mest truede gruppen av virveldyr i verden
- Nedgang i sjøfuglbestander på 60-80% i Norge
- Sjøfugl bruker og trekker over store havområder
- Avhengig av koloniene på land
- Langtlevende og lav reproduksjon
- Millioner av landfugler trekker over havområdene to ganger per år
- 40% av trekkfuglarter er i nedgang, vadefuglbestanden har gått ned med 30%



Sjøfugl i havet



MARCIS

marine spatial planning and cumulative impacts of blue growth on seabirds



Search places

Google Earth Engine Apps

Welcome to the MARCIS tool!

The MARCIS tool is a result of the [MARCIS research project](#).

The MARCIS tool assesses and visualizes single and cumulative impacts (CIA) on seabirds from blue growth and climate change and life cycle impacts (LCA) on migratory birds from offshore wind farms. The impact assessments can be customized by species, scale, season, and stressors, while LCA can be tailored to collision, displacement, and disturbance impacts.

The MARCIS tool is developed by NINA and is intended for research and non-commercial use only. The tool is provided "as is", without warranties of any kind. Any use of the tool or modification/sharing of the source code must acknowledge the MARCIS project and its partners.

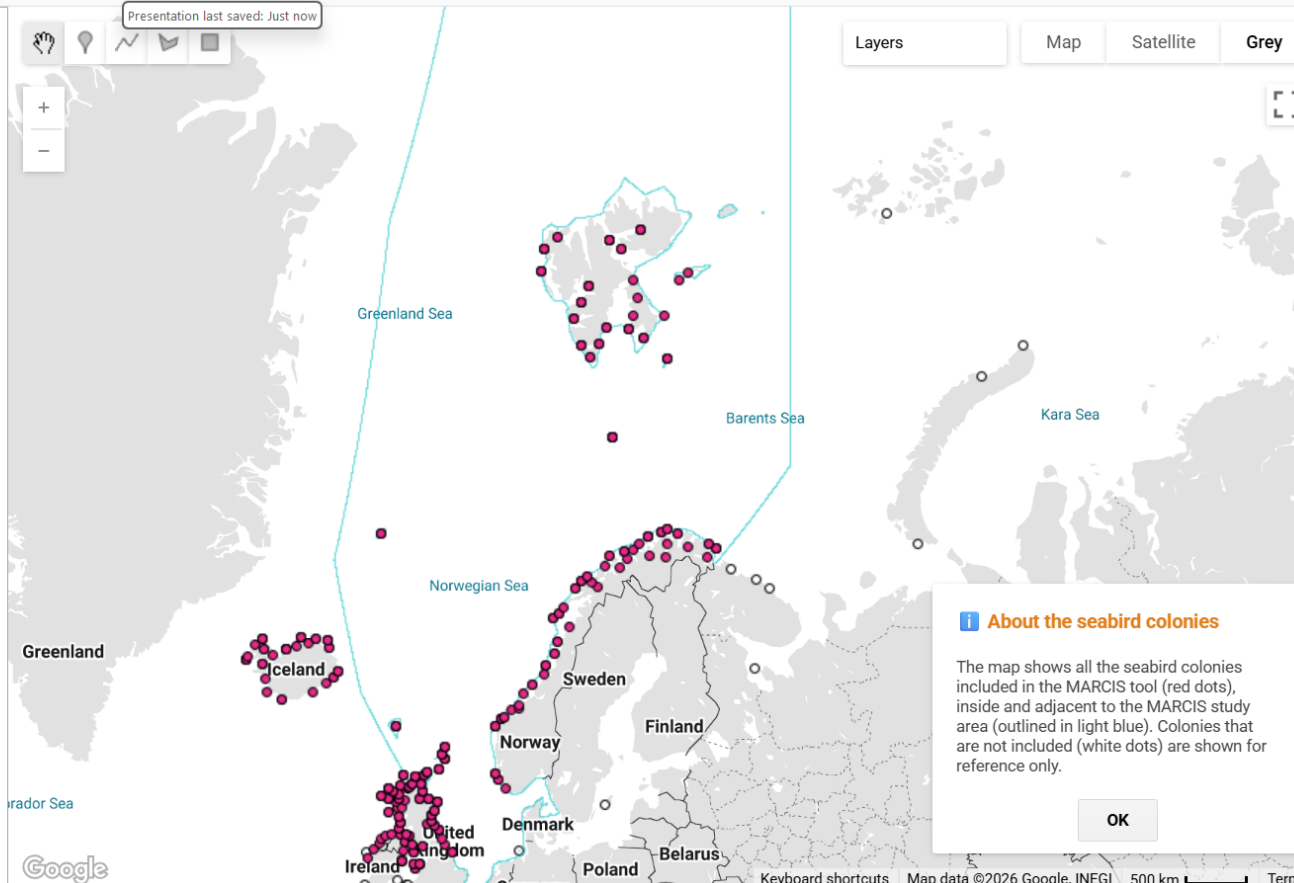
[Consult the manual to use the tool and understand the results.](#)

Do you have questions or found a bug? [Send us your feedback](#)

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[Click here to assess impacts on seabirds](#)

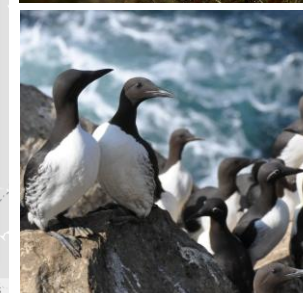
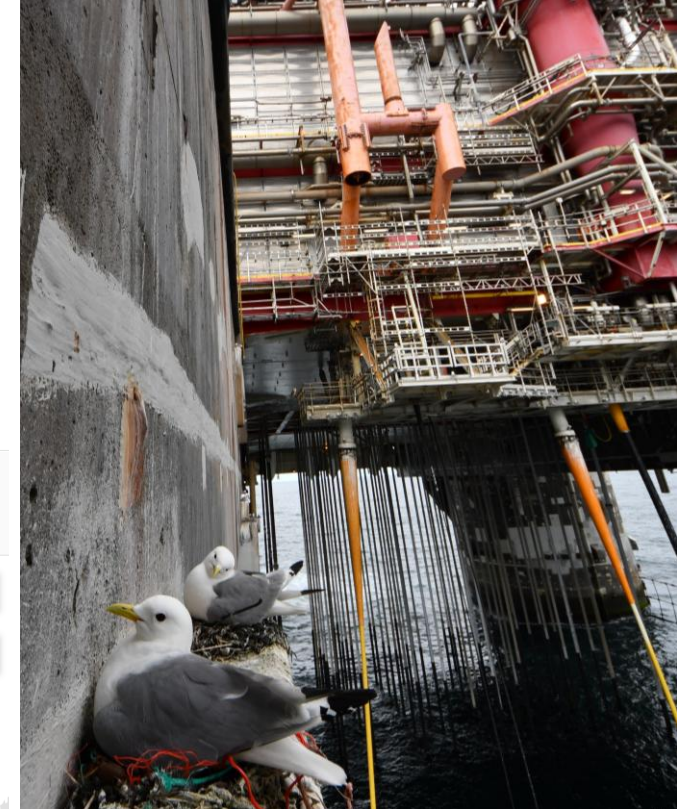
[Click here to assess LCA impacts on migrating birds](#)



About the seabird colonies

The map shows all the seabird colonies included in the MARCIS tool (red dots), inside and adjacent to the MARCIS study area (outlined in light blue). Colonies that are not included (white dots) are shown for reference only.

OK



Single/Cumulative impacts on seabirds



Done

Follow the workflow. Processing may take time—the tool runs even if the browser reports that “This page is not responding.”

[Click here to return to the introduction panel](#)

Reset the panel

All six species

All countries

All international regions

All international colonies

Non-breeding season

22. All stressors – current status quo

Start processing



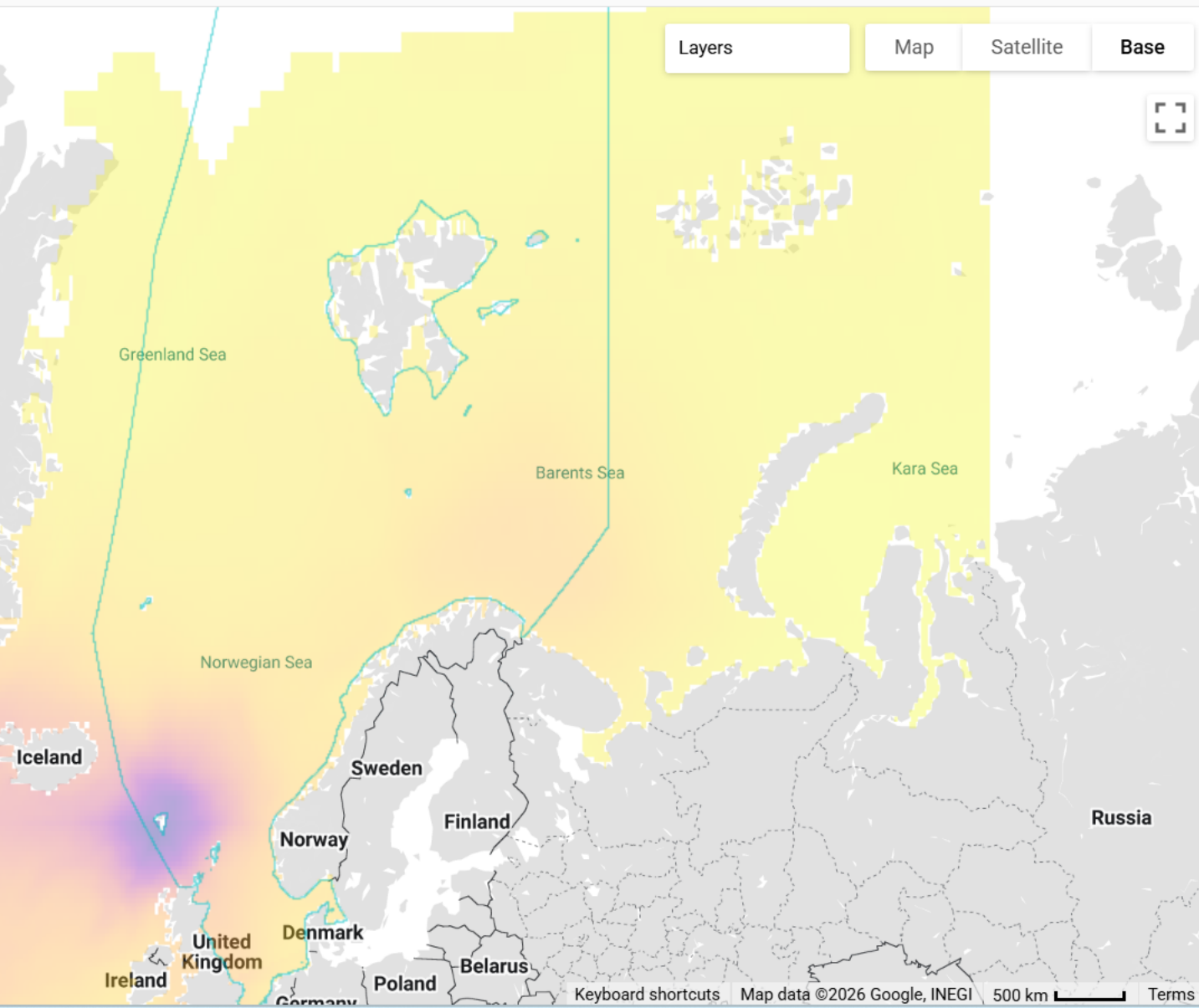
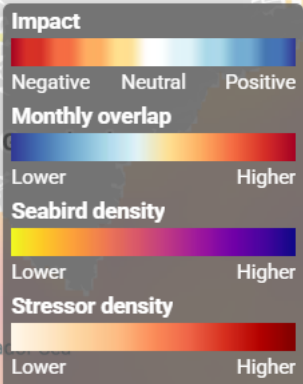
Show monthly overlap

