Intaros – general assembly 2021

Task 6.2
Improved ecosystem understanding and management

Lead: Institute of Marine Research (IMR), Gro I. van der Meeren

Contributors: Aarhus University (AU)

Greenland Institute of Natural Resources (GINR)

Technical University of Denmark (DTU)

Demonstrate how an iAOS can:

- **contribute** towards validation
- **allow** for use of ecological models like NORWECOM and Atlantis
- **build upon** the existing environmental and fisheries reporting and management systems for the case areas to demonstrate how data from iAOS may allow for implementing similar procedures in other parts of the Arctic (see alsoTask 6.8).

IMR data available on OPeNDAP

CTD data

	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
G.O. Sars																										
Johan Hjort																										
Helmer Hansen																										
Kristine Bonnevie																										
Håkon Mosby																										
Jan Mayen																										
Michael Sars																										
Sarsen																										

Mooring data from Barents Sea Opening

BSO1	71,5 N	20,0 E	1997 - 2017
BSO2	72,0 N	20,0 E	1997 - 2017
BSO2B	72,25 N	20,0 E	1997 - 2017
BSO3	72,5 N	20,0 E	1997 - 2017
BSO3B	72,75 N	20,0 E	1997 - 2017
BSO4	73,0 N	20,0 E	1997 - 2017
BSO5	73,5 N	20,0 E	1997 - 2017

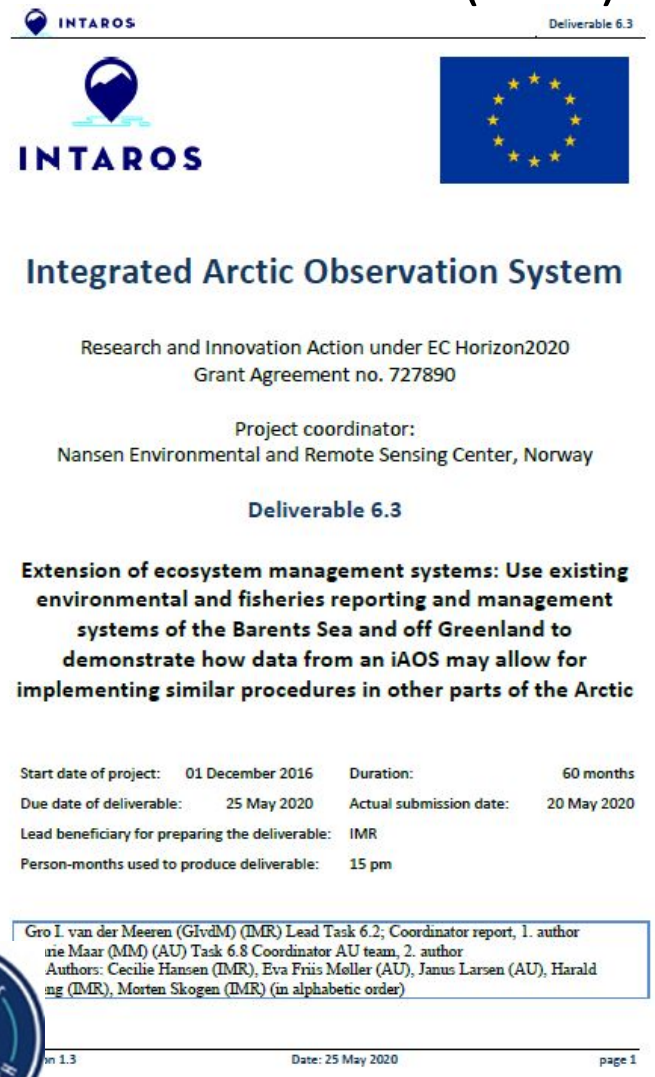
Data published in 2020 at NMDC and registered in the INTAROS catalogue

- Distribution simulation:
  - Herring 2010 – 2069
  - Mackerel 2010 – 2069
  - Blue whiting 2010 – 2069

- Overfishing simulation:
  - Herring 2015 – 2025
  - Mackerel 2015 – 2025
  - Blue whiting 2015 - 2025

Results by January 2021

Deliverables 6.3 (M42)



