Integrated Ecosystem Assessments in ICES Working Groups

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ICES
CIEM
Science for sustainable seas

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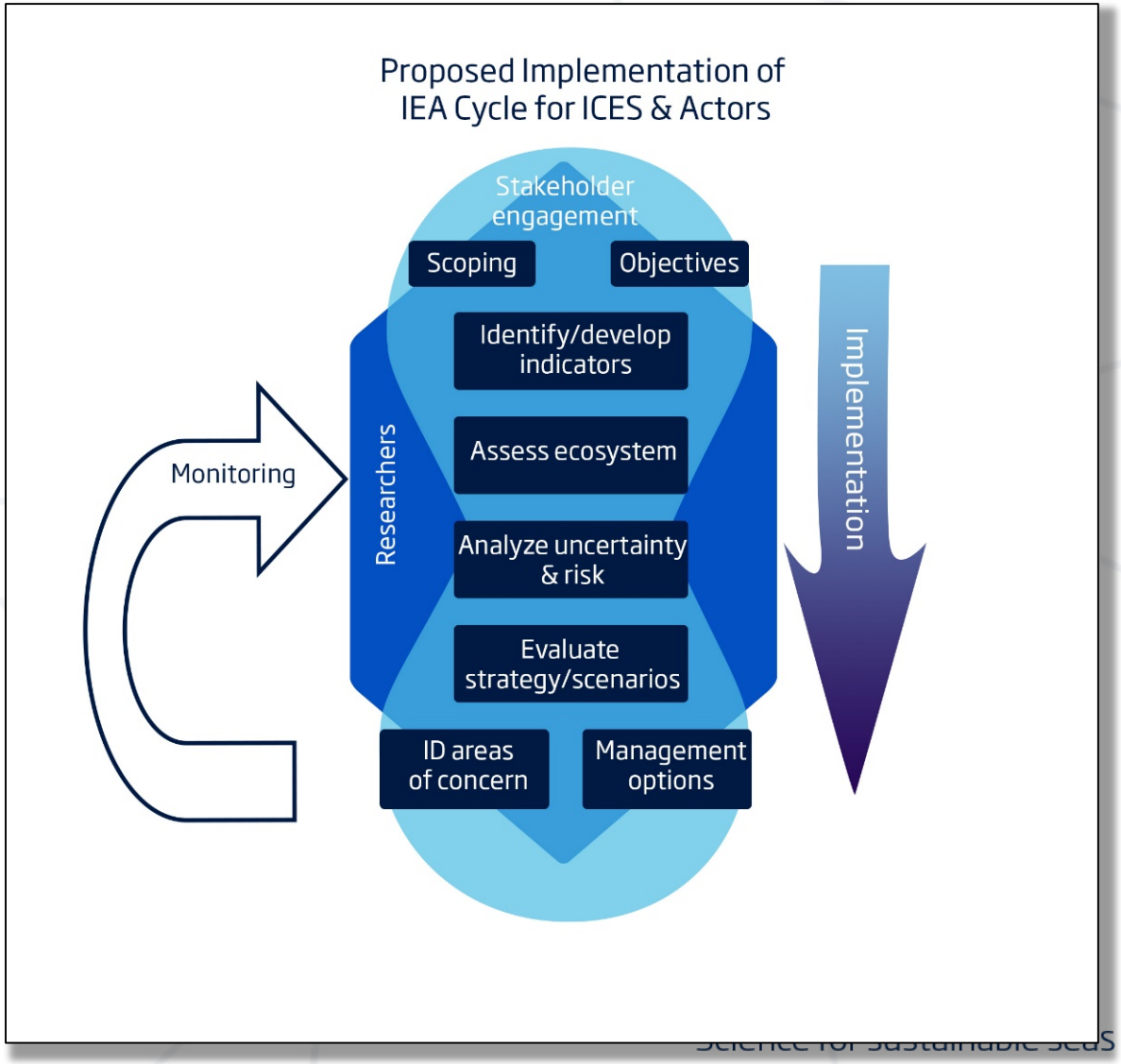
Integrated Ecosystem Assessments

- Assessment: describing the state and trajectory of the ecosystem
- Integration: jointly consider information from different ecosystem components

Integrated Ecosystem Assessments

IEA is “a synthesis and quantitative analysis of information on relevant physical, chemical, ecological and human processes **in relation to specified ecosystem management objectives”**. (Levin et al. 2009, ICES 2012 WKBEMIA)

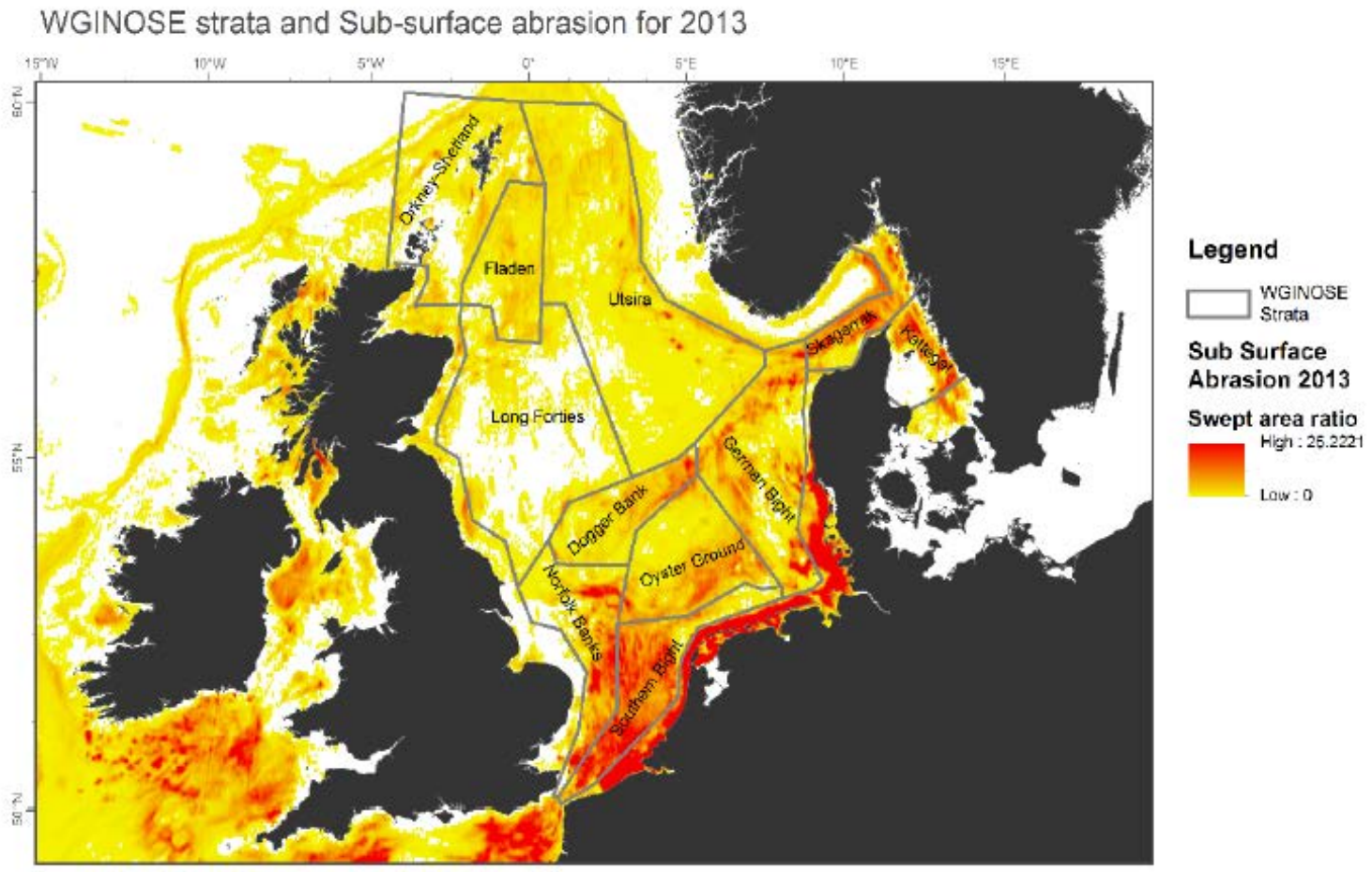


8 ICES IEA expert groups

ICES/HELCOM Working Group on Integrated Assessments of the Baltic Sea (WGIAB)