Show applied weights

Show relative impact

Show uncertainty

Download CIA



Single/Cumulative impacts on seabirds



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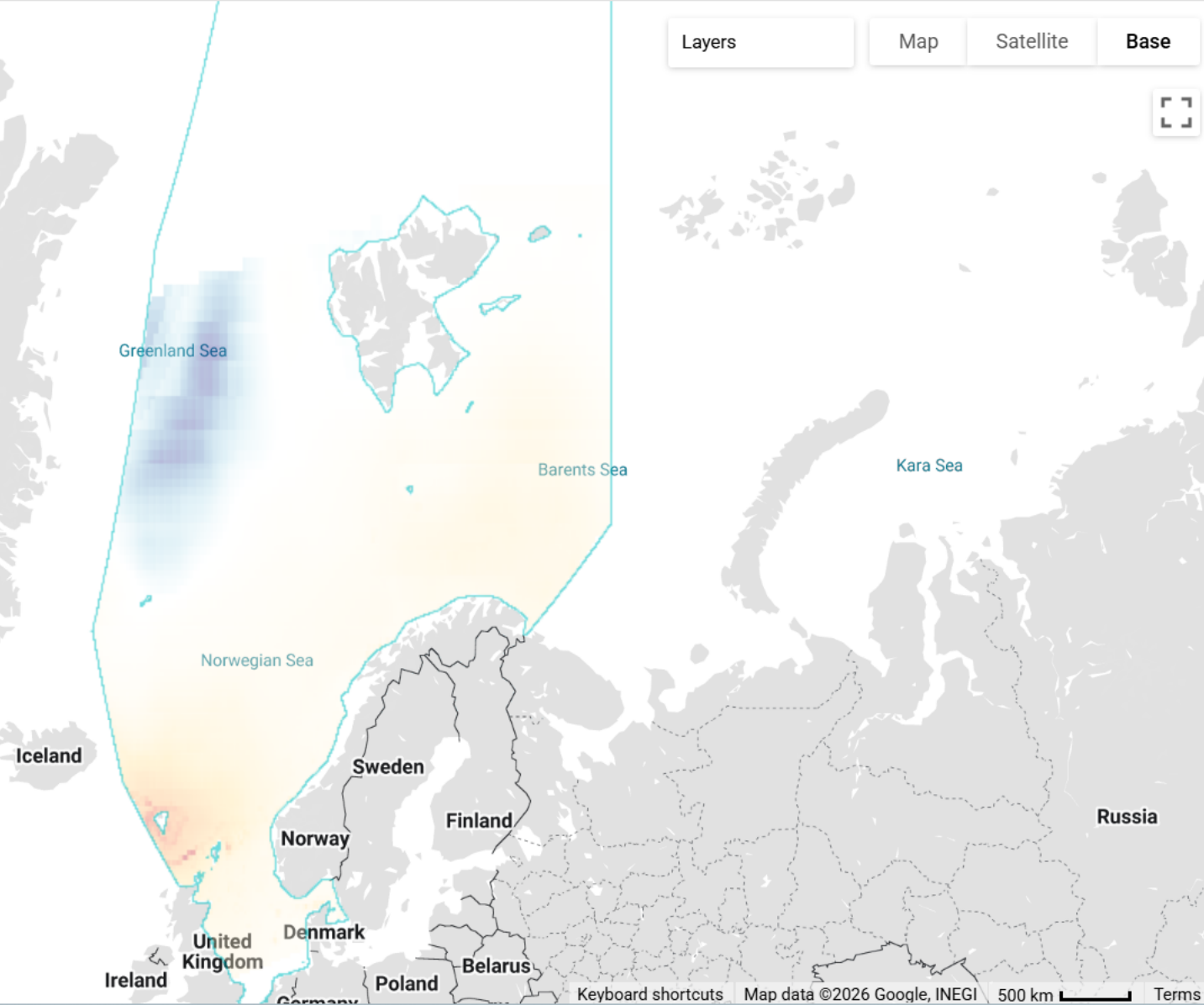
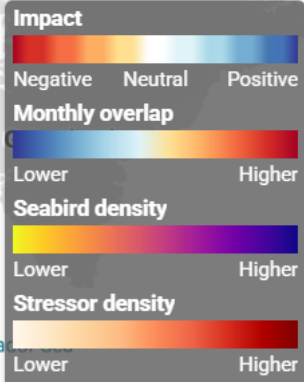
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Single/Cumulative impacts on seabirds



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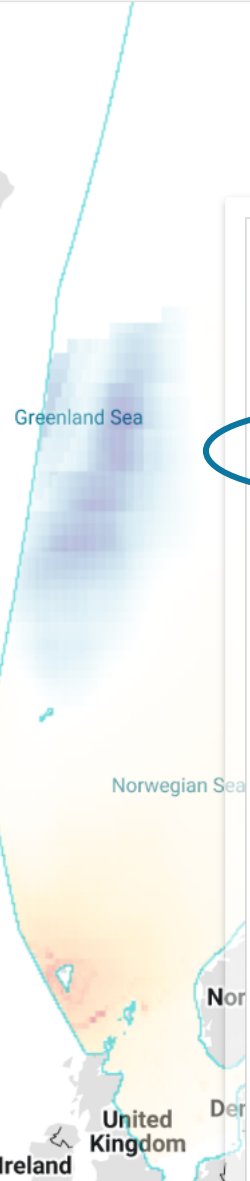
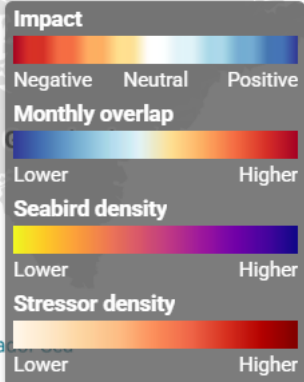
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Download CIA



Layers Map Satellite Base

Applied impact weights

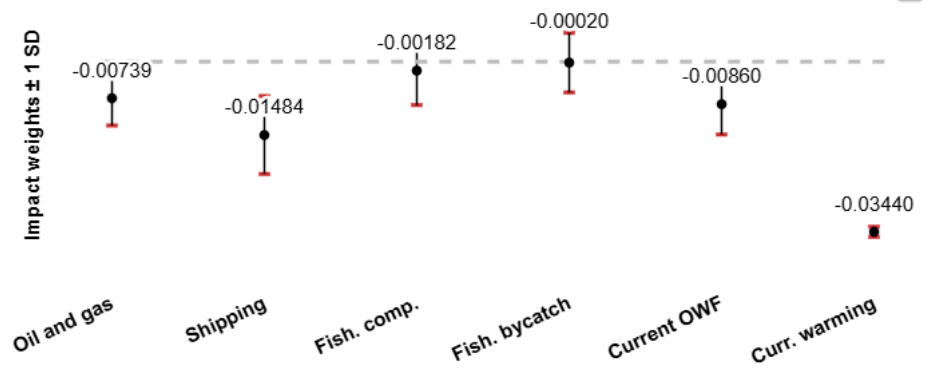
Selection: 22. All stressors – current status quo

Showing impact weights (± 1 SD) for one species at a time. Use the selector below to switch species.

Select species for weight chart:

Atlantic puffin

This chart shows the applied impact weights and their uncertainty range (± 1 standard deviation) in relation to the no-impact (0) baseline (grey dashed line). The weight scale ranges from -1 to 1. Negative impact weights (below the baseline) reflect negative impacts while positive weights (above the baseline) indicate positive impacts.