INTAROS Deliverable 6.3

INTAROS

Integrated Arctic Observation System

Research and Innovation Action under EC Horizon2020
Grant Agreement no. 727890

Project coordinator:
Nansen Environmental and Remote Sensing Center, Norway

Deliverable 6.3

Extension of ecosystem management systems: Use existing environmental and fisheries reporting and management systems of the Barents Sea and off Greenland to demonstrate how data from an iAOS may allow for implementing similar procedures in other parts of the Arctic

Start date of project:	01 December 2016	Duration:	60 months
Due date of deliverable:	25 May 2020	Actual submission date:	20 May 2020
Lead beneficiary for preparing the deliverable:	IMR		
Person-months used to produce deliverable:	15 pm		

Gro I. van der Meeren (GIvdM) (IMR) Lead Task 6.2; Coordinator report, 1. author
…rie Maar (MM) (AU) Task 6.8 Coordinator AU team, 2. author
Authors: Cecilie Hansen (IMR), Eva Friis Møller (AU), Janus Larsen (AU), Harald …ng (IMR), Morten Skogen (IMR) (in alphabetic order)

…n 1.3 Date: 25 May 2020 page 1

Papers

Hansen, C., van der Meeren, G., Loeng, H. and Skogen, M.D., resubmitted, **Assessing the state of the Barents Sea using indicators. How, when and where?** ICES journal of marine science jan. 2021

Larsen J., Maar M., Mohn C., Pastor A., 2020. **A versatile marine modelling tool applied to arctic, temperate and tropical waters.** PLOS ONE 15(4): e0231193. https://doi.org/10.1371/journal.pone.0231193.

Note

Hansen, C., van der Meeren, G., Loeng, H. and Skogen, M.D., INTAROS: INTEGRATED ARCTIC OBSERVATION SYSTEM (INTAROS)
Barentshavet analysert med økosystem-modeller basert på observerte indikatorer; benyttes de beste indikatorene og er omfanget av datainnhenting optimalt?
Note (in Norwegian) to be discussed by Norwegian stakeholders 2021 at seminar January 2021. Bergen/Austevoll 3. november 2020

INTAROS

Objective & models

How well do the indicators from the Barents Sea management respond to changes in climate and fisheries, does it matter when and where the observations are sampled, and can they be used in management?

A selection of the indicators in the management plan was evaluated by using two end-to-end ecosystem models; NORWECOM.e2e and NoBa Atlantis

