

**JUNE 1 - 3**  
**SKAGEN**  
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**The Industrial Fishery 10**  
**Years from now**







# The industrial fishery in 10 years

Anna Rindorf, DTU Aqua

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## What so special about industrial fishing?

- Industrial fishing targets large densities of fish with high oil content
- So does a wide range of fish, seabirds and mammals
- Fish with high oil content occurring in large densities exploit zooplankton prey in a highly variable environment
- As a result, their biomass varies greatly from year to year



**Fishing  
For  
Forage  
Fish**

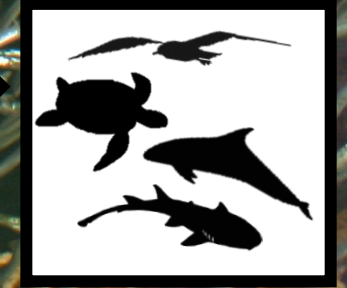
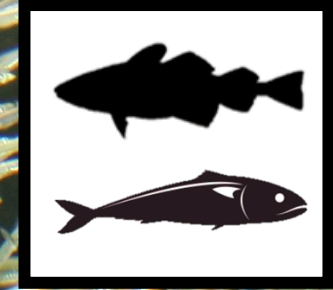
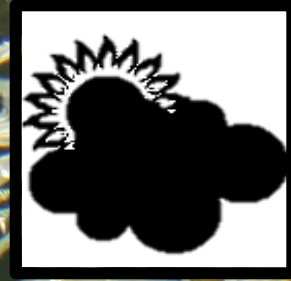
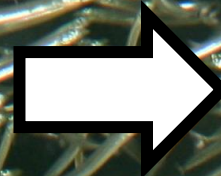
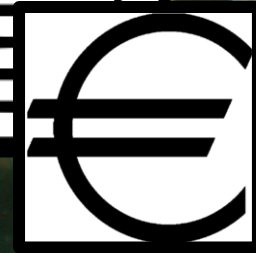


# What affects the future of these stocks and their management?

- Climate, climate, climate
- Density and predator stocks
- Quest for stable high catches
- MPAs and BREXIT
- Renewable energy
- Shifting policy objectives?