Science for sustainable seas

Multiple spatial and temporal scales



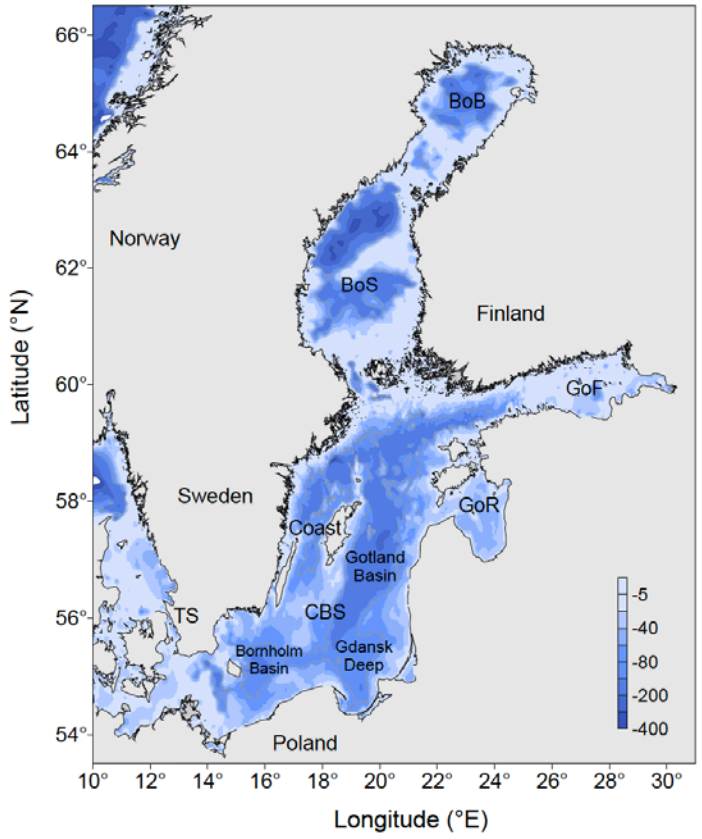
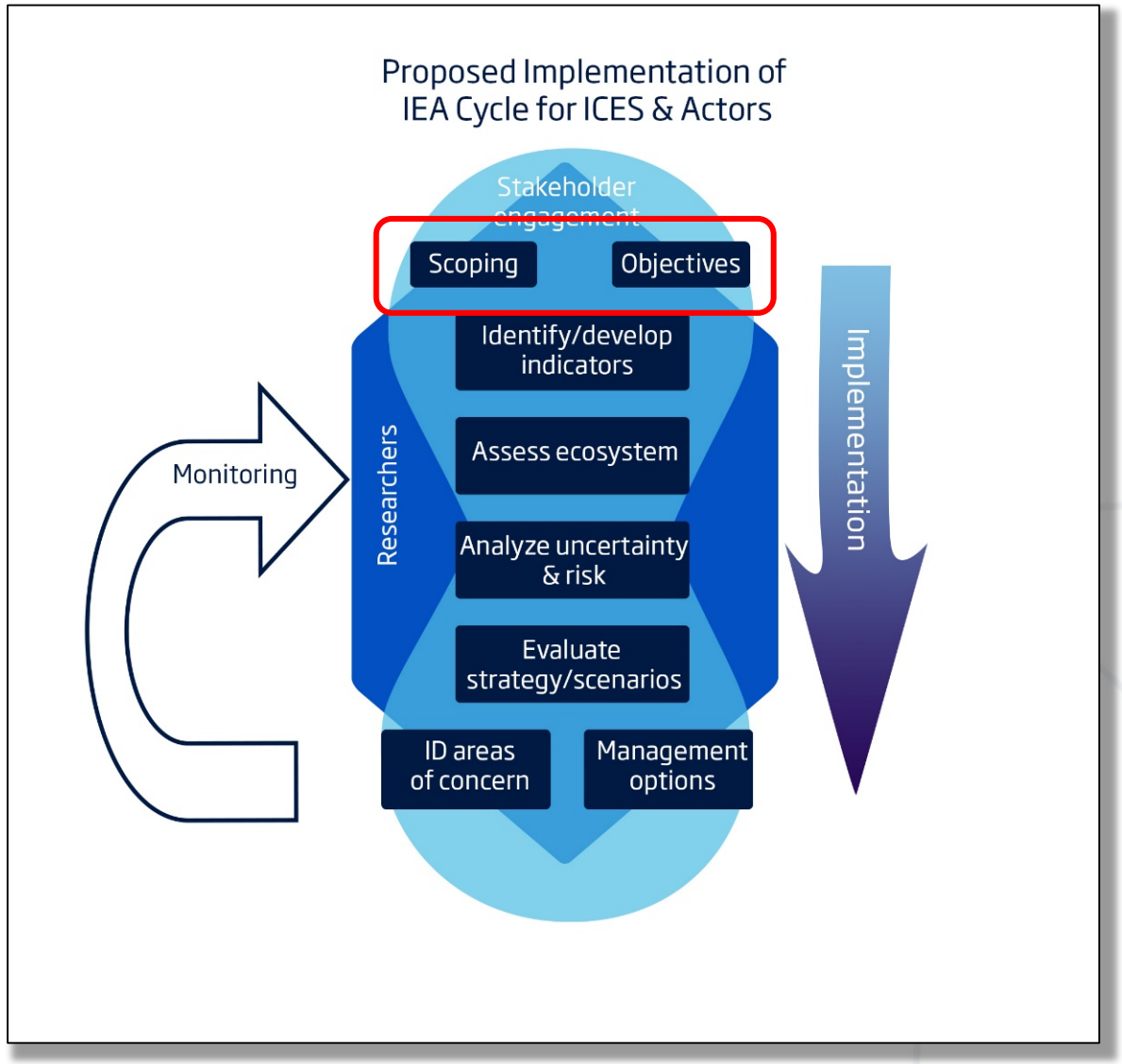


Figure 1.1. Map of the Baltic Sea with the seven sub-ecosystems investigated by WGIAB: TS = the Sound, CBS = central Baltic Sea (including Bornholm Basin, Gotland Basin, and Gdańsk Deep), GoR = Gulf of Riga, GoF = Gulf of Finland, BoS = Bothnian Sea, BoB = Bothnian Bay, and COAST = a coastal ecosystem in the Baltic proper.