Source of impact weights per stressor:

- Oil and gas (LITERATURE)
- Shipping (LITERATURE)
- Competition (MODELLED)
- Bycatch (MODELLED)
- Current OWF (MODELLED)

Single/Cumulative impacts on seabirds



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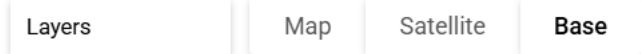
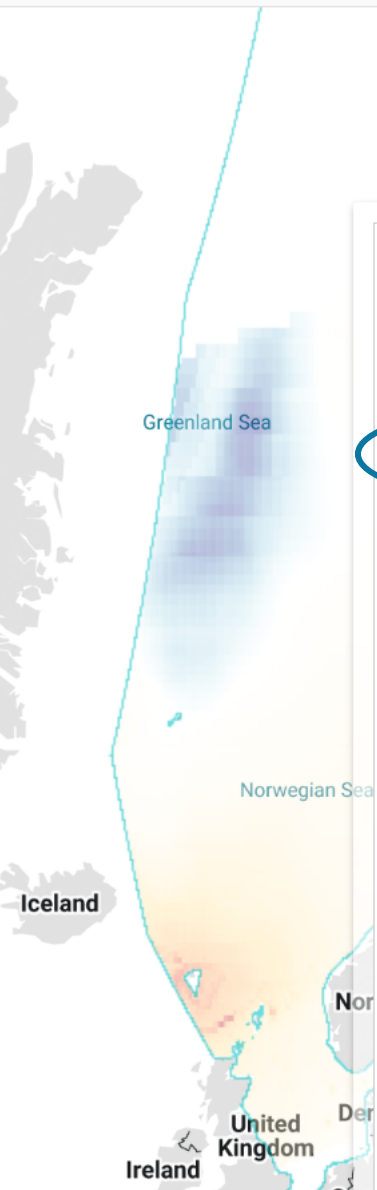
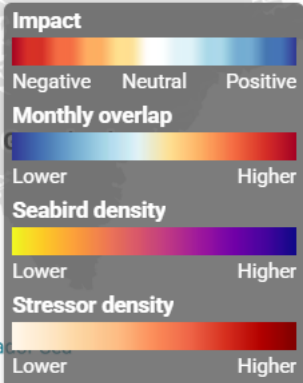
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Show relative impact

Show uncertainty

Download CIA



Applied impact weights

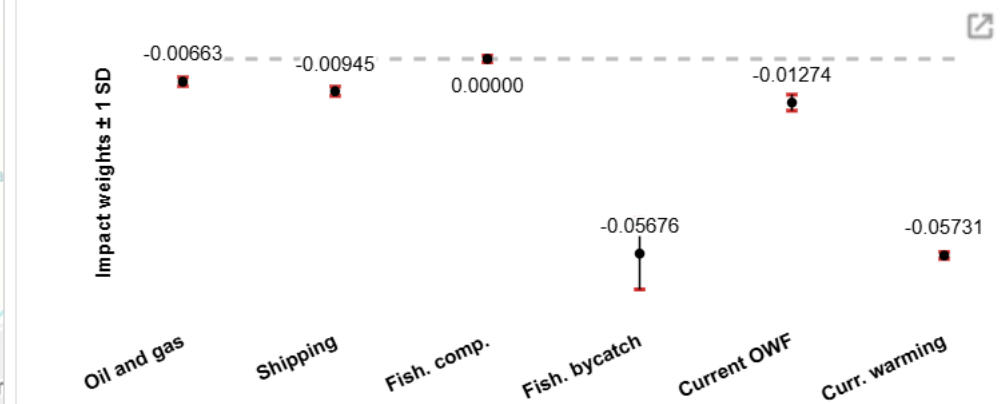
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Showing impact weights (± 1 SD) for one species at a time. Use the selector below to switch species.

Select species for weight chart:

Northern fulmar

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+

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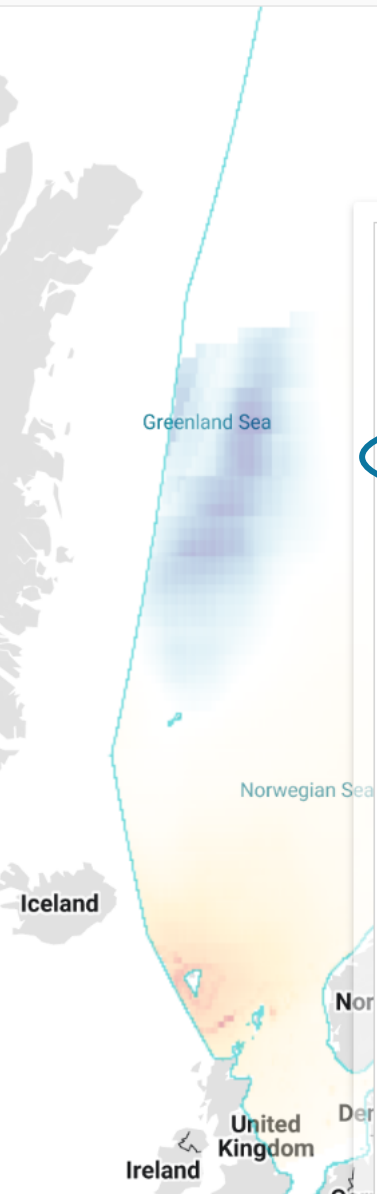
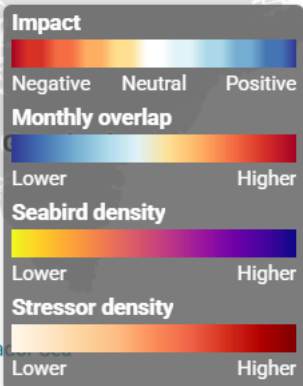
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Show relative impact

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Layers Map Satellite Base

Applied impact weights

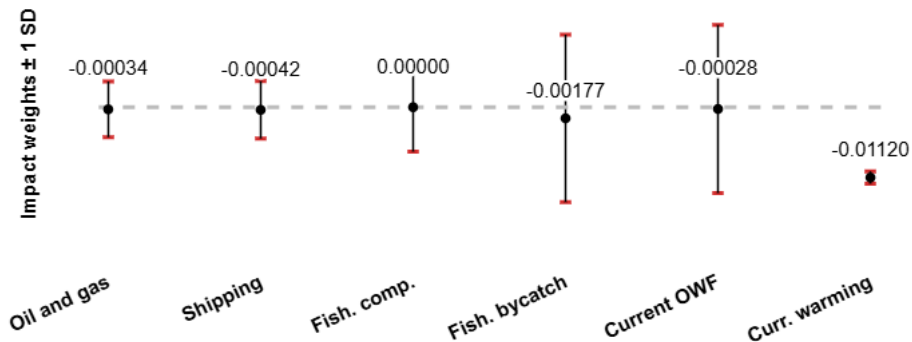
Selection: 22. All stressors – current status quo

Showing impact weights (± 1 SD) for one species at a time. Use the selector below to switch species.

Select species for weight chart:

Black-legged kittiwake

This chart shows the applied impact weights and their uncertainty range (± 1 standard deviation) in relation to the no-impact (0) baseline (grey dashed line). The weight scale ranges from -1 to 1. Negative impact weights (below the baseline) reflect negative impacts while positive weights (above the baseline) indicate positive impacts.



Source of impact weights per stressor:

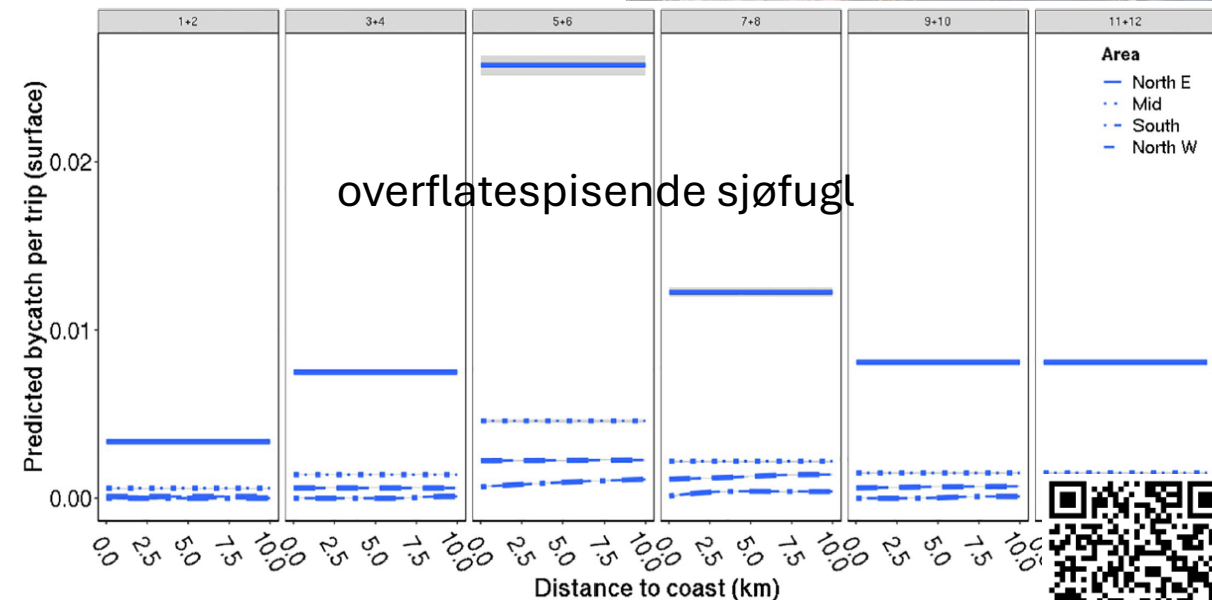
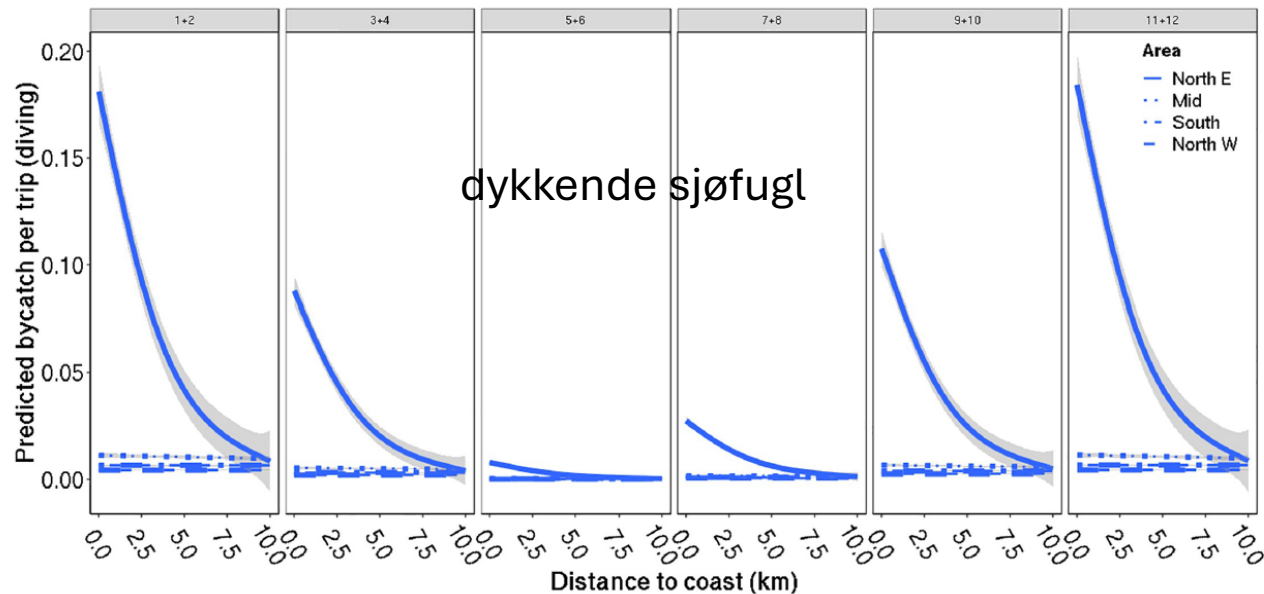
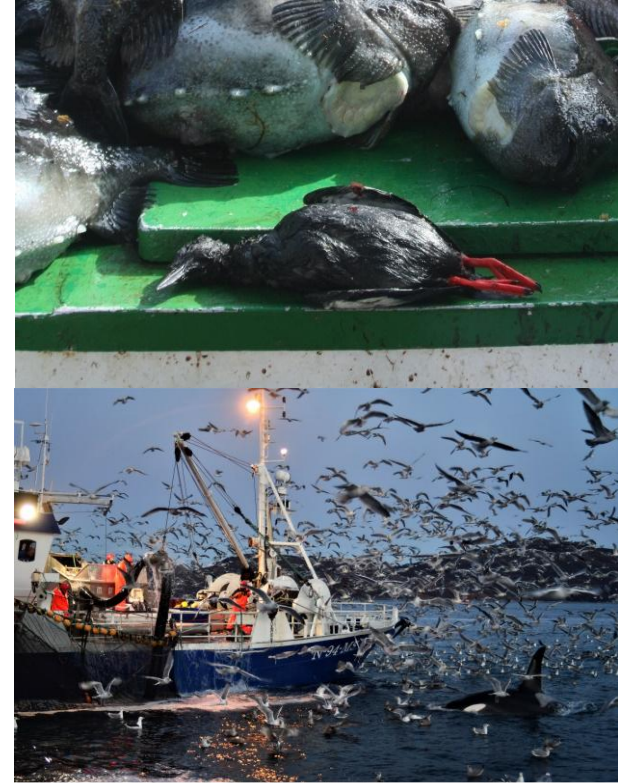
- Oil and gas (MODELLED)
- Shipping (MODELLED)
- Competition (MODELLED)
- Bycatch (MODELLED)
- Current OWF (MODELLED)