In the  
crystal  
ball

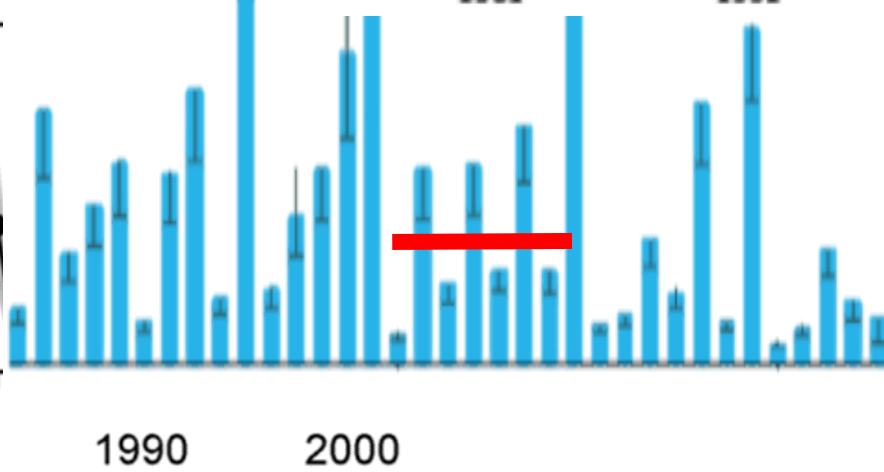
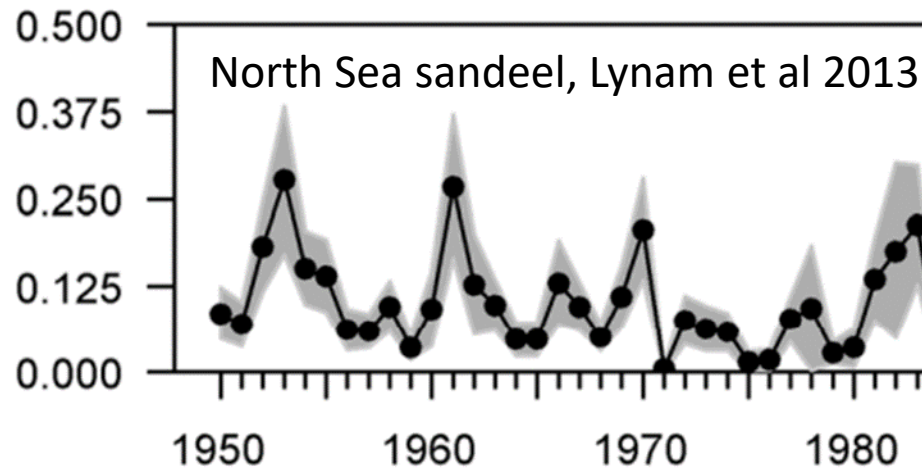
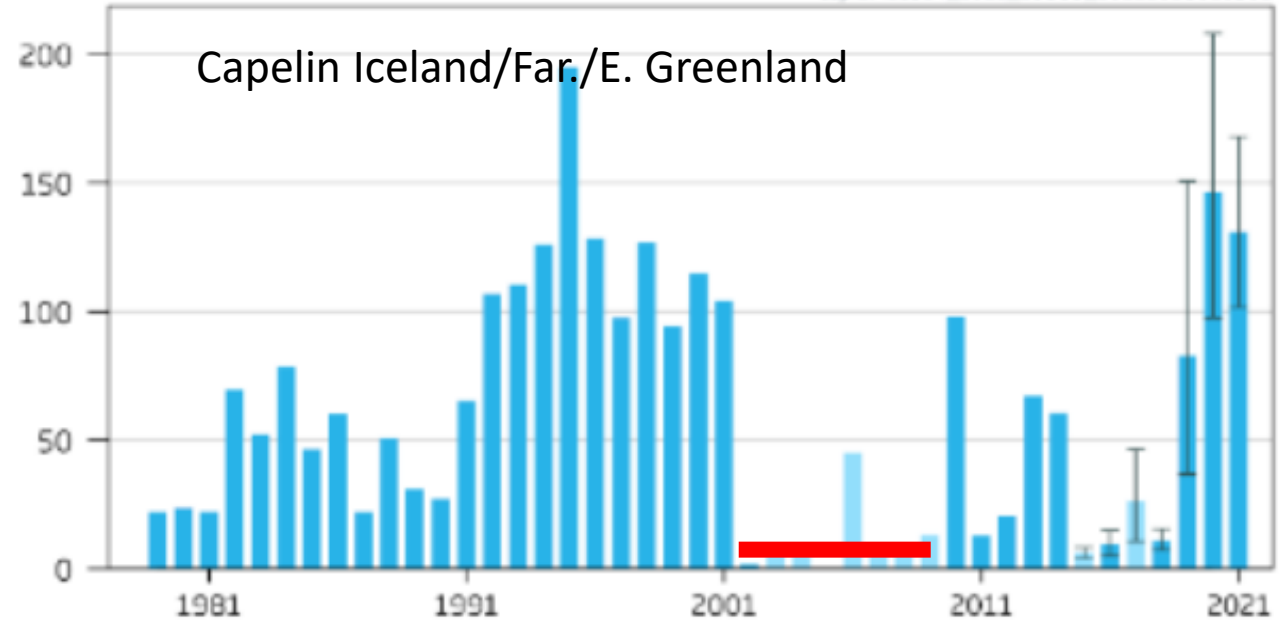


# Stable high catches in a variable environment:

## Were they always there in high densities?



Sandeel Dogger Bank



Blue bars: recruitment from ICES assessment 2021/2022



# Less spawners= less new fish? More spawners=less new fish?

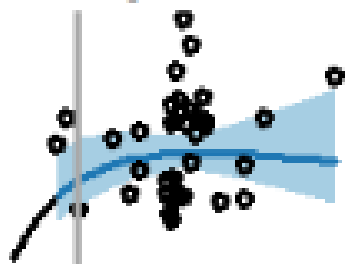
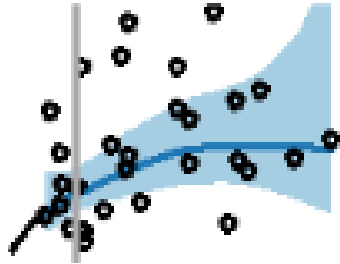
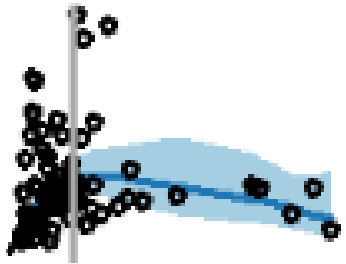
But do they grow the same way?