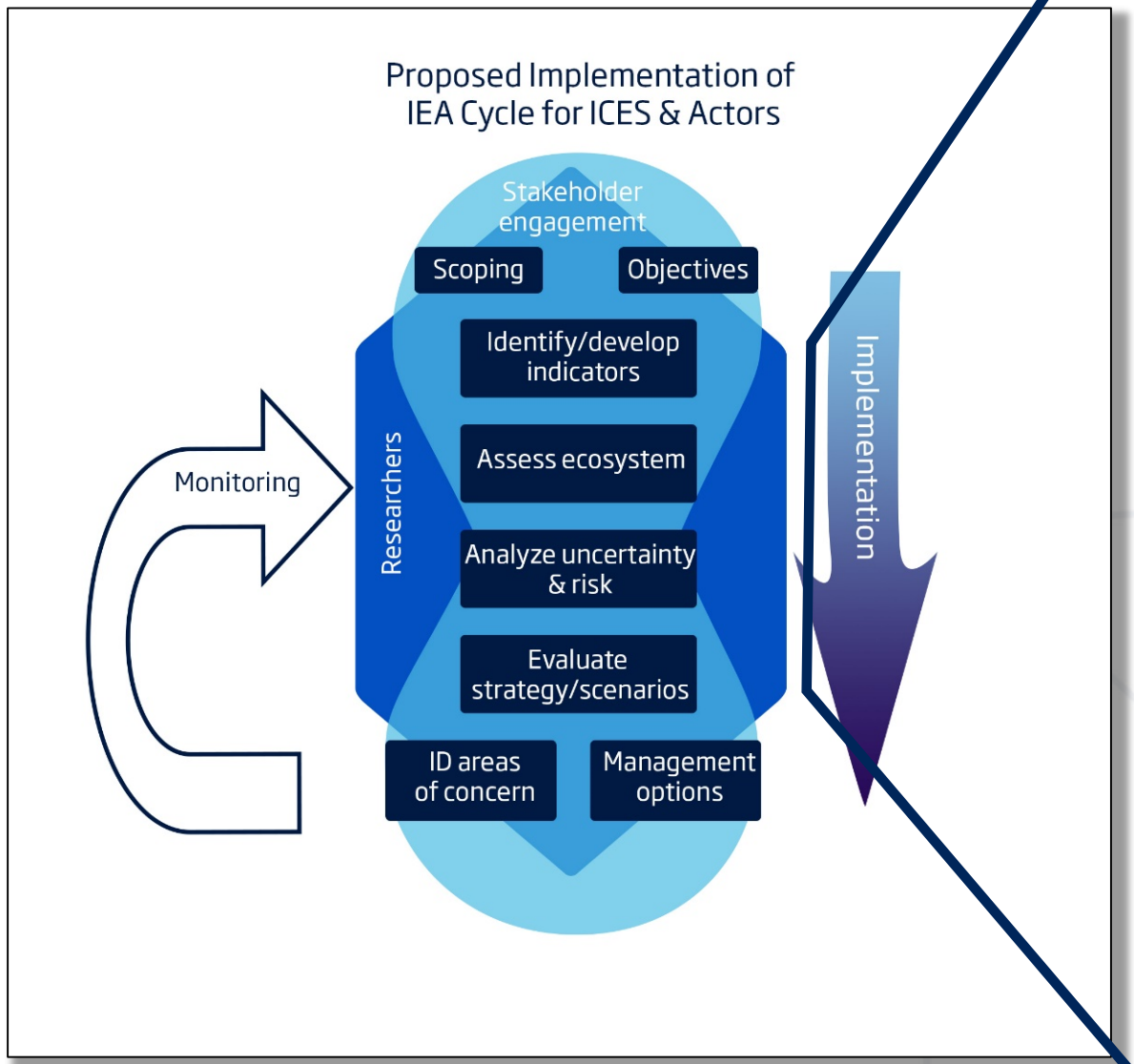
IEA in ICES perspective



Scoping of ecosystem management objectives – currently much focus

- Legislations, international agreements, managers, other stakeholders….
- Focus on externally defined objectives
  - Effectively bridging disciplines;
  - From negotiation to considering how collective disciplines contribute to solving the problem
  - Overcome barriers - individual discipline's priorities, communication and culture (DePiper et al. 2017)

IEA in ICES perspective



Observations

Aggregated data & indicators

Model output

Publications

Integrated analyses
Identifying scenarios
Modelling & scenario testing
Expert judgements