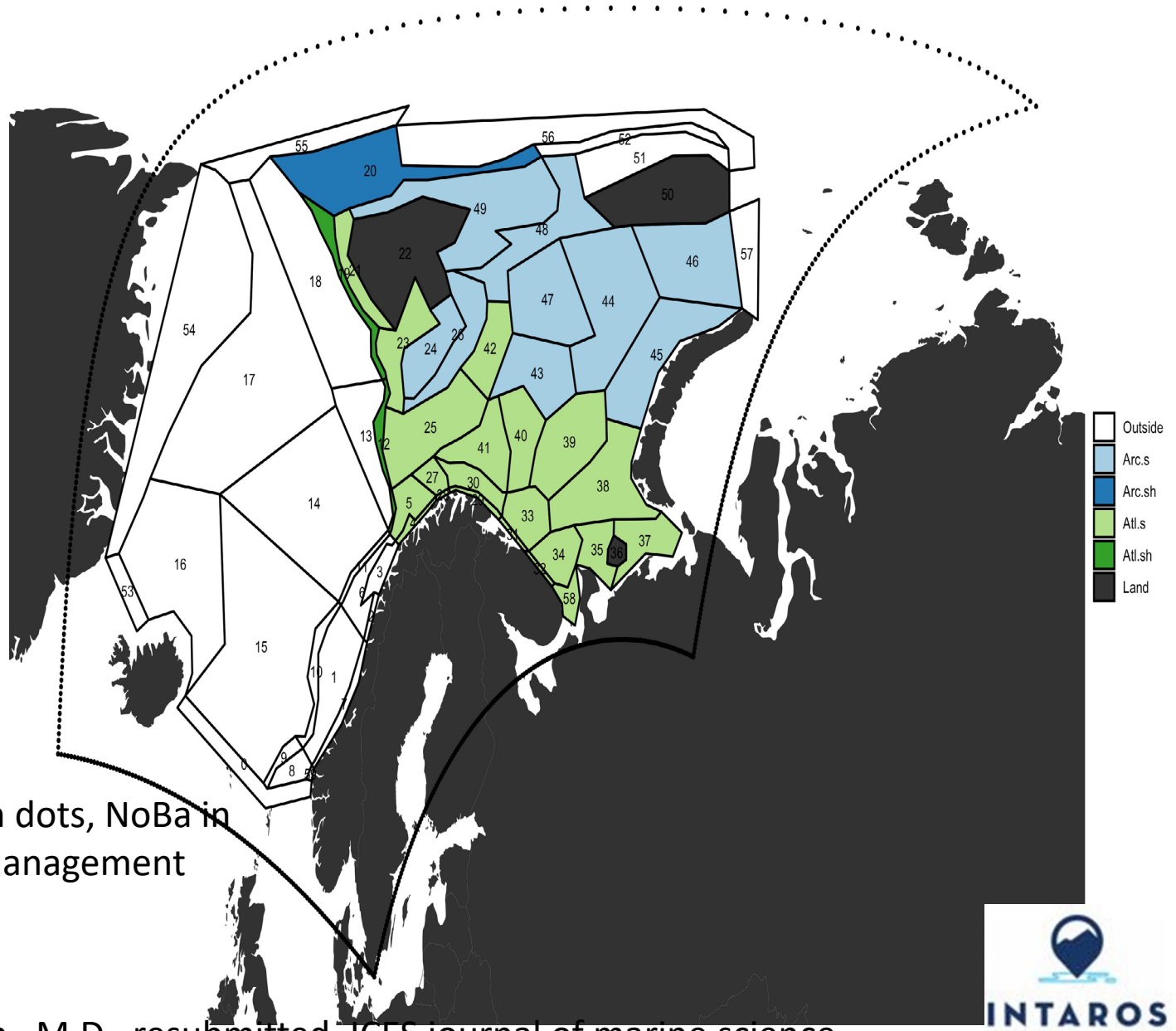
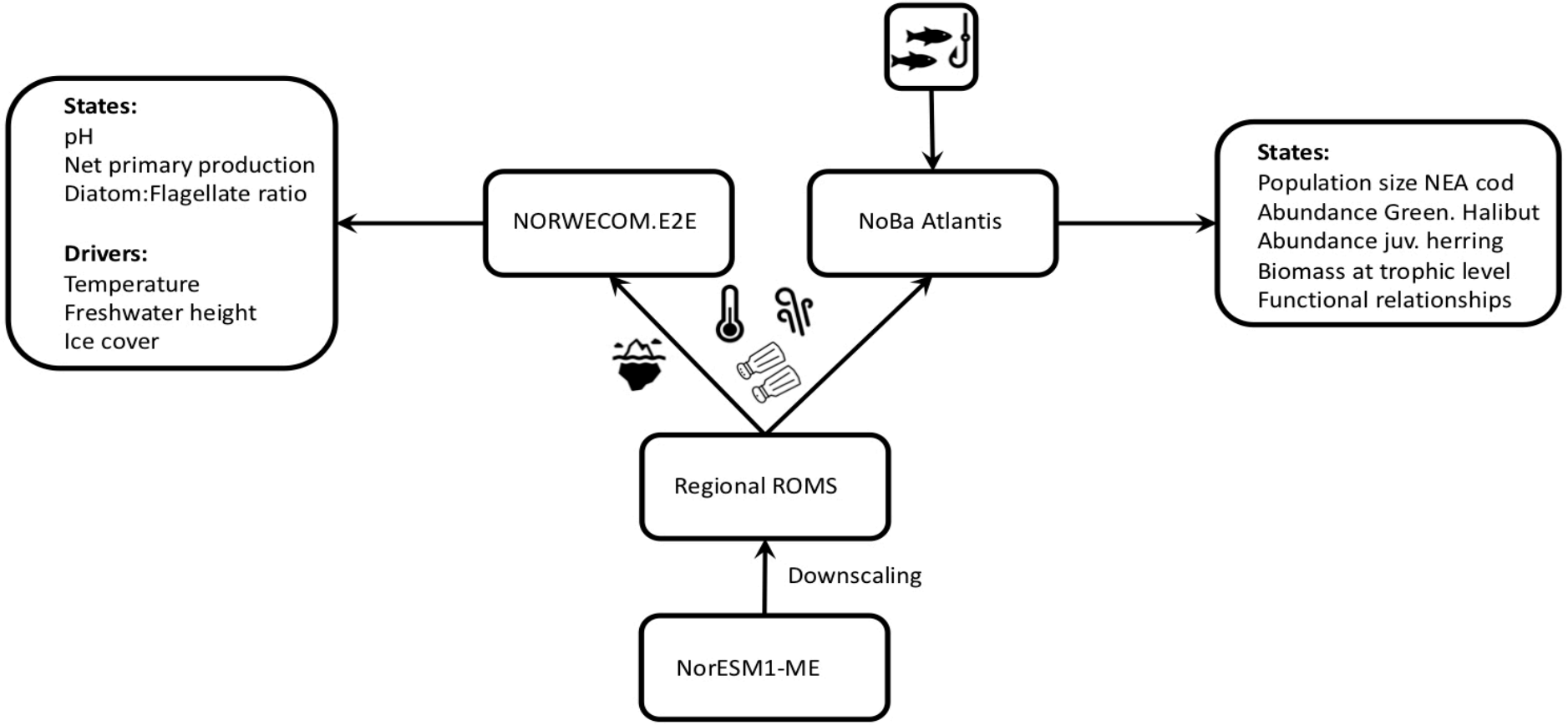


