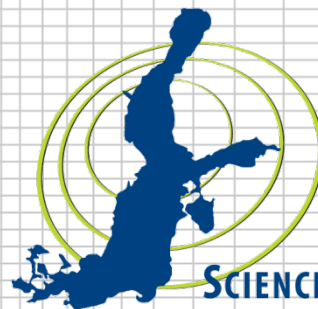


Projected Baltic Sea ecosystem changes in future climates



BONUS

SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

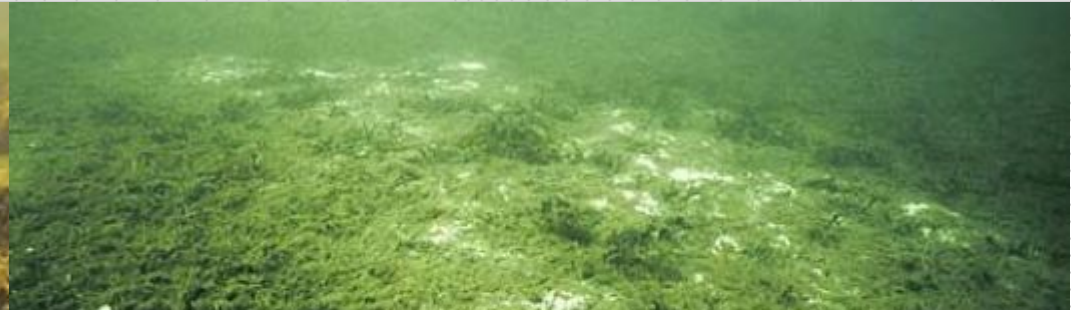
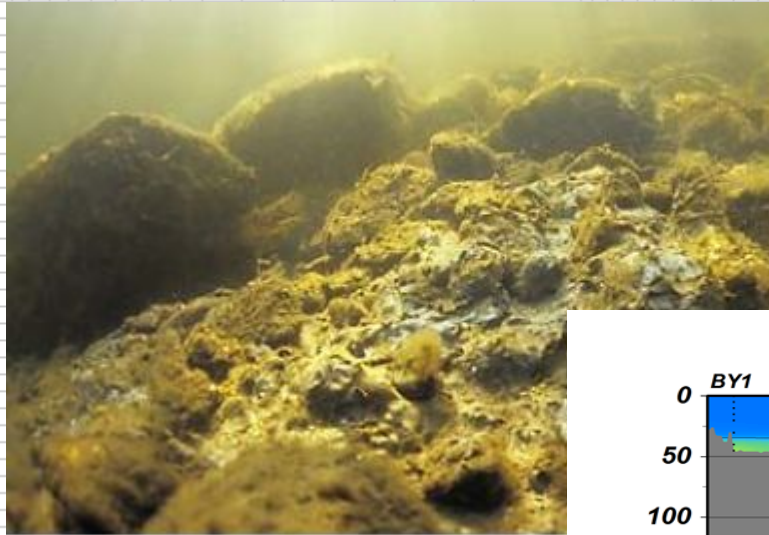
Baltic Sea; where are we now?