Ecosystem state and change

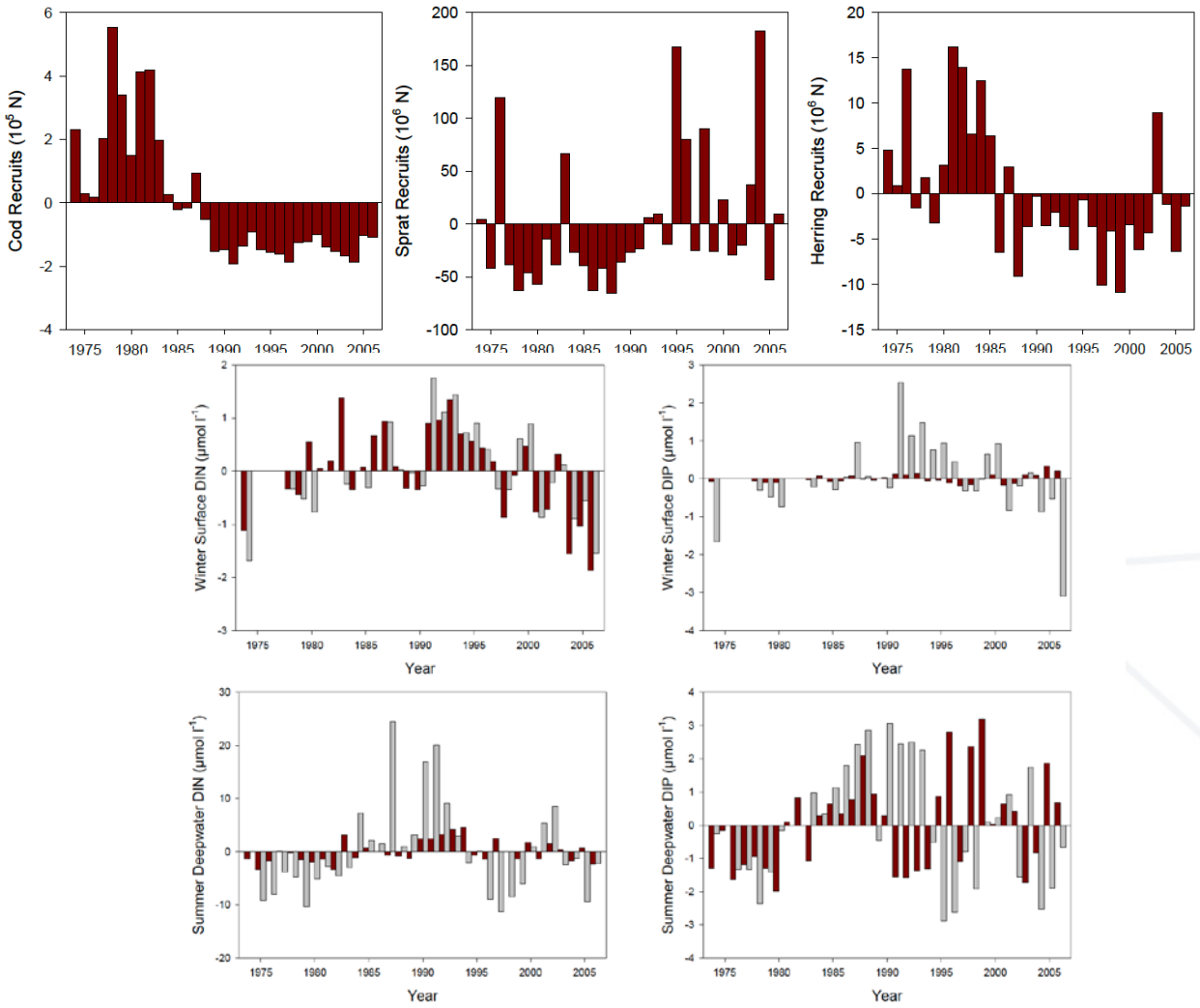
Main drivers

Cumulative effects

Vulnerability
Risks
Sustainability

Management strategies & options

Single time series



WGIAB, Diekmann & Möllmann, 2015

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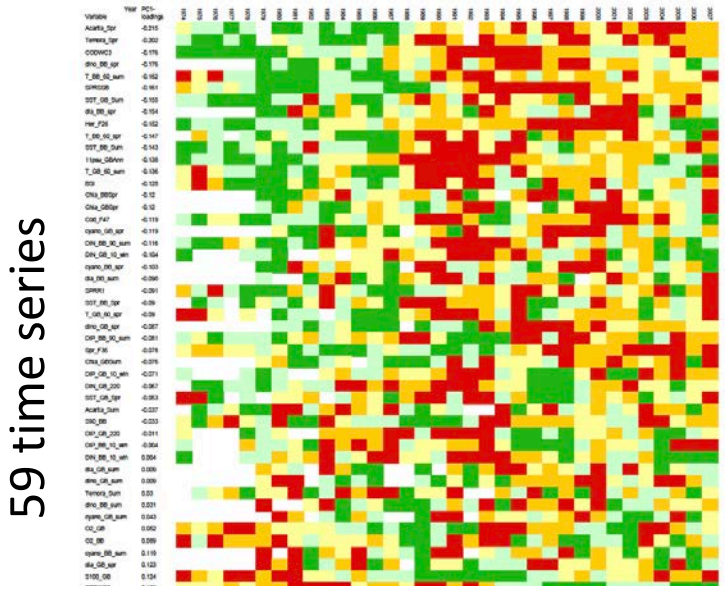
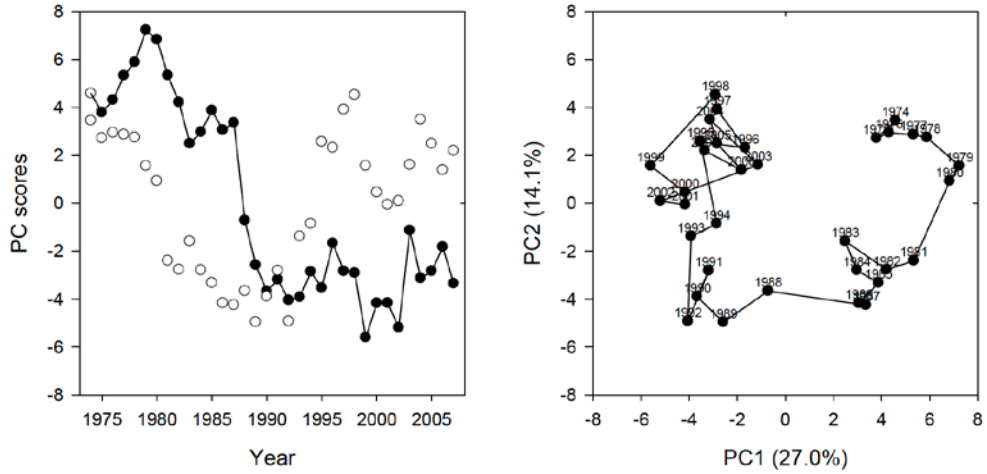
Integrated Trend Analysis (ITA)





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Integrated Trend Analysis (ITA)

ICES Journal of Marine Science

ICES Journal of Marine Science (2017), doi:10.1093/icesjms/fsx223

Principal component analyses for integrated ecosystem assessments may primarily reflect methodological artefacts

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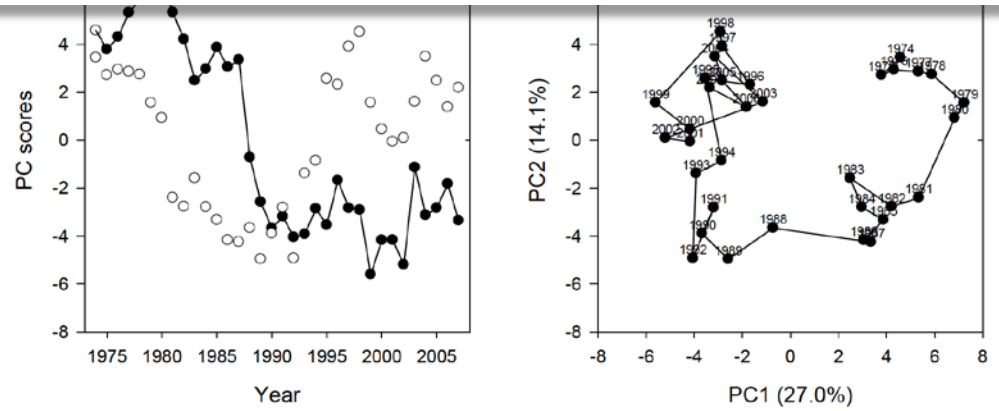

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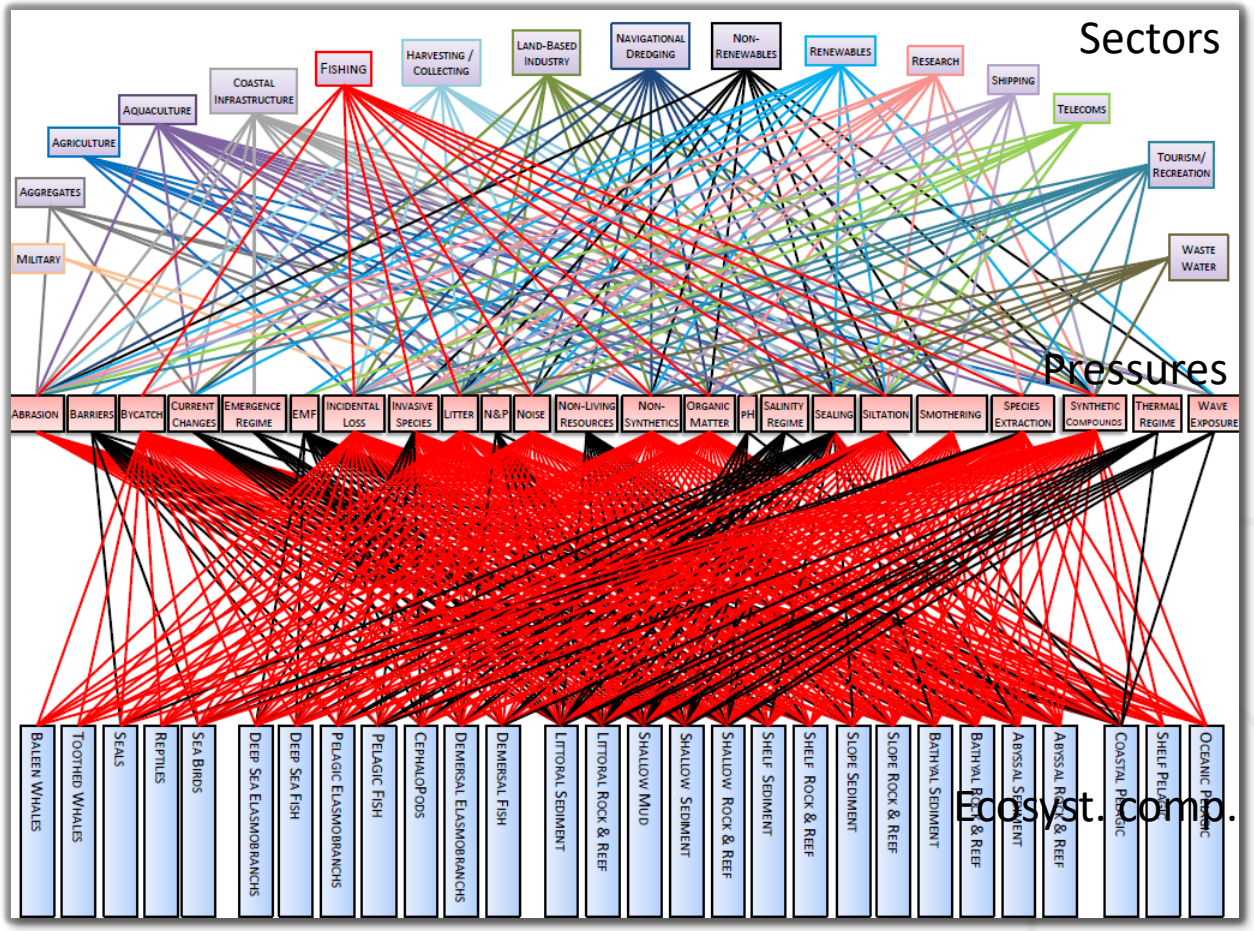
Sectors, pressures and states