Fiskeri



Bifangst av sjøfugl

- Bifangstproblematikk er større for kystnært garnfiske enn for linefiske men begrenset i tid og rom
- Forebyggende tiltak inkluderer stenging av fiskefelt i sårbare perioder for garnfiske, og modifisering av redskap og drift for linefiske



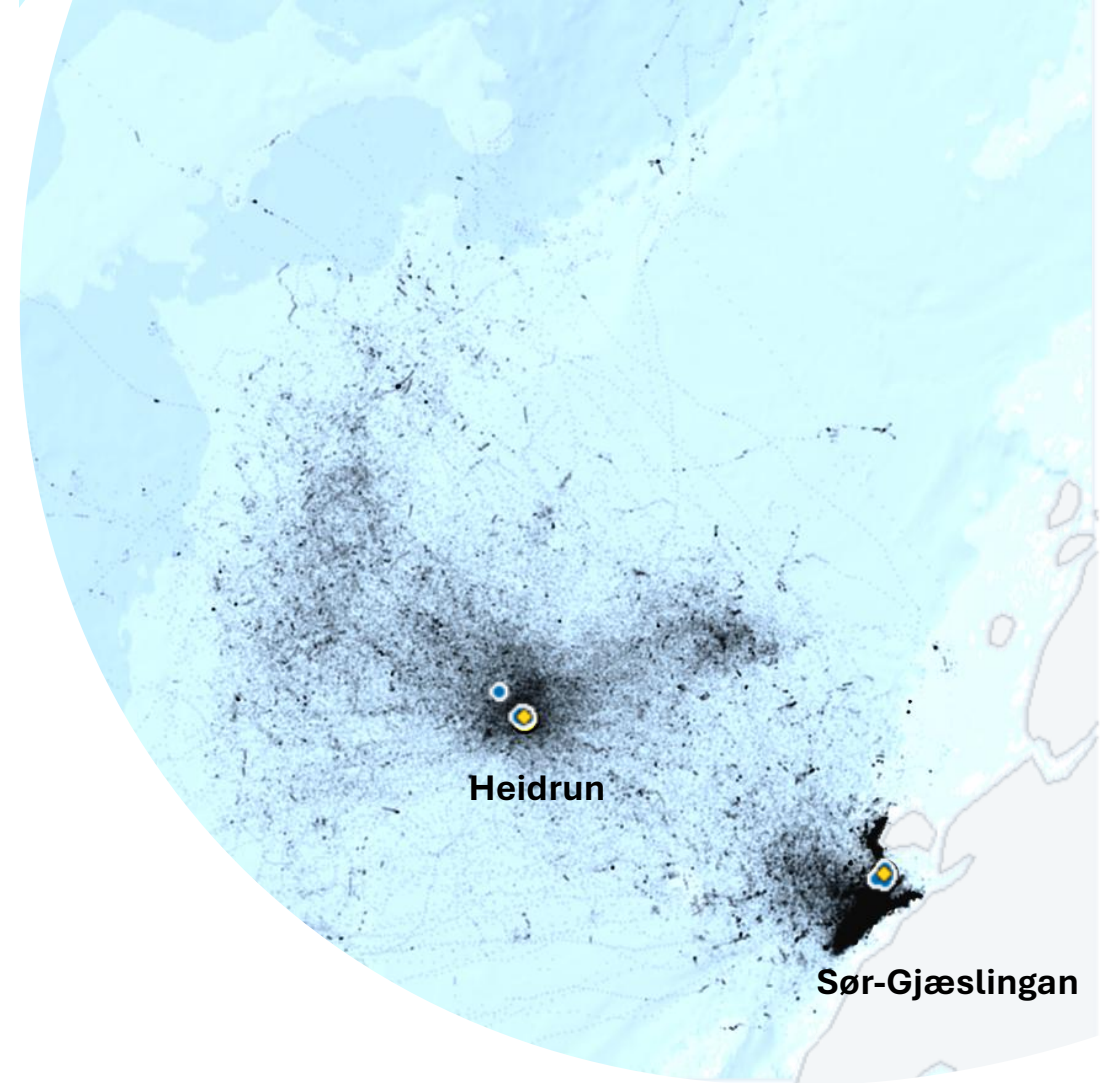
Olje & gass



Krykkje på oljerigger

Tilflukt eller fraflukt

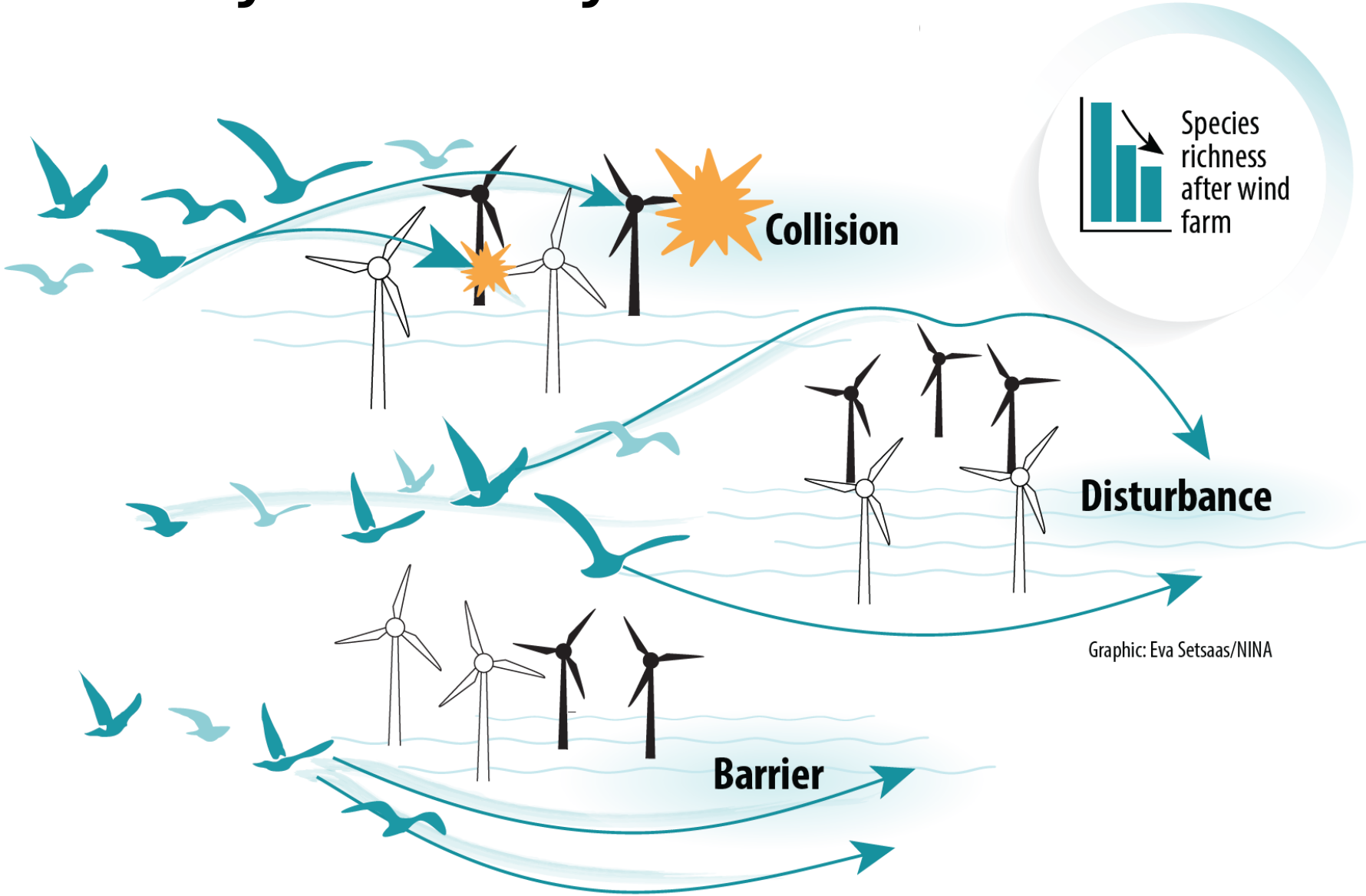
- Lengre turer lenger unna, men mindre tid til å søke etter mat
- Romlig uforutsigbare bevegelser, men stabile mellom år (2024-2025)
- Utnyttelse av mindre produktive havområder for å søke etter mat
- Mindre predasjon på oljeplattformen (kun store måker)