Figure: NORWECOM.e2e model domain in dots, NoBa in solid lines, and Indicator areas from the management plans marked in colors.

Hansen, C., van der Meeren, G., Loeng, H. and Skogen, M.D., resubmitted, ICES journal of marine science

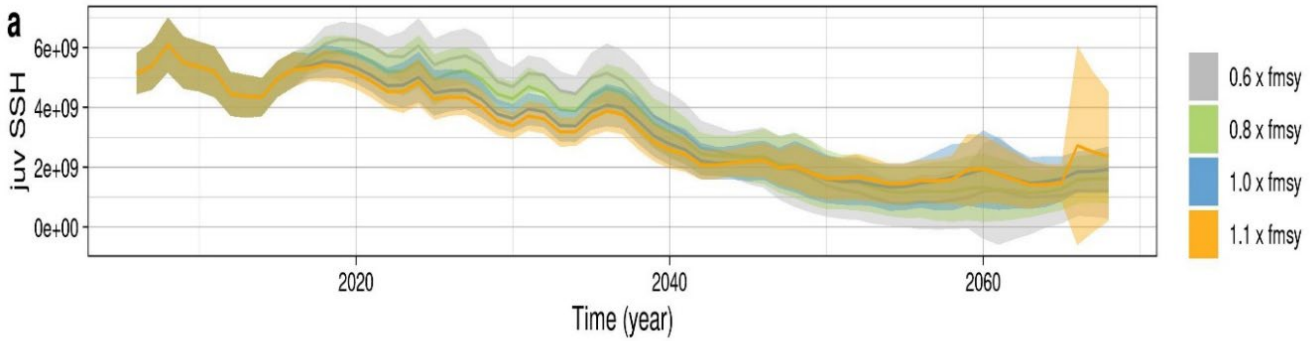
Indicators and model system



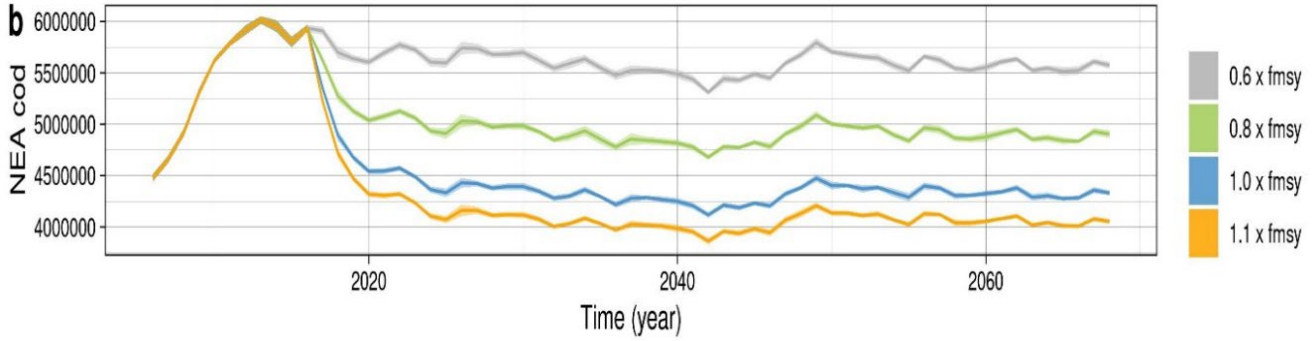
Hansen, C., van der Meeren, G.I., Loeng, H. and Skogen, M.D., resubmitted, ICES journal of marine science