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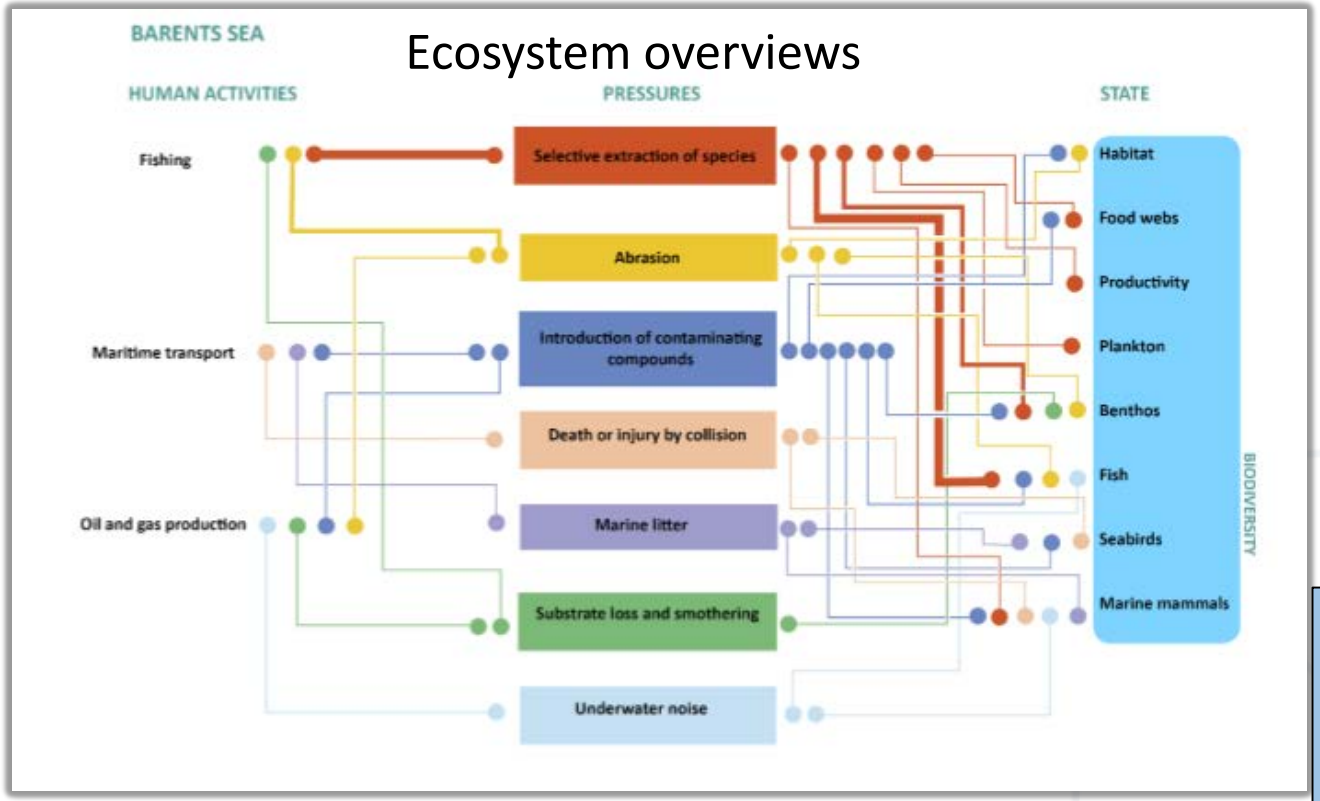

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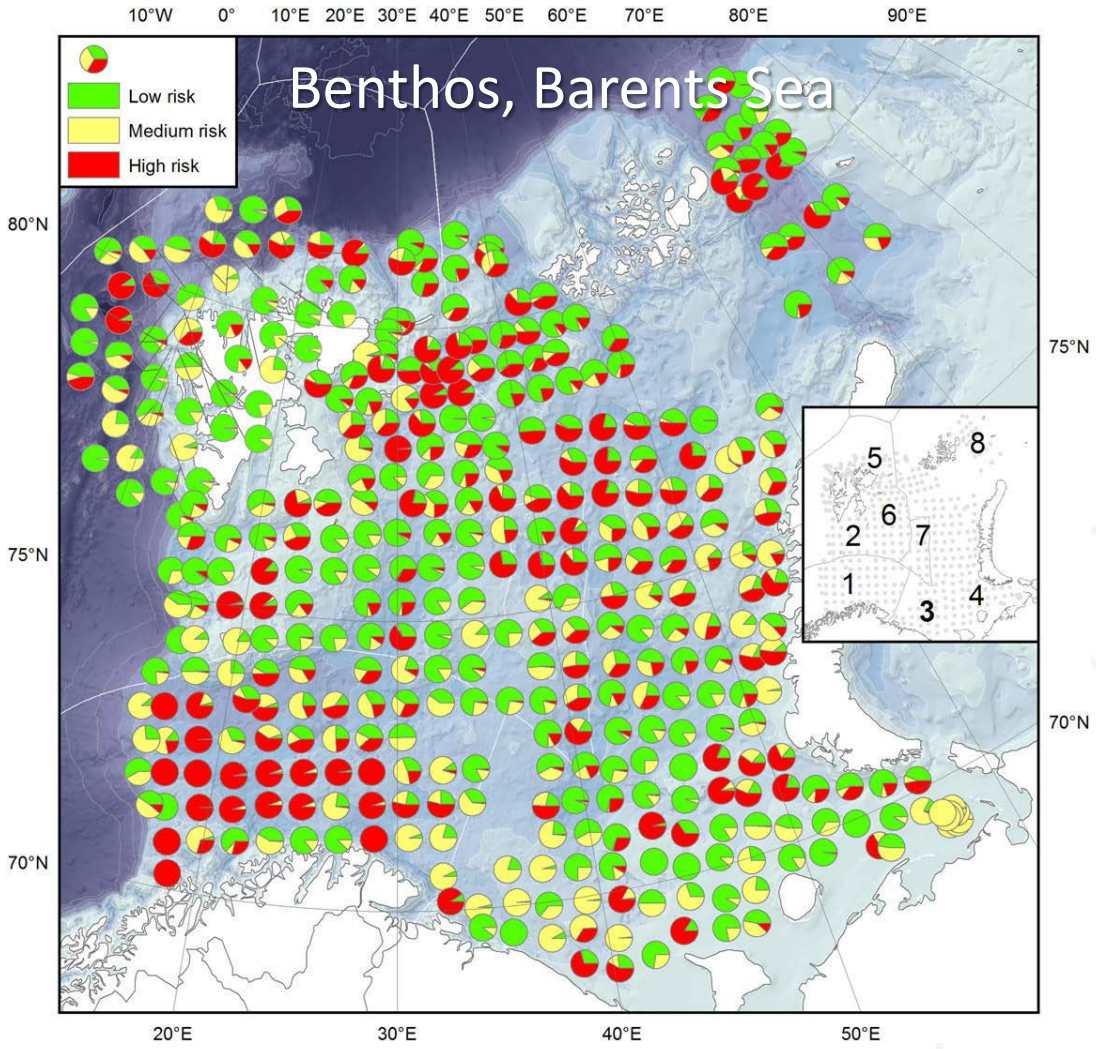
Biodiversity, traits, functional diversity and vulnerability