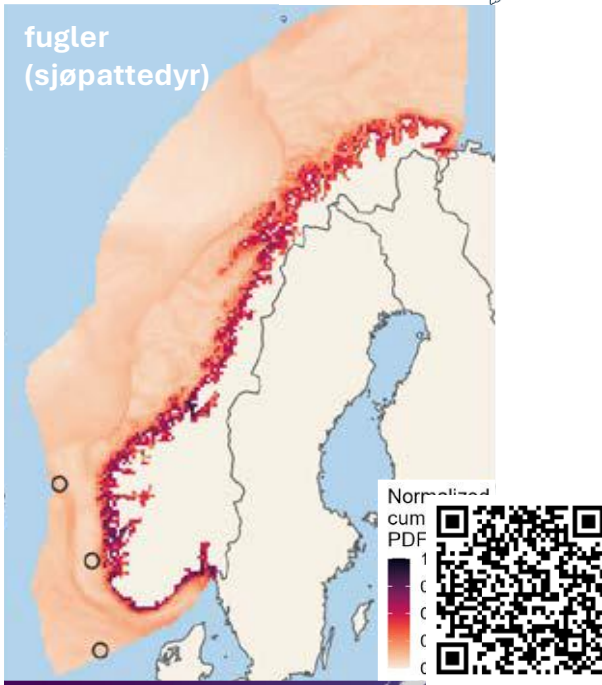
Havvind



Livsyklusanalyse av havvind



Graphic: Eva Setsaas/NINA

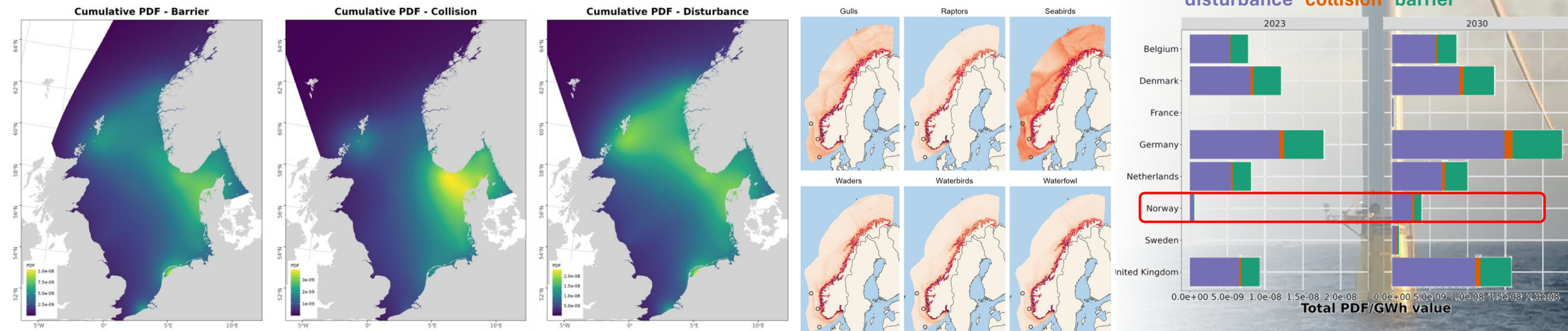


Critchley et al. 2025. Life-cycle impact assessment of offshore wind energy development on migrating bird diversity in the North Sea. *J Appl Ecol* 62: 1597-1610.

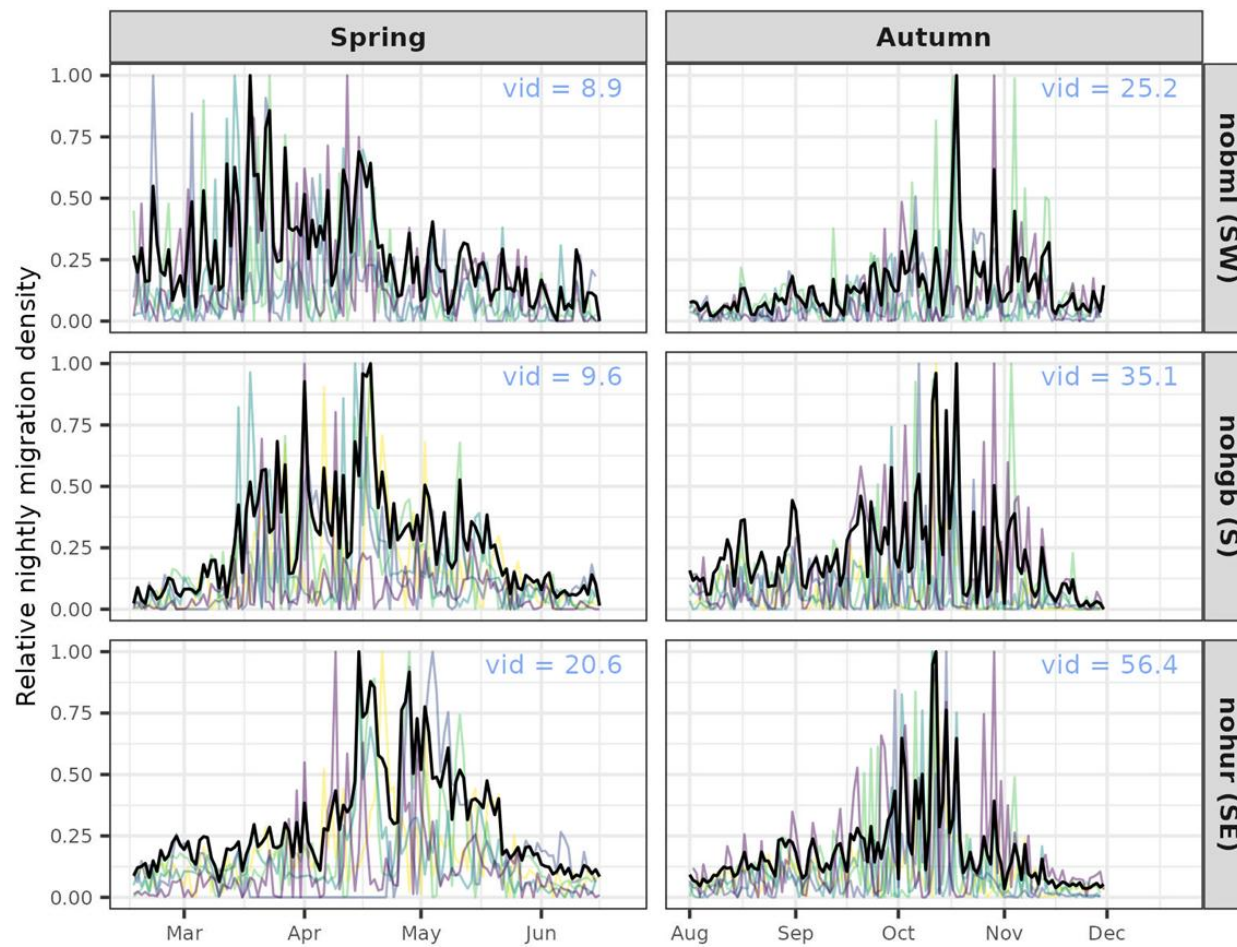
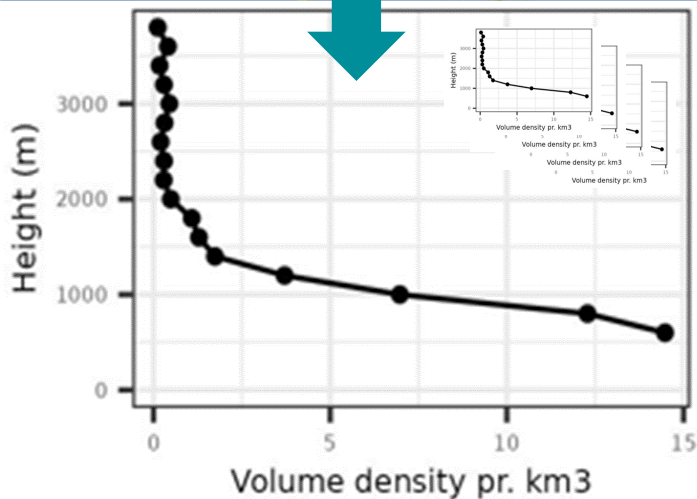
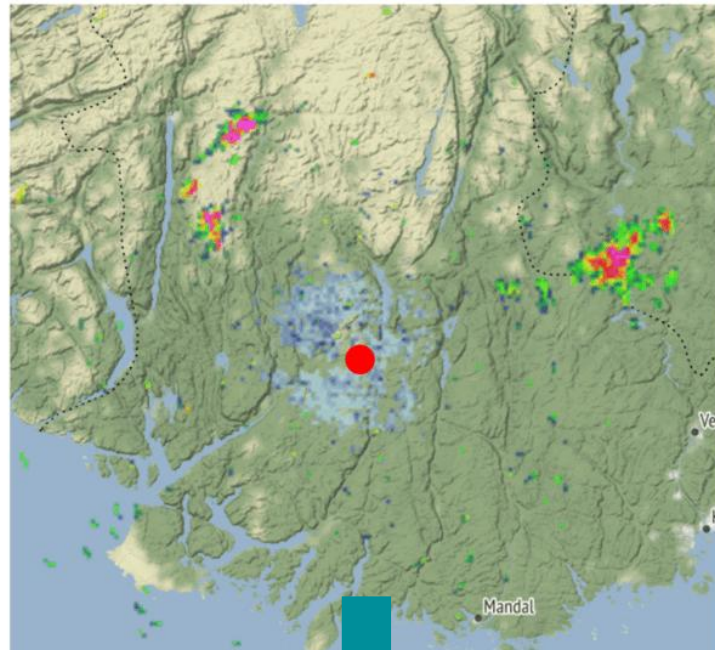
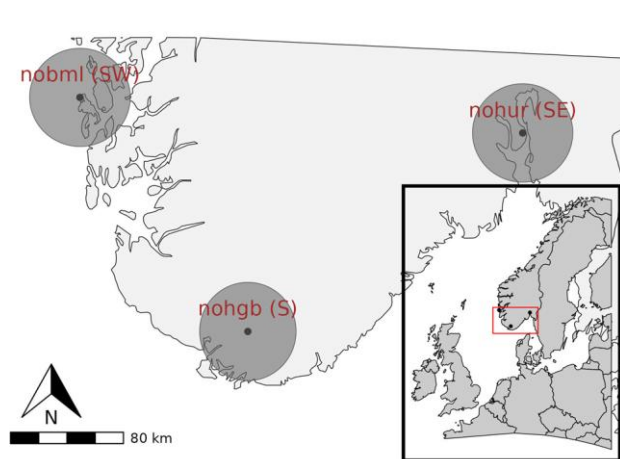
Kvalnes et al. 2025. D5.5: Holistic Assessment of Wind Energy Stewardship at WENDY Use Cases. WENDY deliverable