NE Arctic cod

Anchovy

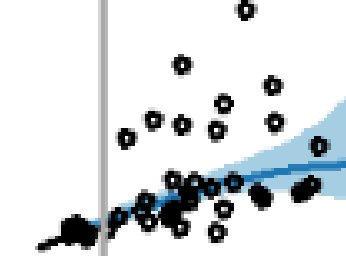
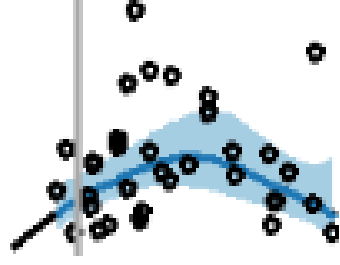
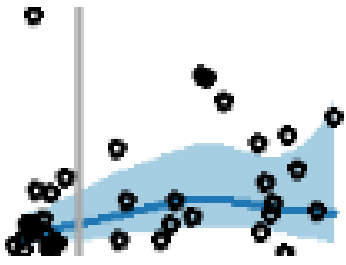
Capelin iceland



Capelin NE Arctic

Norway pout

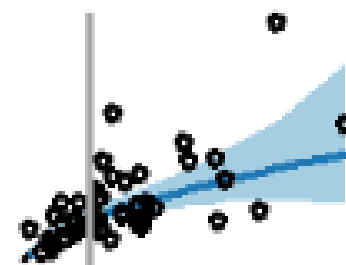
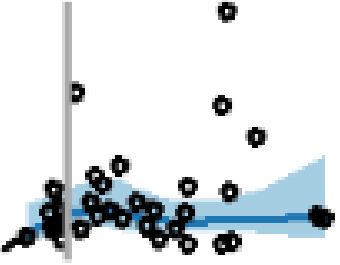
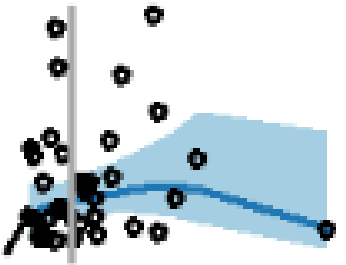
Sardine