ICES 2017. WGIBAR

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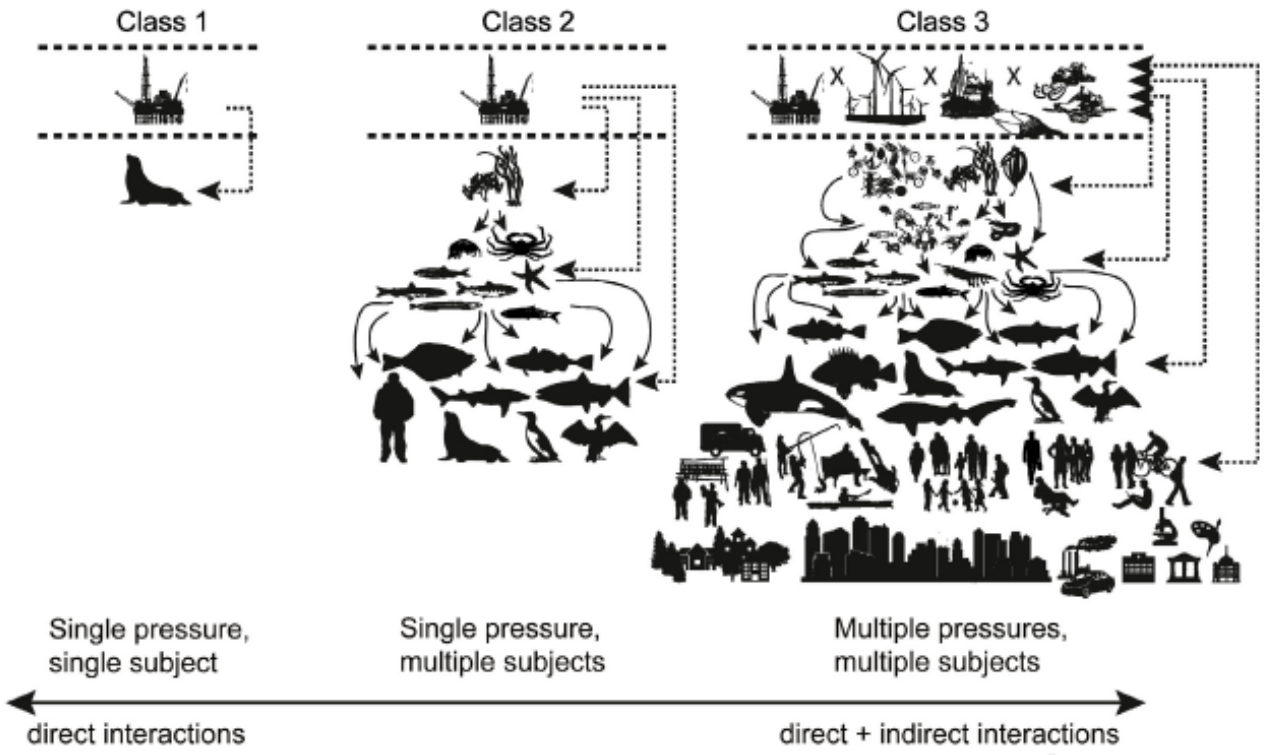
Risk assessments



Holsman et al. 2017

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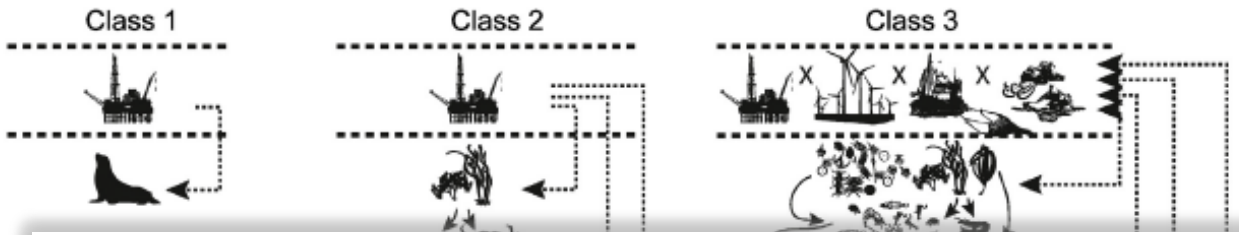


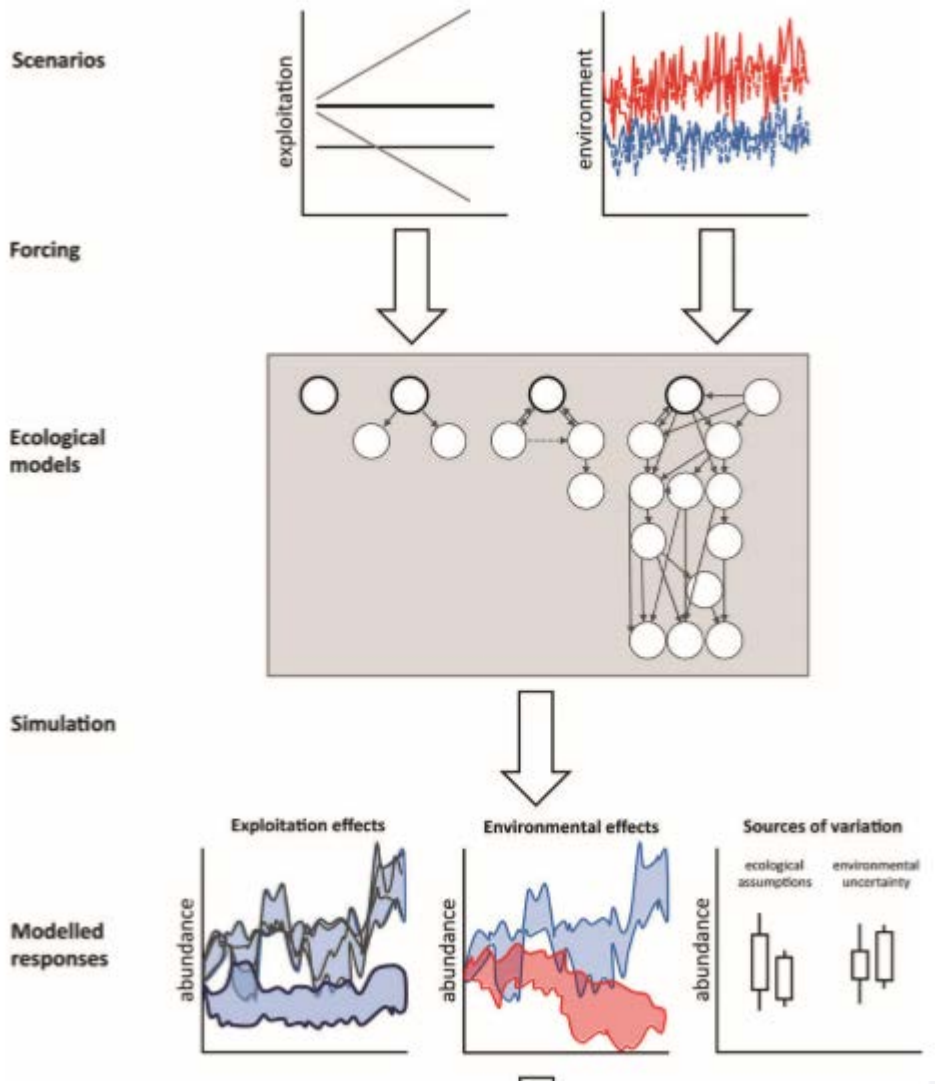
Species level

Species	Assess	Fstatus	Bstatus	FW1Pred	FW1Prey	FW2Prey	Climate	DistShift	EstHabitat
Ocean Quahog	l	l	l	l	l	l	h	mh	l
Surfclam	l	l	l	l	l	l	mh	mh	l
Summer flounder	l	h	lm	l	l	l	lm	mh	h
Scup	l	l	l	l	l	l	lm	mh	h
Black sea bass	l	l	l	l	l	l	mh	mh	h
Atl. mackerel	h								
Butterfish	l								
Longfin squid	lm								
Shortfin squid	lm								
Golden tilefish	l								
Blueline tilefish	h								
Bluefish	l								
Spiny dogfish	lm								
Monkfish	h								
Unmanaged forage	na	na	na	l	lm	lm	na	na	na
Deepsea corals	na	na	na	l	l	l	na	na	na