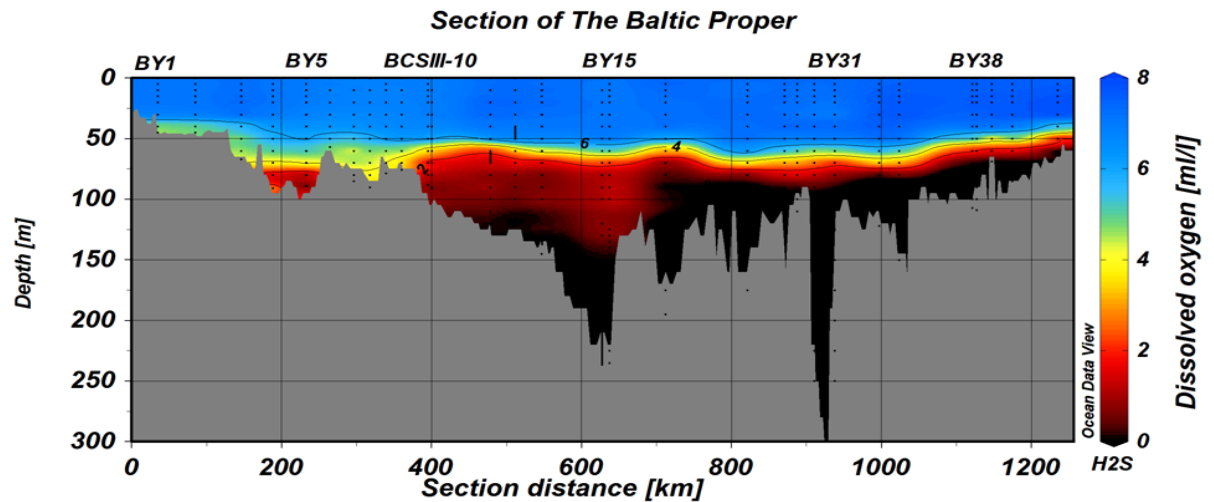
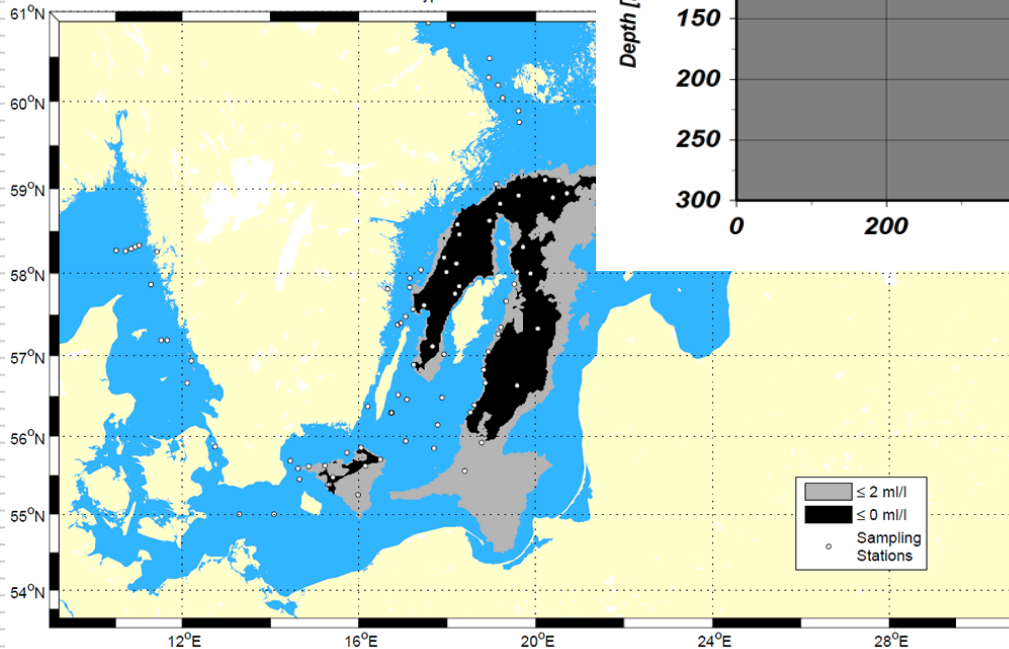
Large Cyanobacterial
blooms



Baltic Sea; where are we now?