Time series of abundance historic and projected (NoBa Atlantis)

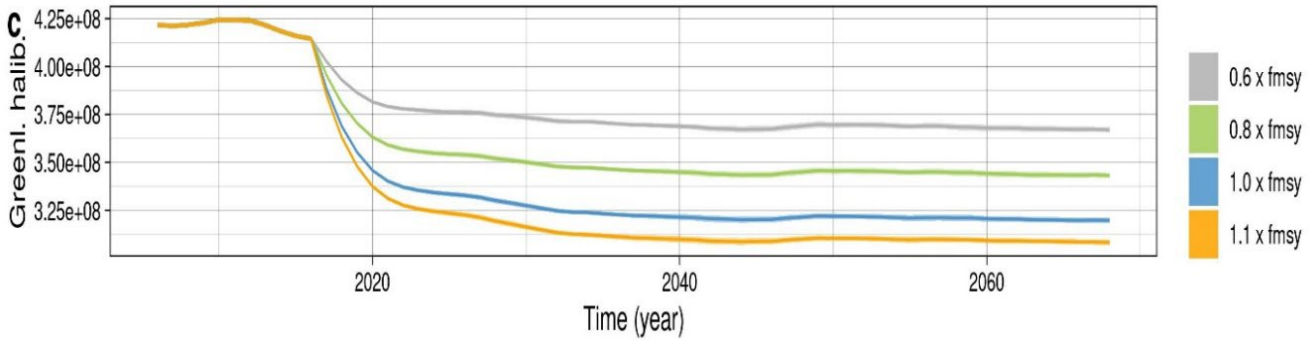
Young herring



Greenland halibut

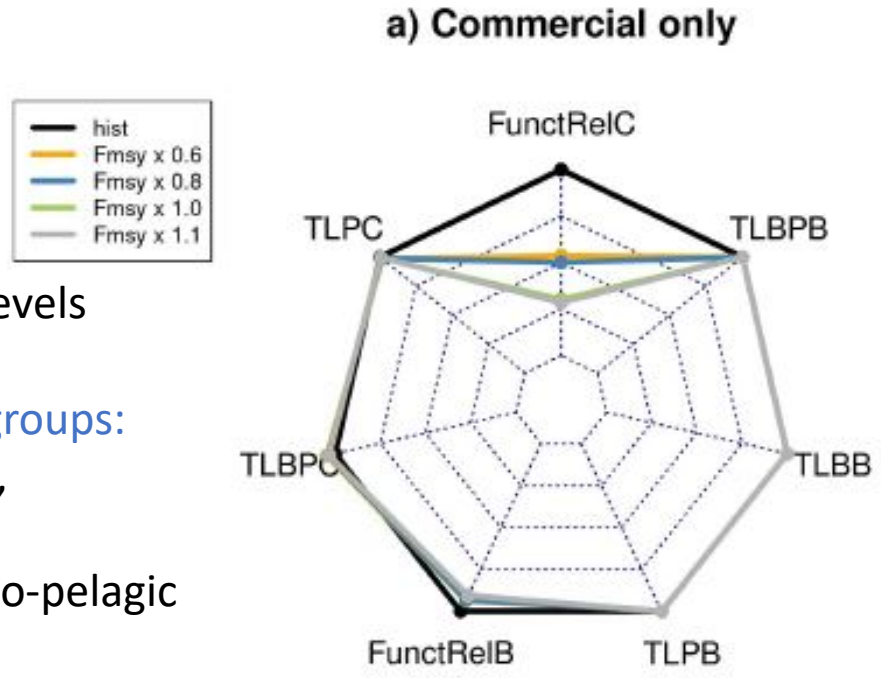


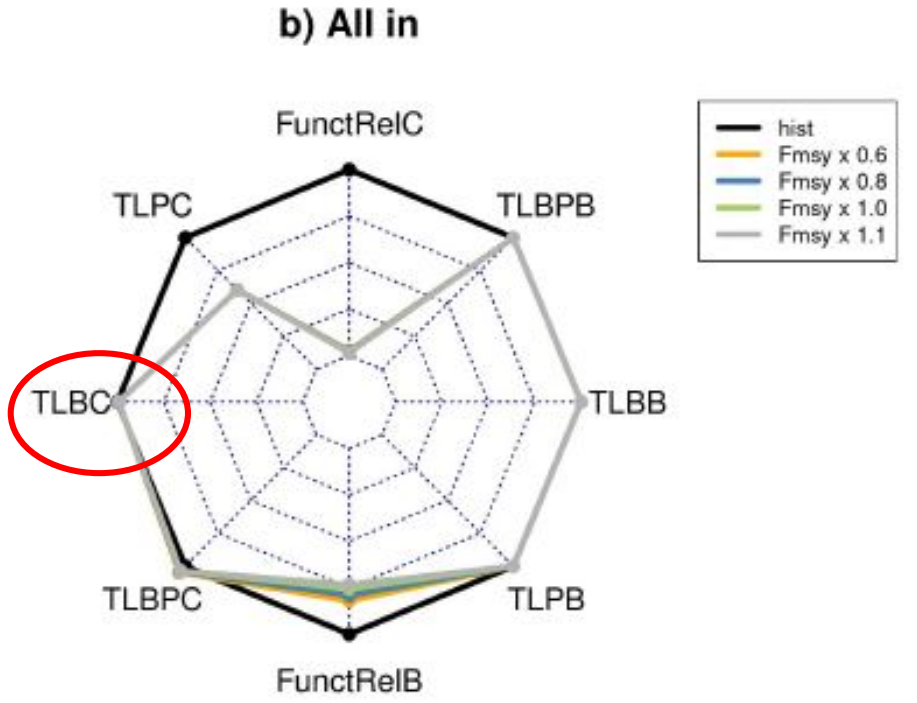
NEA cod



Hansen, C., van der Meeren, G.I., Loeng, H. and Skogen, M.D., resubmitted, ICES journal of marine science

Historic and projected status for selected complex indicators based on various fisheries impact (NoBa Atlantis)





TL-Trophic levels

Functional groups:

- P - pelagic,
- B- Benthic
- PB - bentho-pelagic

Functional relationships:

- C- Catches (FuncRelC; TLPC; TLBPC; TLBC)
- B- Biomass (FuncRElB; TLBPB; TLBB; TLPB)

There were few differences between the scenarios including harvest on additional ecosystem components. Those including the commercial components only

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Sensitivity in net primary production indicator in time and space

(NORWECOM.E2E)

	Best results			Less (not least) good results		
	Polygon	**Month**	**Corr**	**Polygon**	**Month**	**Corr**
Atlantic	33	April	0.54	30	April	0.27
Arctic	47	July	0.69	47	May	0.01
Atlantic edge	19	July	0.56	12	May	0.02
Arctic edge	20	May	0.66	20	June	0.30

	Polygon1	Polygon2	Polygon3	Month1	Month2	Month3	Corr
Atlantic	33			April	August		0.55
	23	32		April			0.59
	5	33		July	April		0.65
	33			April	June	July	0.61
	23	32	33	April			0.61
	29	30	33	August	July	June	0.71

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Conclusions

- The abiotic indicators (e.g. temperature, fresh water height) serves more as a tool to report on climate trends rather than ecosystem status
- The indicators are extremely dependent upon location and time of observation
- Complex indicators (trophic level, functional relationship) gives a good overview of overall changes in the system, but can conceal changes in the individual populations
- The lack of socioeconomic indicators prevents a holistic view of the ecosystem
- To be effectively used for management purposes, the indicators needs to be more closely linked to threshold values and management actions