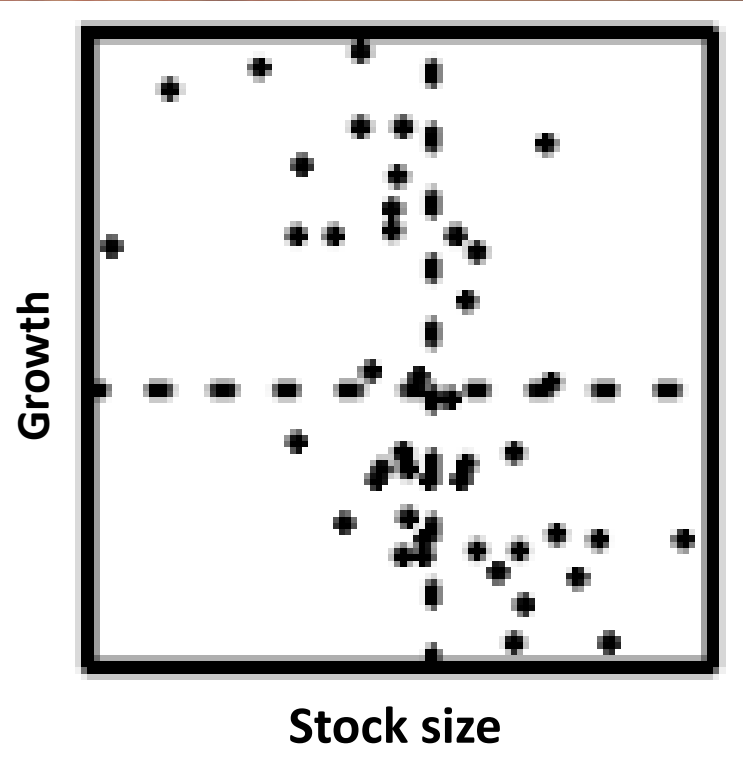
Dogger sandeel

Northeast sandeel

North sea sprat

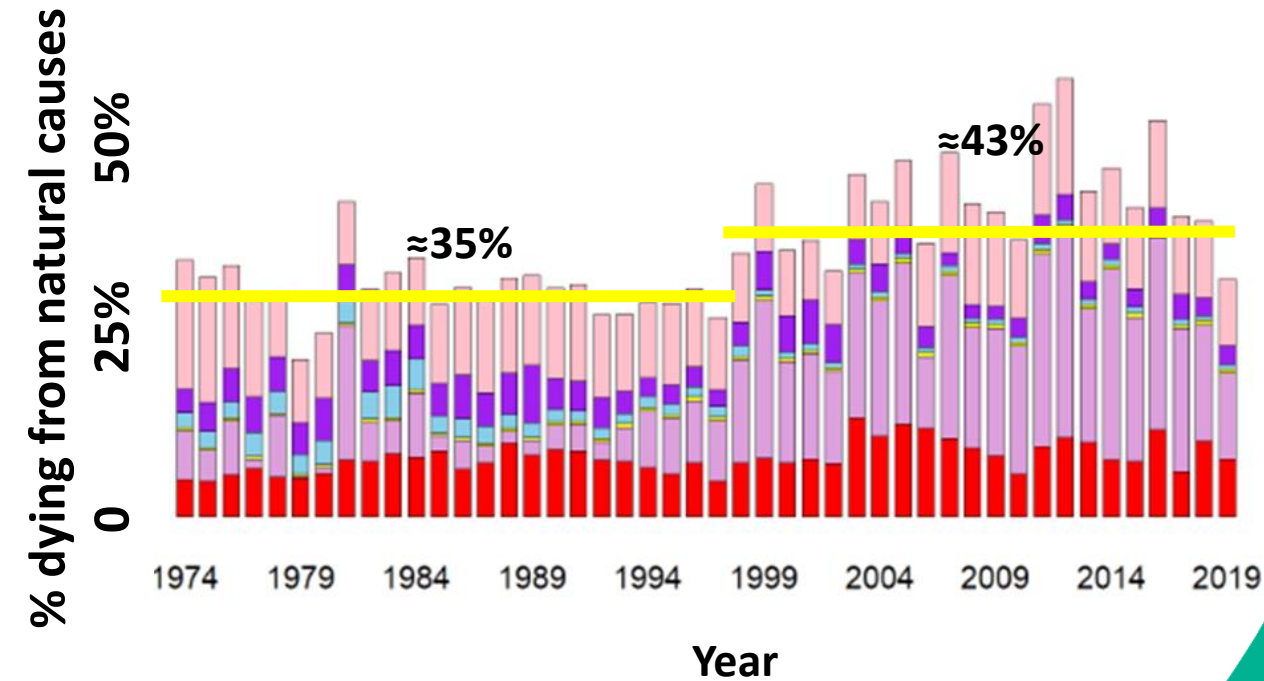


Spawning stock



# More predators=less fish? Less fish=less predators?

- Most predators rely mainly on recruitment
- Public perception is not burdened by the need for evidence!



- lots of evidence of effects of forage fish on predator diet
- Not much evidence of effects on growth outside seabirds and other one-species-of-forage-fish-systems