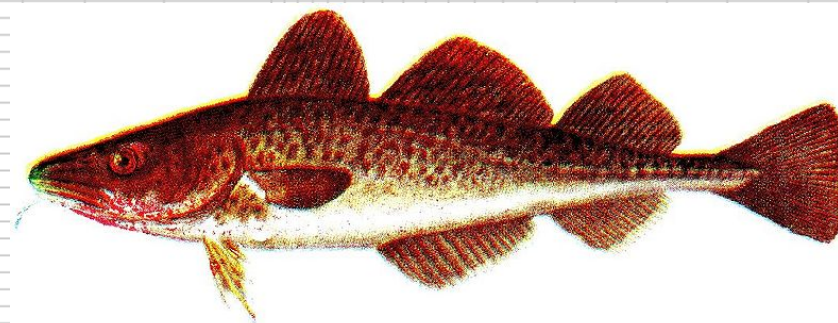
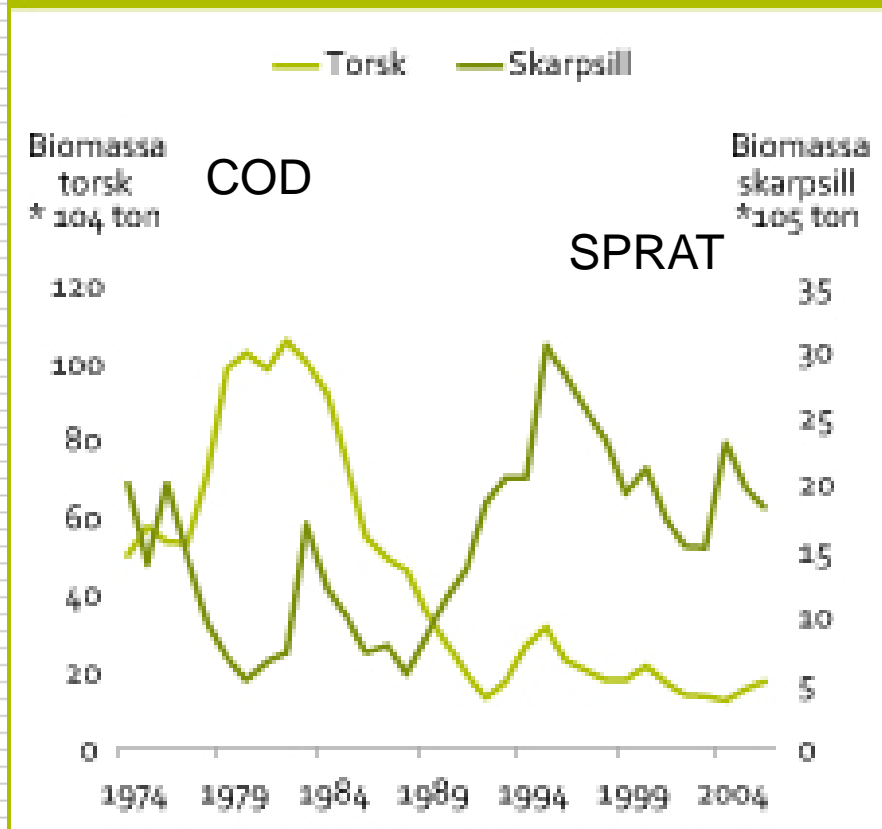
Extent of hypoxic & anoxic bottom w



Hypoxia/anoxia
4 times as large today
compared to 100 years
ago

Baltic Sea; where are we now?

Förhållandet torsk - skarpsill



Decreasing cod biomass

Baltic Sea; how to approach the future?

SMHI



Combined effects of climate change and nutrient loads

Ensemble modelling to quantify uncertainty

Decision support to policy makers

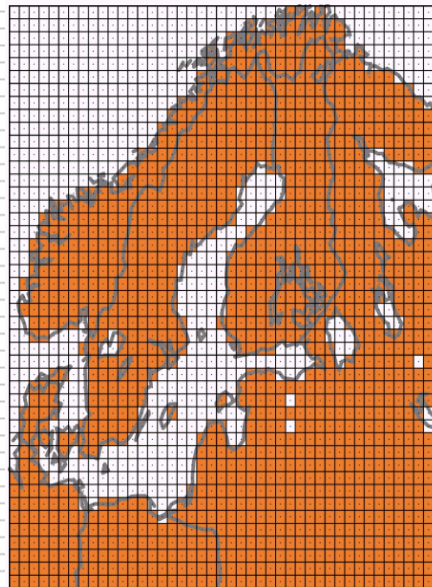


Baltic Sea; how to approach the future?

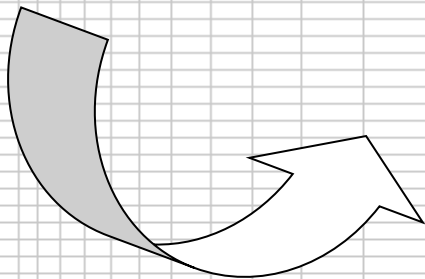
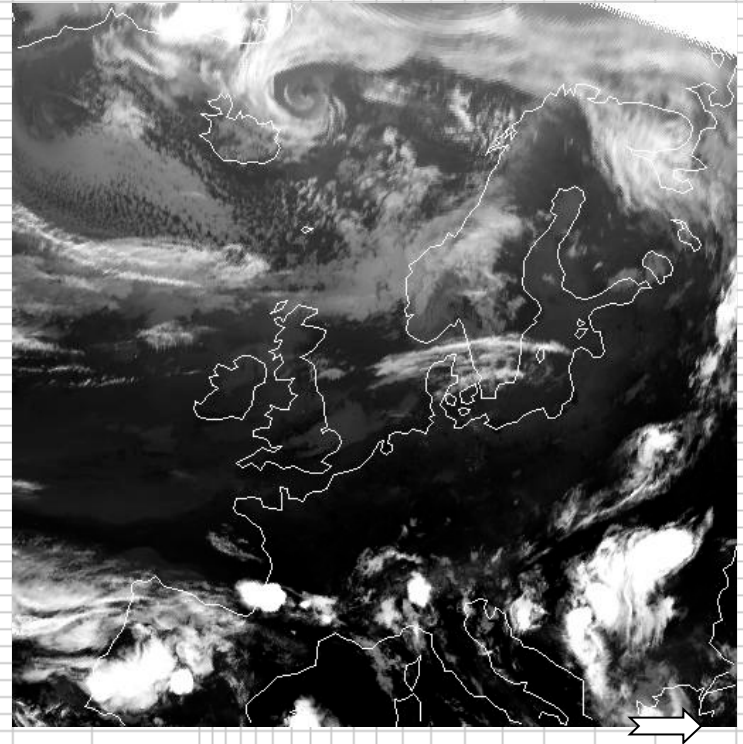
RCAO: Rossby Centre regional Atmosphere – Ocean climate model