Livsyklusanalyse av havvind

- Risikoen er størst fra forstyrrelser og barrierereffekter
- Større/flere vindparker gir større barrierer for trekk
- Største påvirkning for sjøfugl, trekkende vannfugler, rovfugler og måker
- Trekk-korridoren mellom Sør-Norge og Danmark er en høyrisikosone

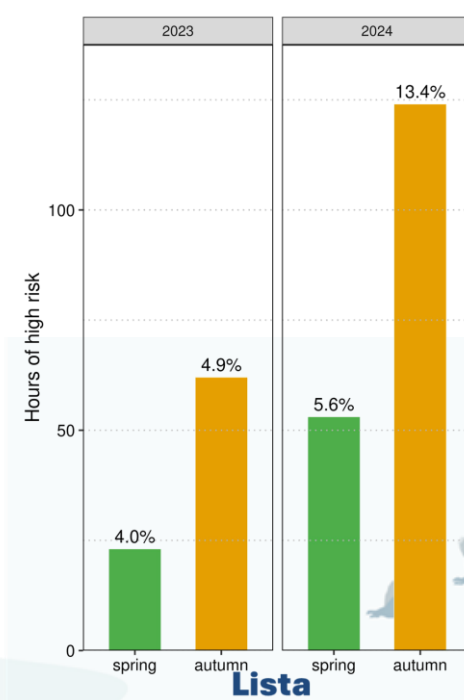


Værradar for fugletrekk



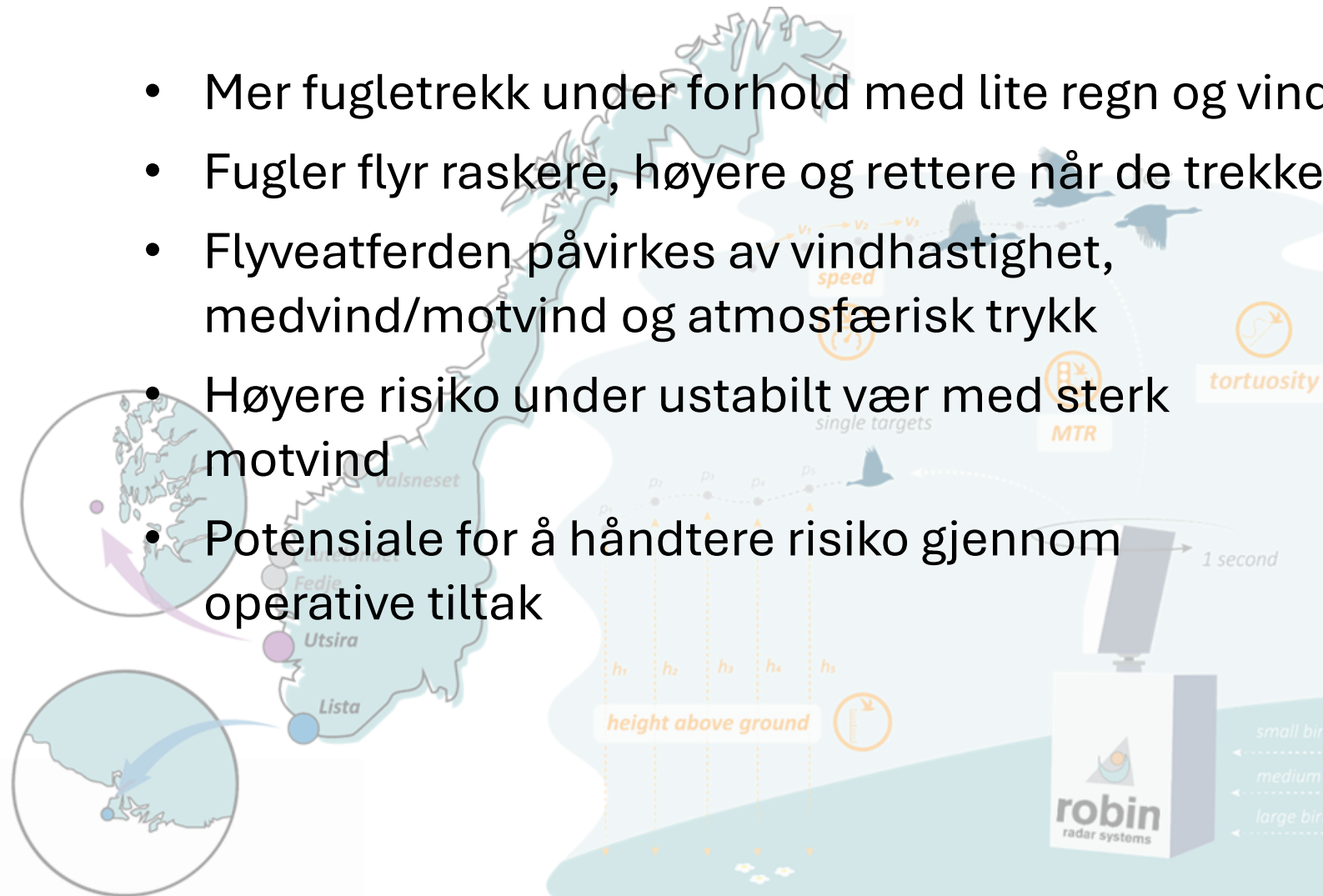
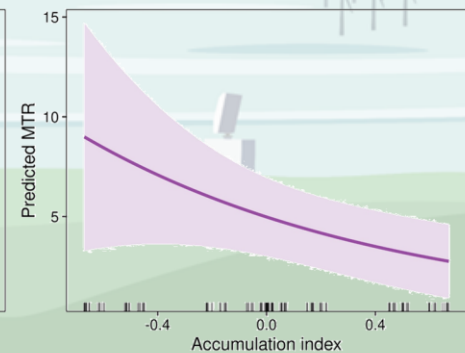
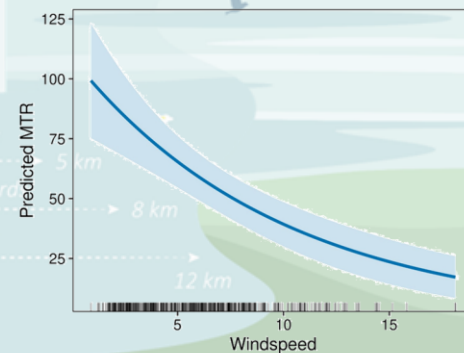
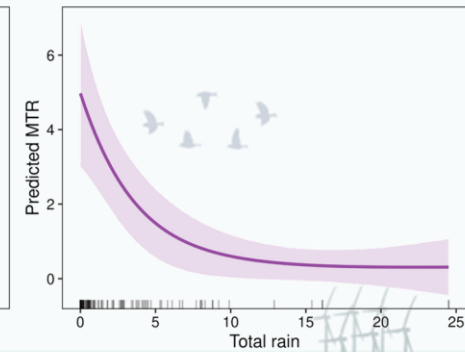
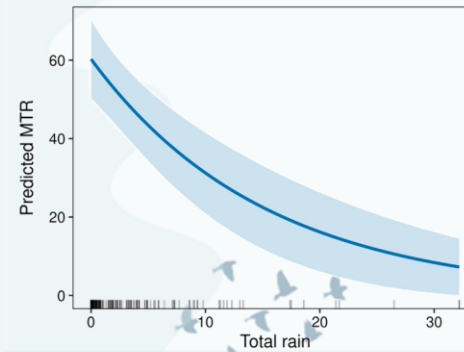
Fugleradar for fugletrekk

- Mer fugletrekk under forhold med lite regn og vind
- Fugler flyr raskere, høyere og rettere når de trekker
- Flyveatferden påvirkes av vindhastighet, medvind/motvind og atmosfærisk trykk
- Høyere risiko under ustabil vær med sterk motvind
- Potensiale for å håndtere risiko gjennom operative tiltak