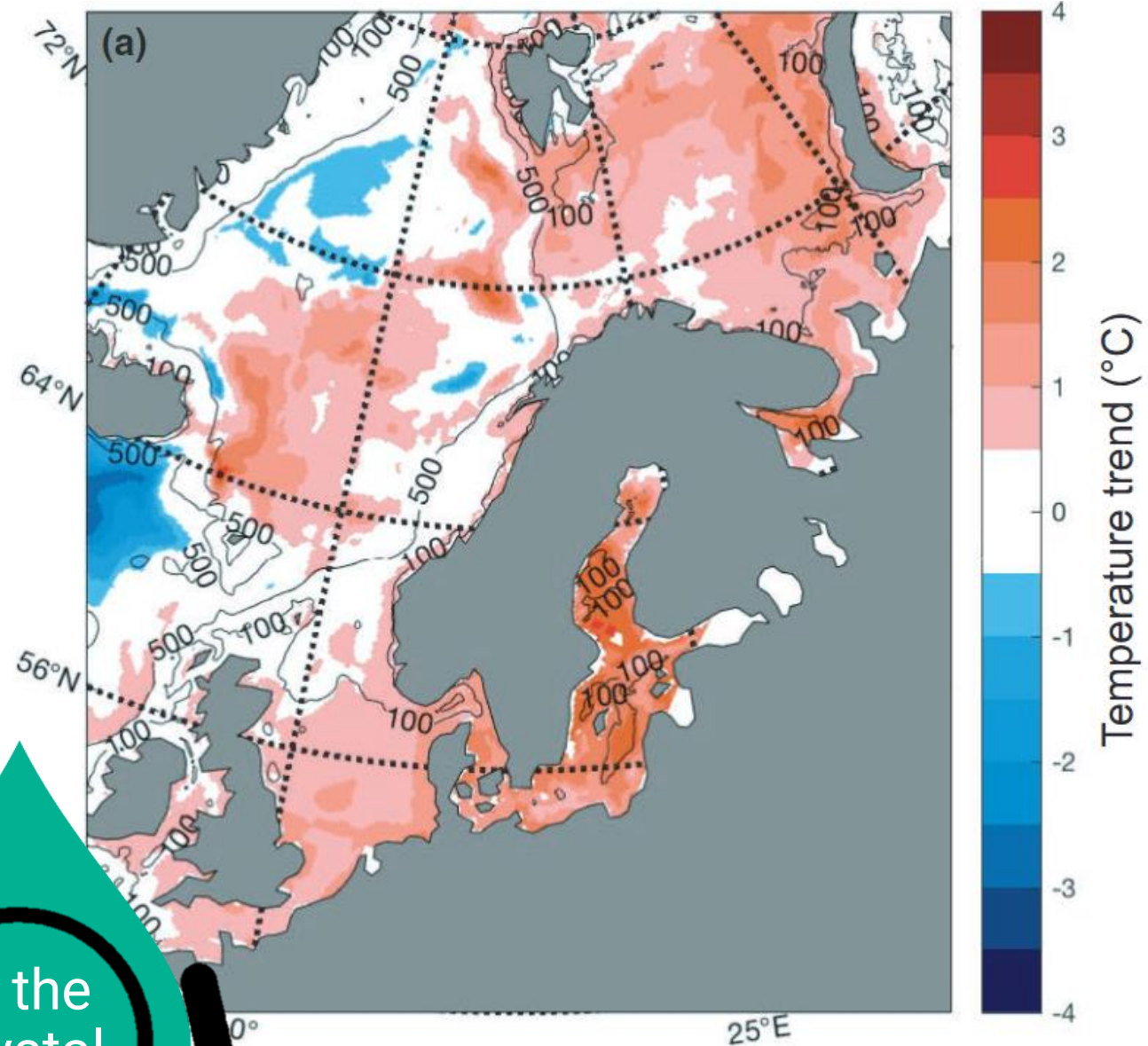
Forage  
fish and  
their  
predator  
s





# Looking into the productivity future

- A few stocks are expected to increase (NS sprat) or remain at present level (capelin)
- Most are expected to decrease (sandeel, Norway pout)
- In the North Sea, retaining present productivity results in 45-70% decrease in yield
- We cannot expect to gains to be compensated by other fisheries in the same year
- It is possible that new (southern) species will increase to fishable levels

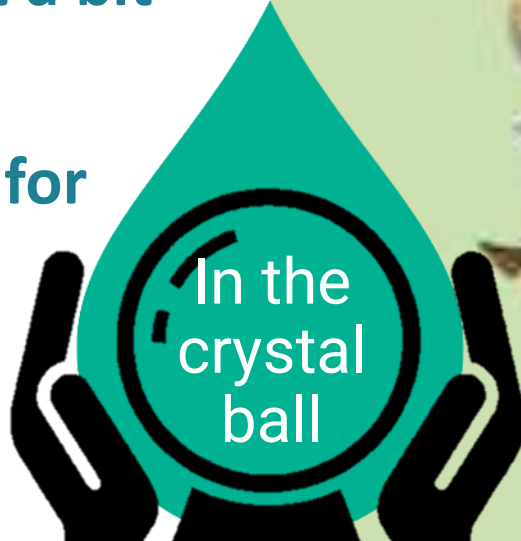


Clausen et al. 2017,  
Kjesbu et al 2022



## Looking into the policy future

- Policy focus will likely increase on assigning MPAs and maintaining stocks in spite of low productivity
- This means that all stock advice will feel the impact of decreases
- There are efforts to increase the acceptable risk to recruitment a bit
- MPAs, BREXIT and renewable energy will decrease the area for fishing
- Effects of these on stock productivity are unknown







Thank you for  
listening

Shaping Ecosystem Based Fisheries Management  
<https://seawiseproject.org/>