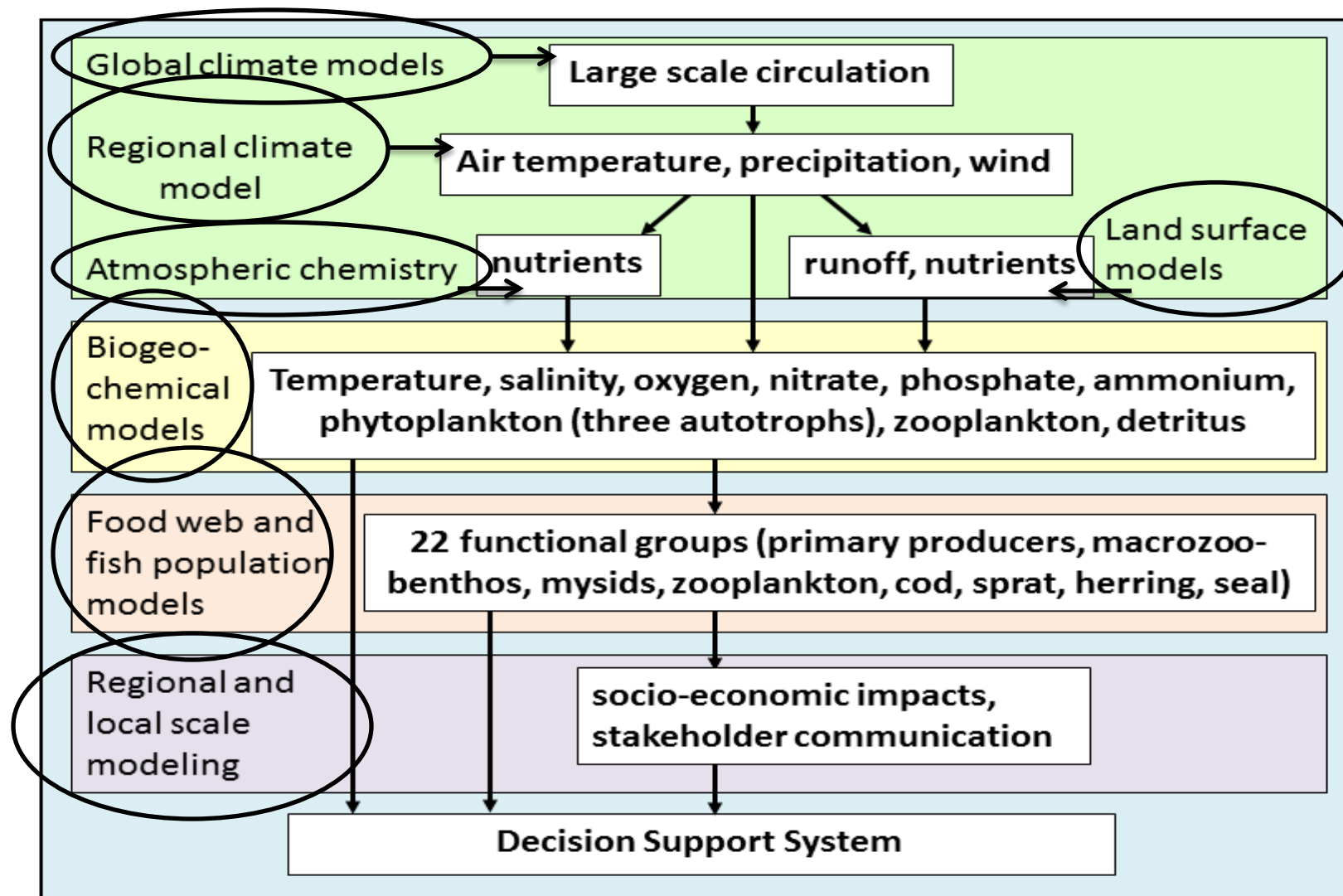
Global



Regional



Meier, H.E.M et al., et al, 2011:Quality assessment of atmospheric surface fields over the Baltic Sea of an ensemble of regional climate model simulations with respect to ocean dynamics. Oceanologia