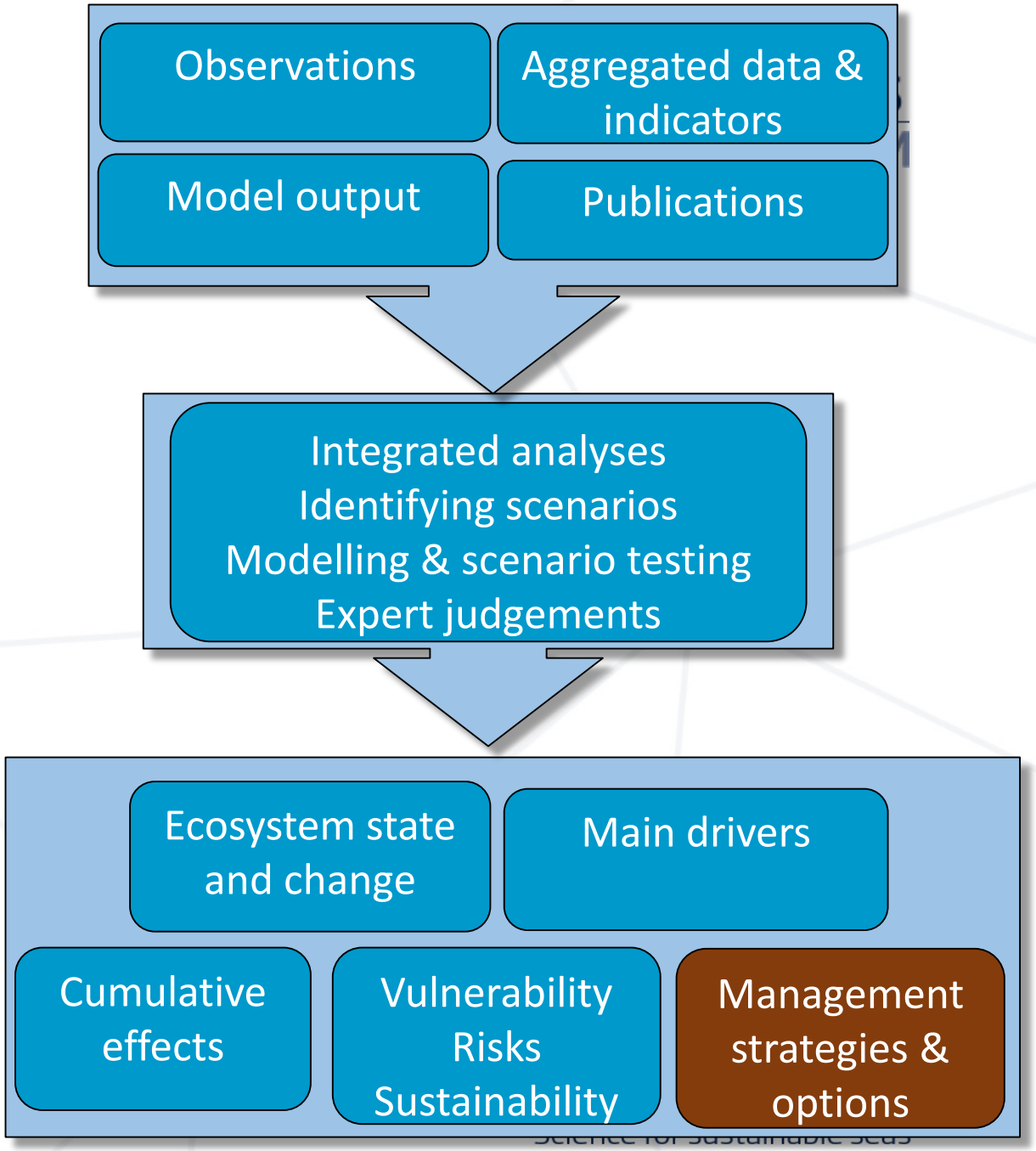
Ecosystem level

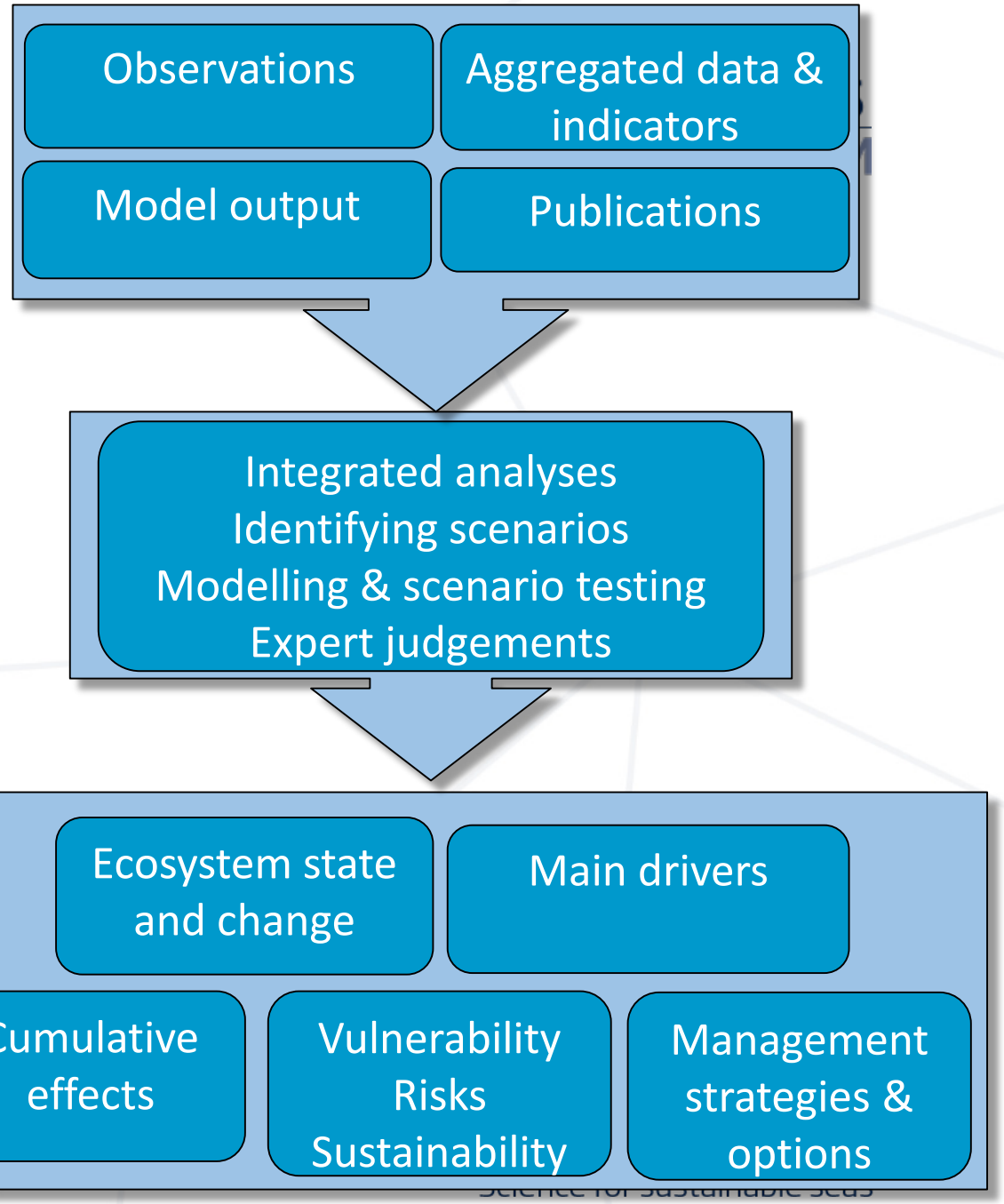
System	EcoProd	CommProf	RecVal	FishRes1	FishRes4	FleetDiv	Social	ComFood	RecFood
Mid-Atlantic	lm	mh	h	l	mh	mh	lm	h	mh