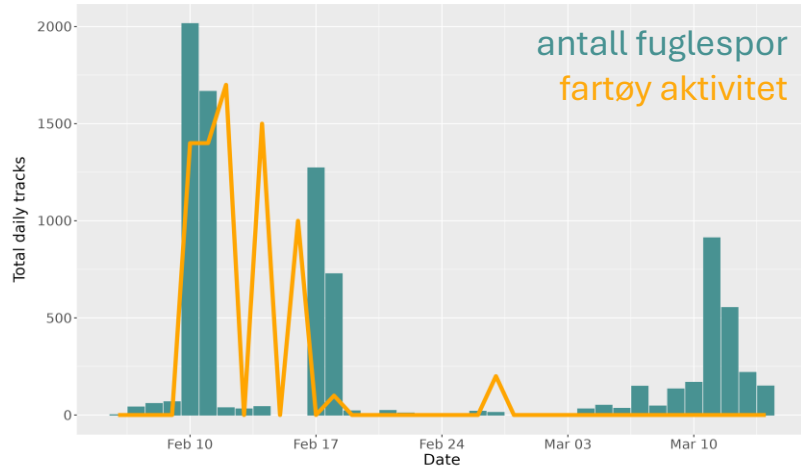
Lista

Utsira

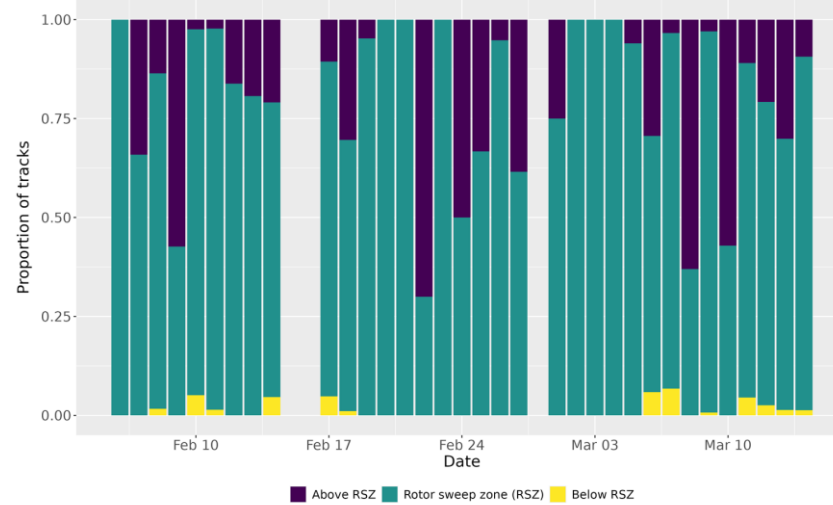


Fugleradar ute på havet

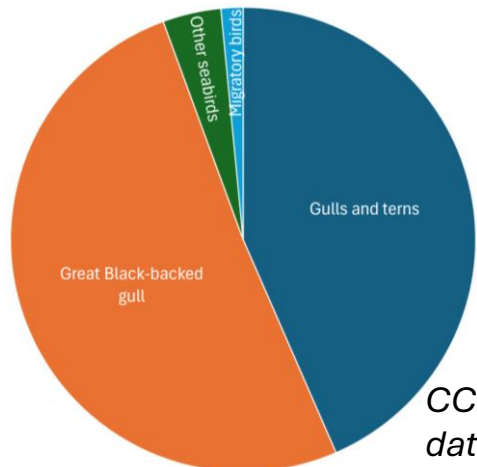
Hvor mange?



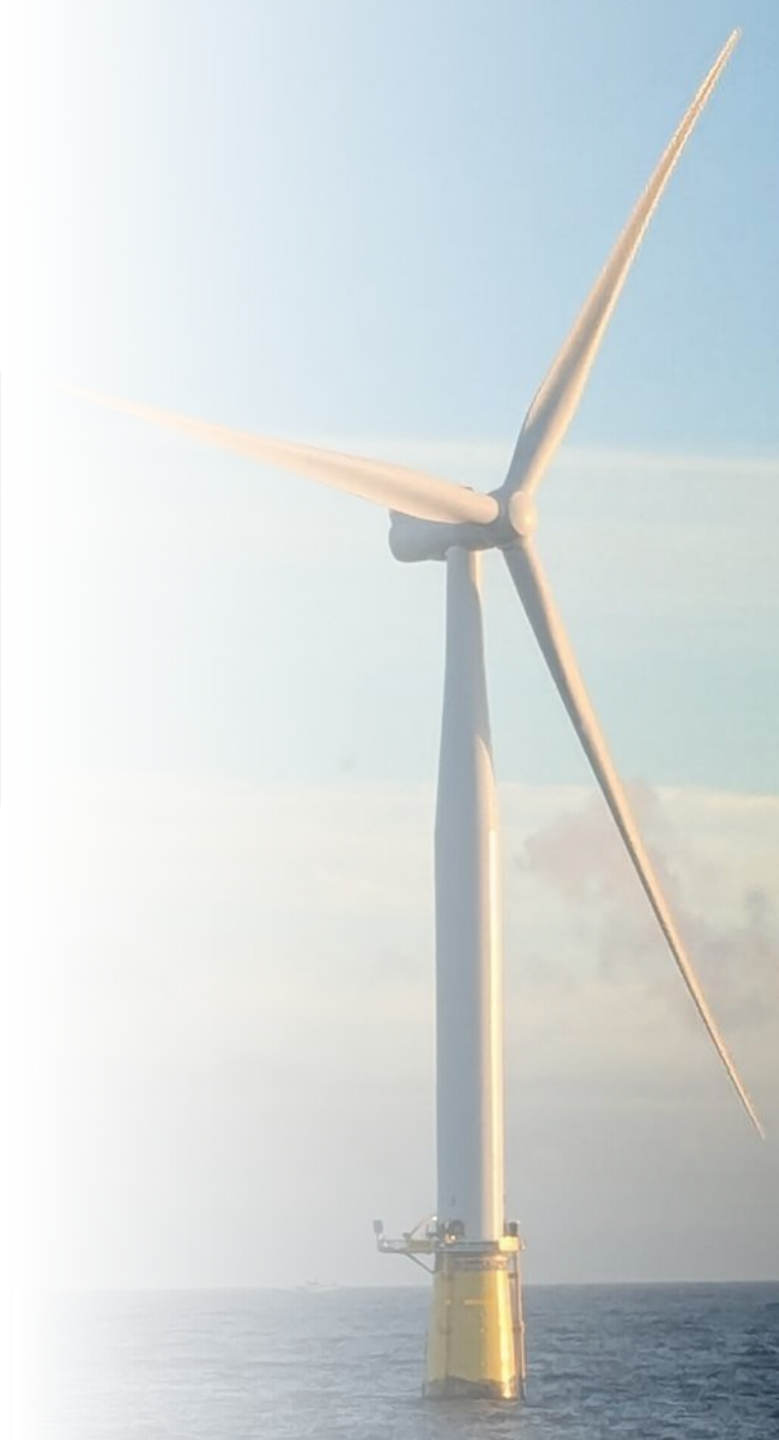
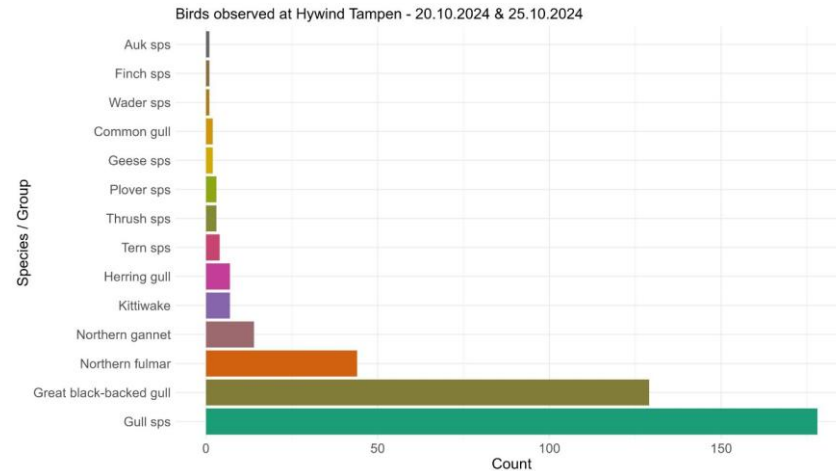
Hvor høy?



Hvem?