1/7 → 350/1500 = arter av växter/djur

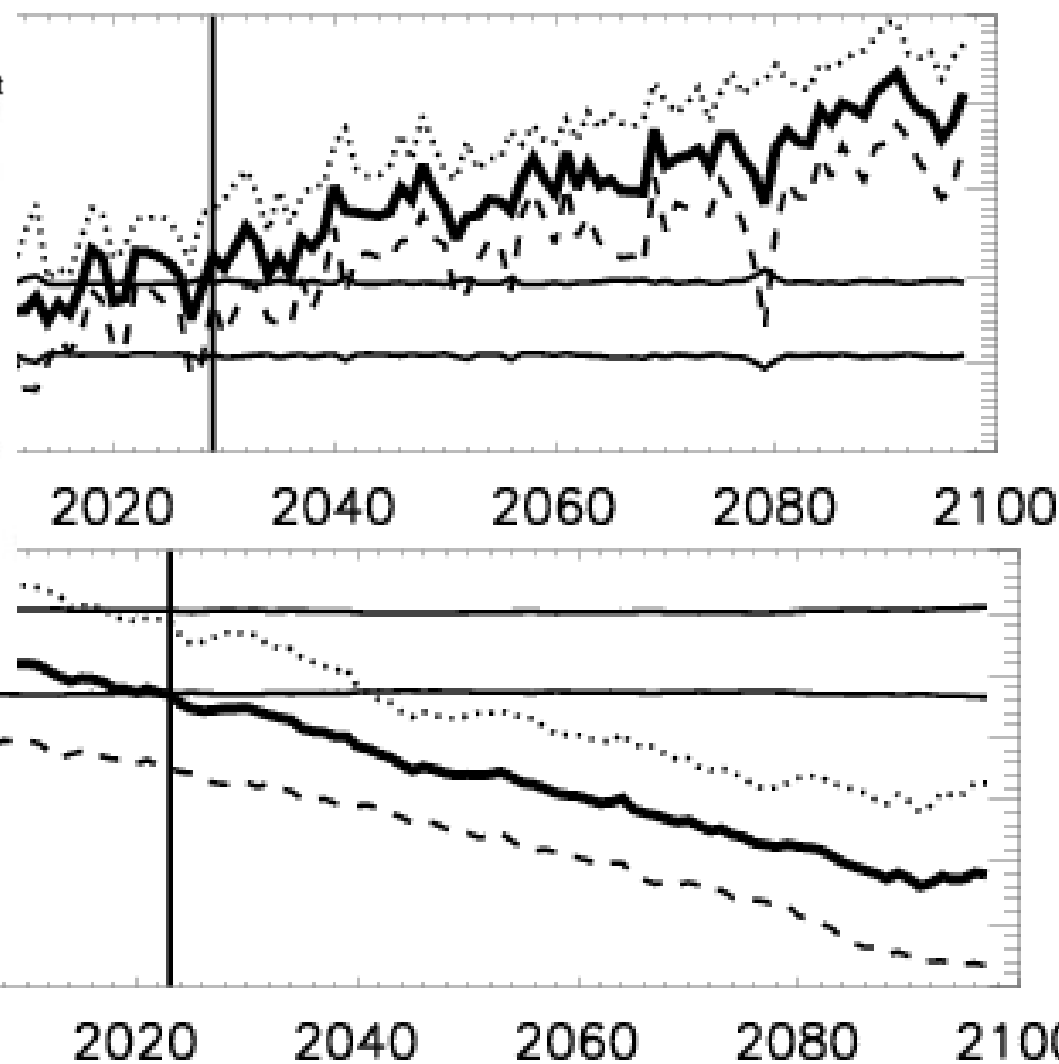