Quantitative models



Möllmann et al. (2014)



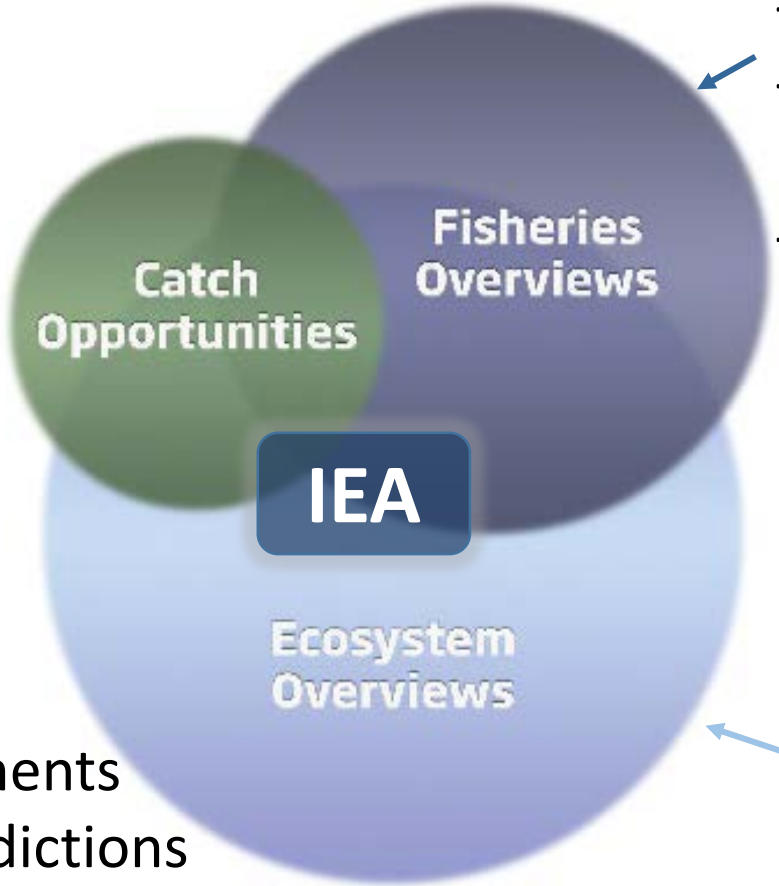


All IEA groups, varying approaches

Varying effort, varying approaches

IEAs and ICES advice

- Environmental impacts on stocks
- Multispecies interactions and management
- Ecosystem effects of fisheries



Single stocks
- Ecological processes
  - impacting stock developments
  - improving short term predictions
- Benchmarks and HCRs; relevant scenarios

- Multisector impacts on ecosystems
- Cumulative impacts, trade-offs

IEA in ICES perspective

- Flexible approach – beyond the Levin IEA cycle
  - Diverse input
  - Diverse approaches; Qualitative expert jugdements to quantitative approaches
  - Diverse output
- No one size fits all! Depending on
  - data availability
  - system and pressures
  - interests, capacity and competence of people involved

⇒ Collectively much experience on diverse approaches

- Scoping => development of more and targeted approaches relative to EAM objectives

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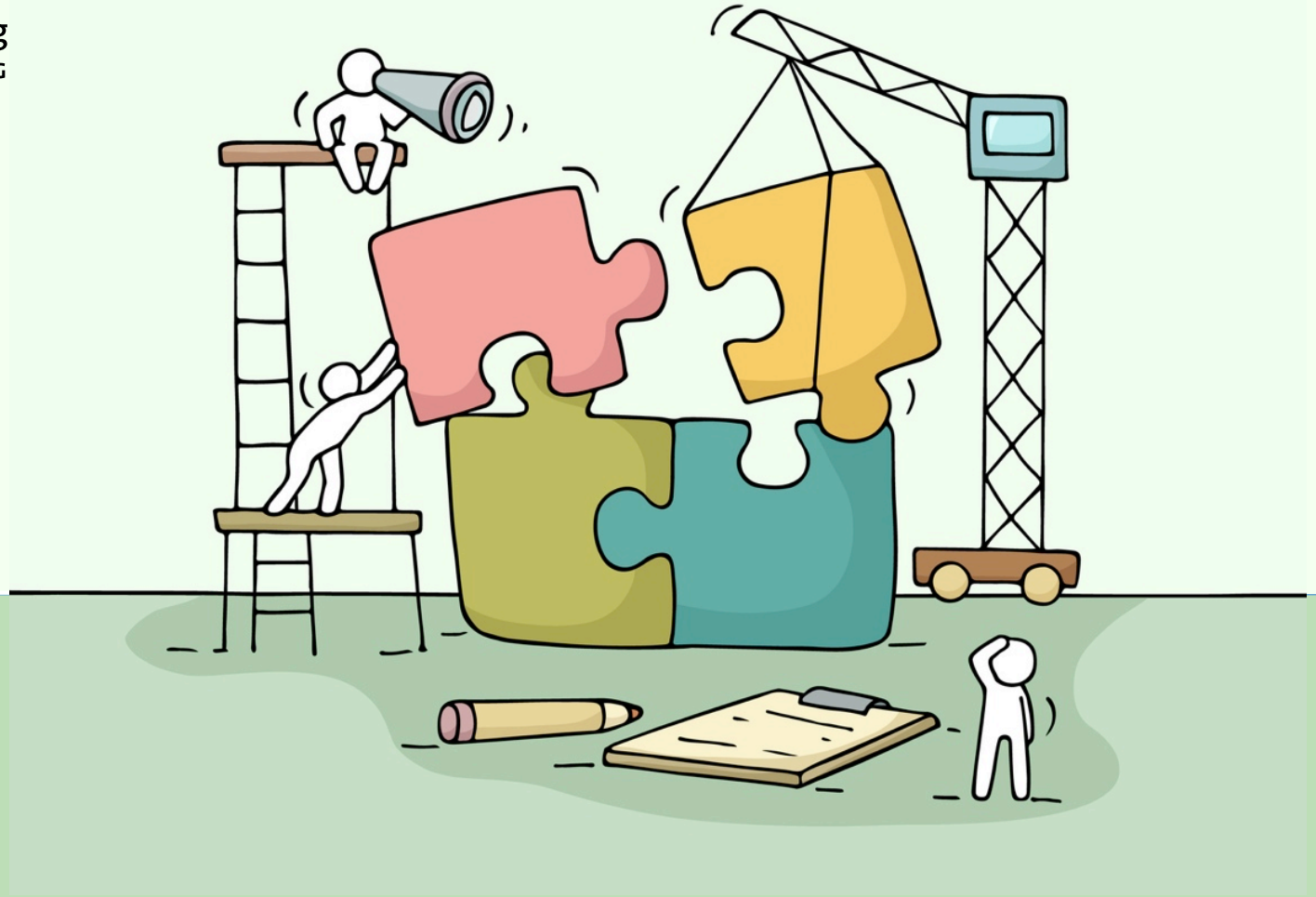

Thank you for your attention!

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