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Next steps and deliverabels

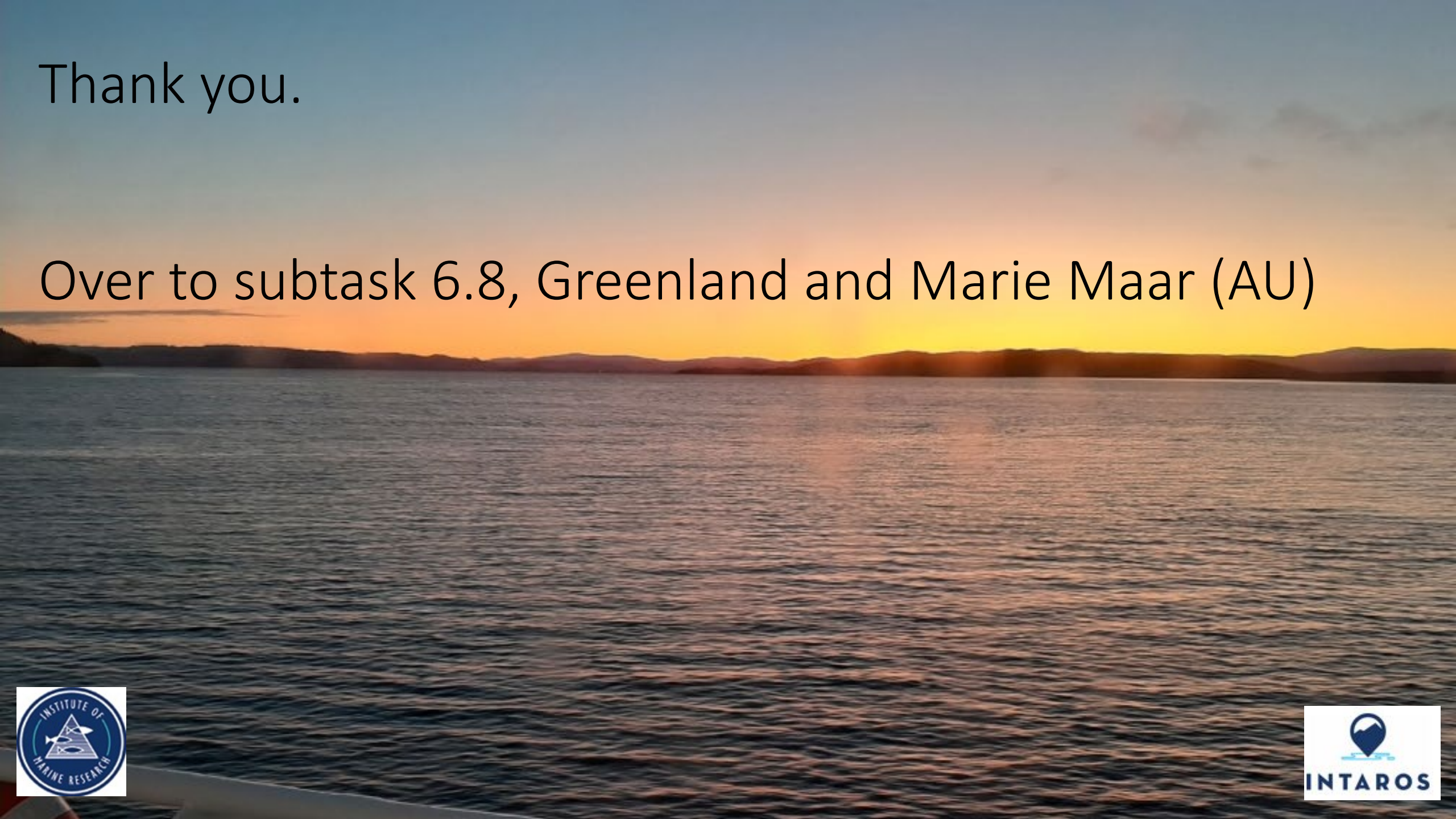
Stakeholder communication and collaboration

- Working group meeting with national management bodies in Norway (20. January 2021)

  Aim: Discuss the use, usefulness and types of indicators needed and wanted by legisators and managers

- Continued collaboration and share of information with subtask partners for preparing and deliver on stakeholdes

- Milestones IMR Subtask 6.2/6.8:
  - Report with input, advices and reccomendations from this workshop as D. 6.10 (M54)
  - Publshing new tests of inputs and advices, for robustnes and value of the suggestions (Spring/summer 2021)
  - Final results from workshop and papers, to be included in D. 6.13 (M58)
  - Dissemination WP7 products published by end of project


Thank you.
Over to subtask 6.8, Greenland and Marie Maar (AU)
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