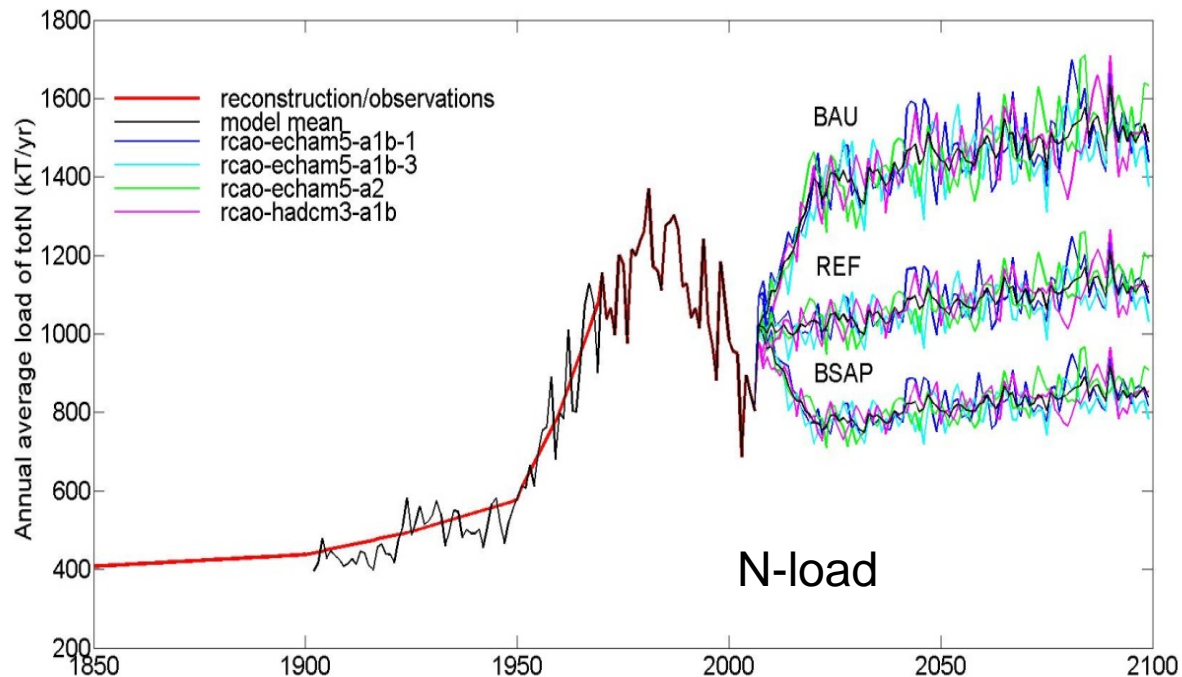
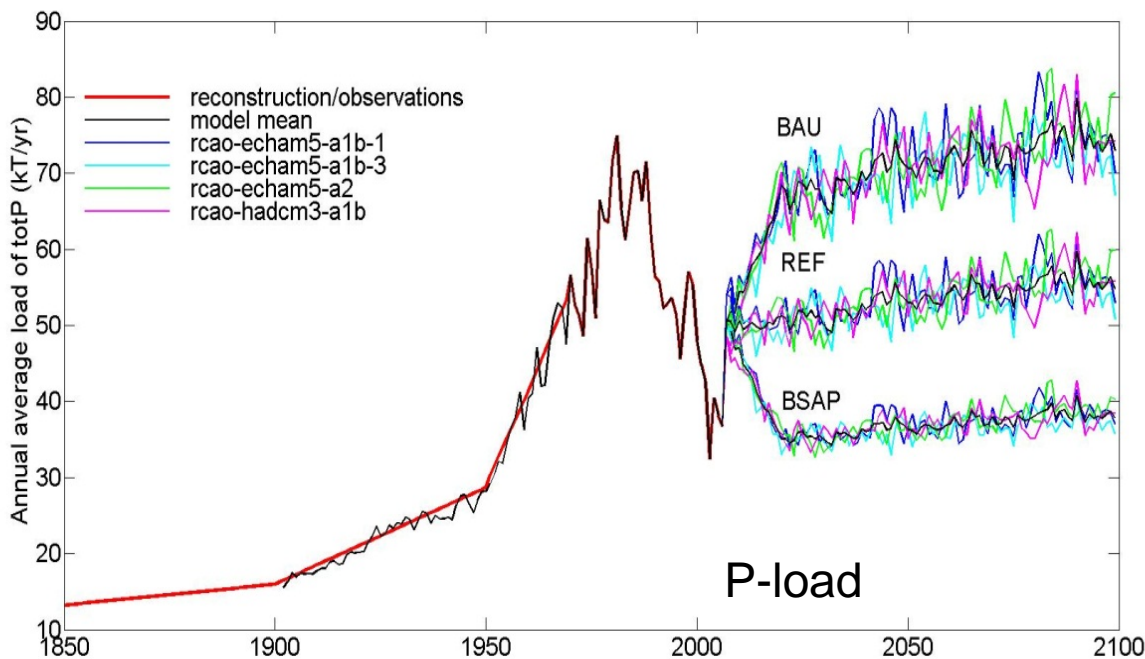
3 → 30 = salthalt i promille