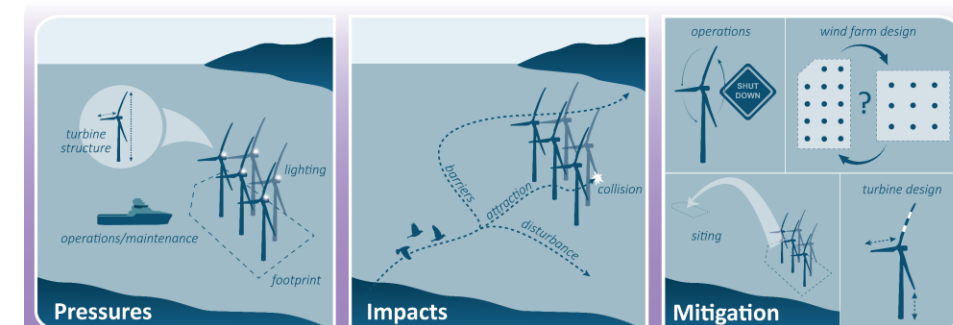
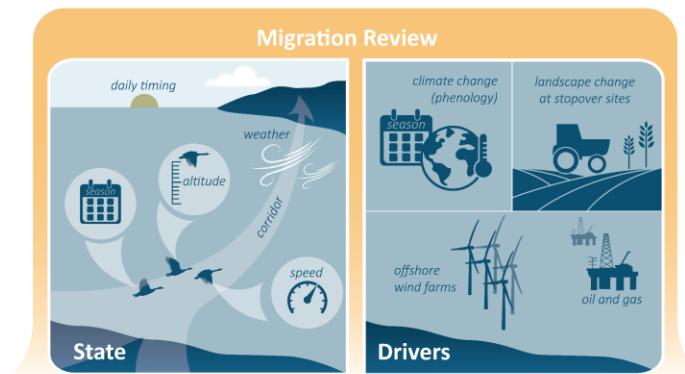
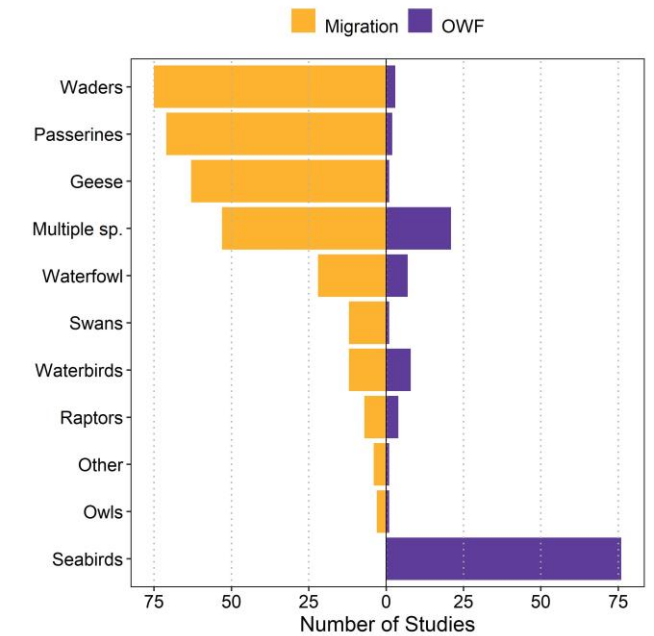


CCTV kamera data (Spoor)



Havvind og trekkende fugler

- Fenologi og påvirkning av klimaendringer godt studert
- Mangel på grunnleggende romlige og tidsmessige data for å vurdere den samlede belastningen av flere store havvindkraftverk
- Få studier om påvirkninger og potensielle avbøtende tiltak
- Prioriterte forskningsområder inkluderer:
 - Forbedret overvåking og sporing av trekkbevegelser
 - Vurdere virkninger på individuell kondisjon og på bestandsnivå
 - Evaluere effektiviteten av ulike avbøtende tiltak
 - Utvikling av sanntidsovervåkingsverktøy for å støtte planlegging og avbøtende tiltak

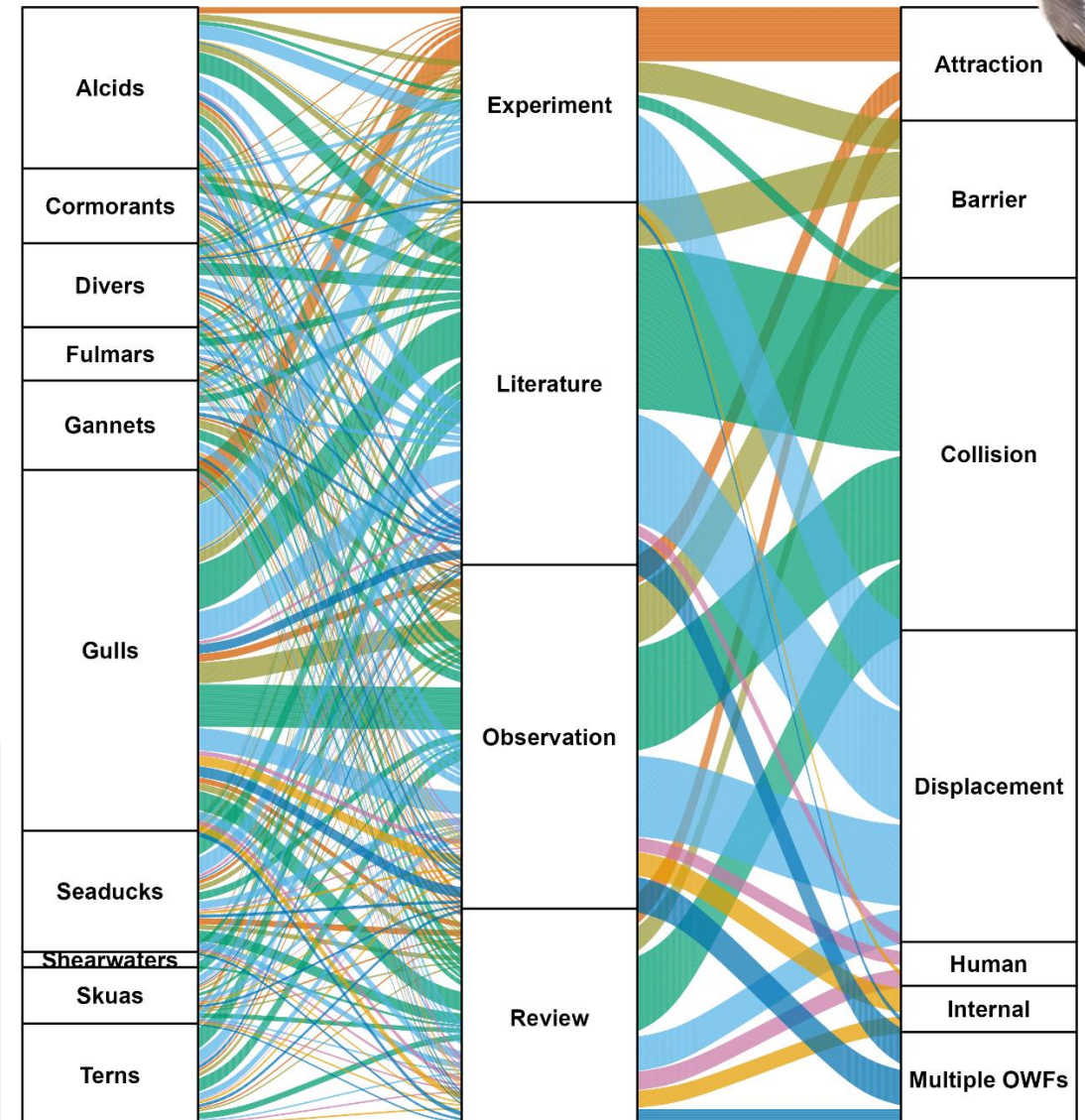
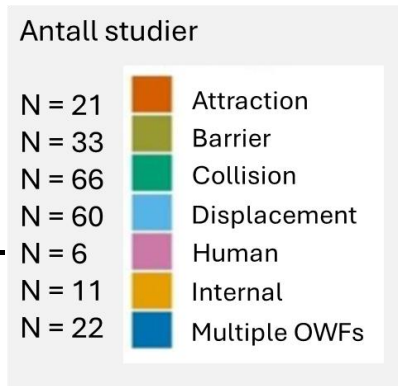


Virkninger av havvind på sjøfugl



Kunnskapshull

- Få studier andre steder enn Europa
- Få studier over lengre tid
- Få empiriske studier på bestandsnivå
- Lite kunnskap om samlet belastning
- Avbøtende tiltak nevnt men ikke evaluert → lokalisering
- Få eksperimentelle før-etter-kontroll-impact studier

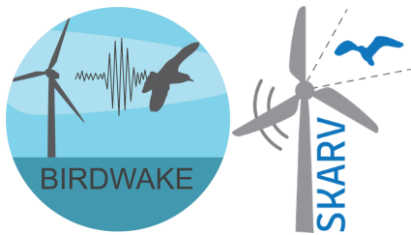


Oppsummering



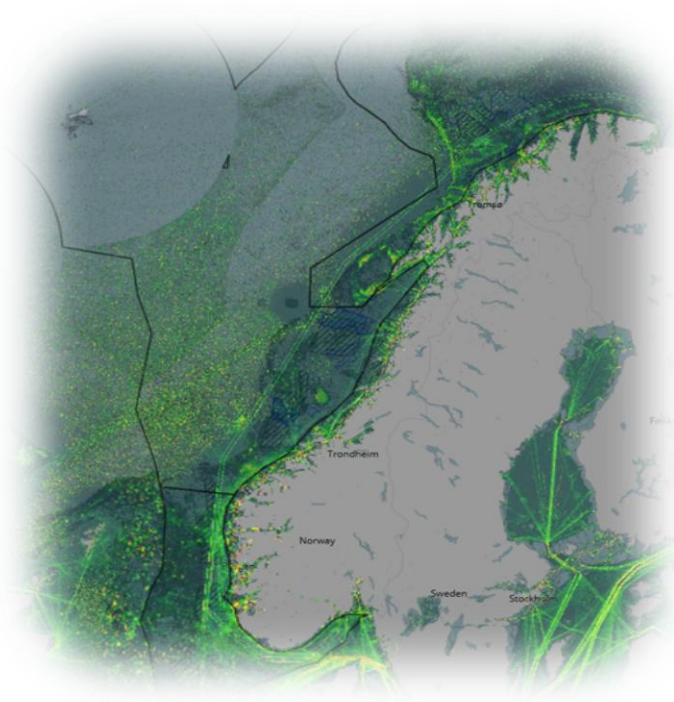
Anbefalinger

- Stort behov for langtids-
overvåking av sjøfugl og
fugletrekk
- Strategisk og tverrsektorell
forskningsprogram for å
belyse den samlede
belastningen
- Implementer og evaluer
avbøtende tiltak som vanlig
praksis



Sjøfugl som et prioritert næring

- Et fult hav...uten marint vern
 - 4.5% → 30% i 2030
- Jevons paradoks
 - Økt ressurseffektivitet leder til økt ressursbruk, hvor
 - havvind ikke erstatter olje & gass
 - akvakultur ikke erstatter fiskeri
 - ...men de erstatter marint vern
- Sjøfugler går mot utryddelse
 - 1-3% nedgang per år
- 'Shifting baselines syndrome'
 - Stykkevis forringelse
 - Langsom tap av artsmangfoldet
 - Generasjons hukommelsestap
 - Utryddelse av opplevelser



Takk for meg



NINA

Norwegian Institute for Nature Research