Salinity [g]

1960 1980 2000 2020 2040 2060 2080 2100

Large changes in the physical environment

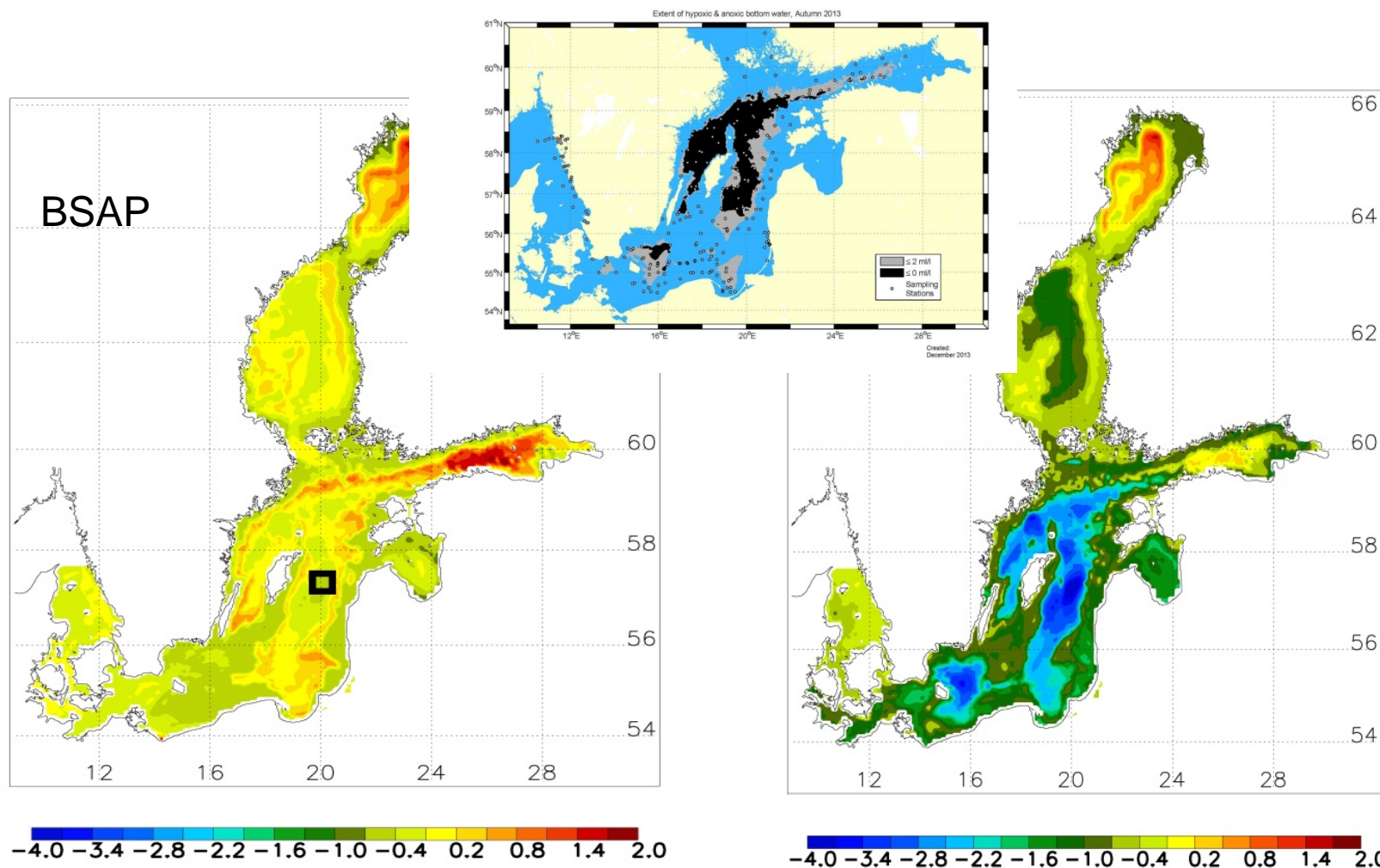




Results: Climate change can induce increased nutrient loads, mainly due to increased river runoff in the scenarios, but also due to changed nutrient dynamics.

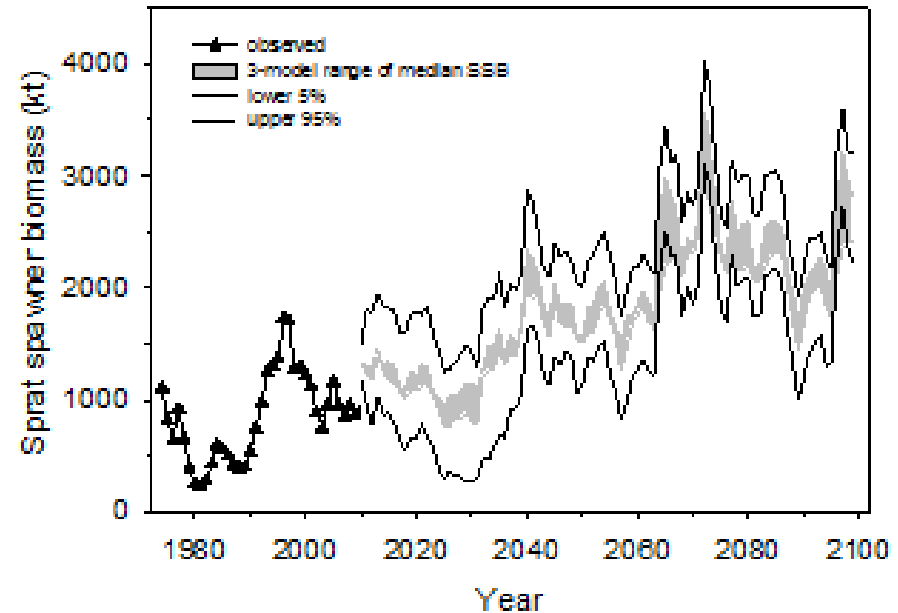
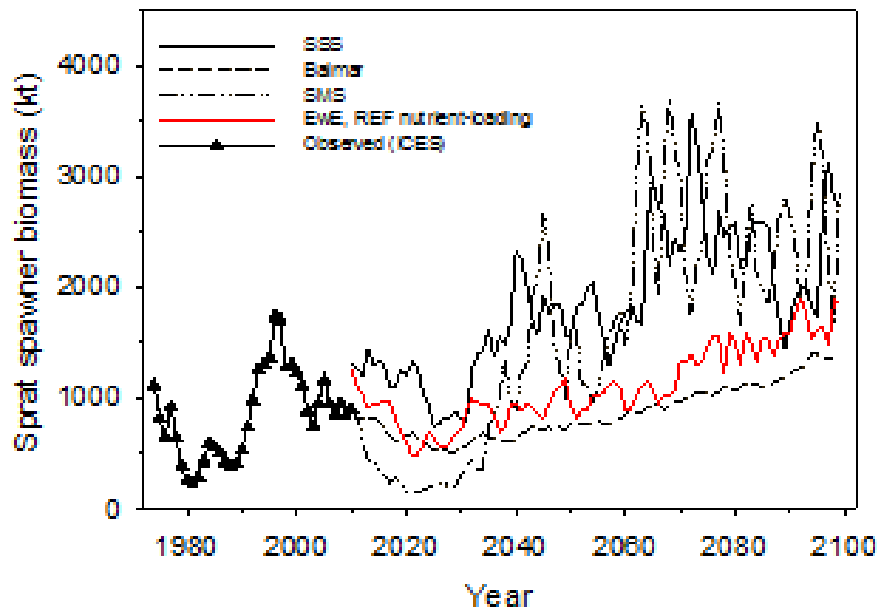
BAU= “worst case”
REF= same concentrations in rivers as today
BSAP= reduced loads according to Baltic Sea Action Plan

Indication of significant climate-change impact on nutrient loading and eutrophication



Future change of oxygen levels at the bottom – indicator of good environmental status

Projections of higher trophic levels (sprat)

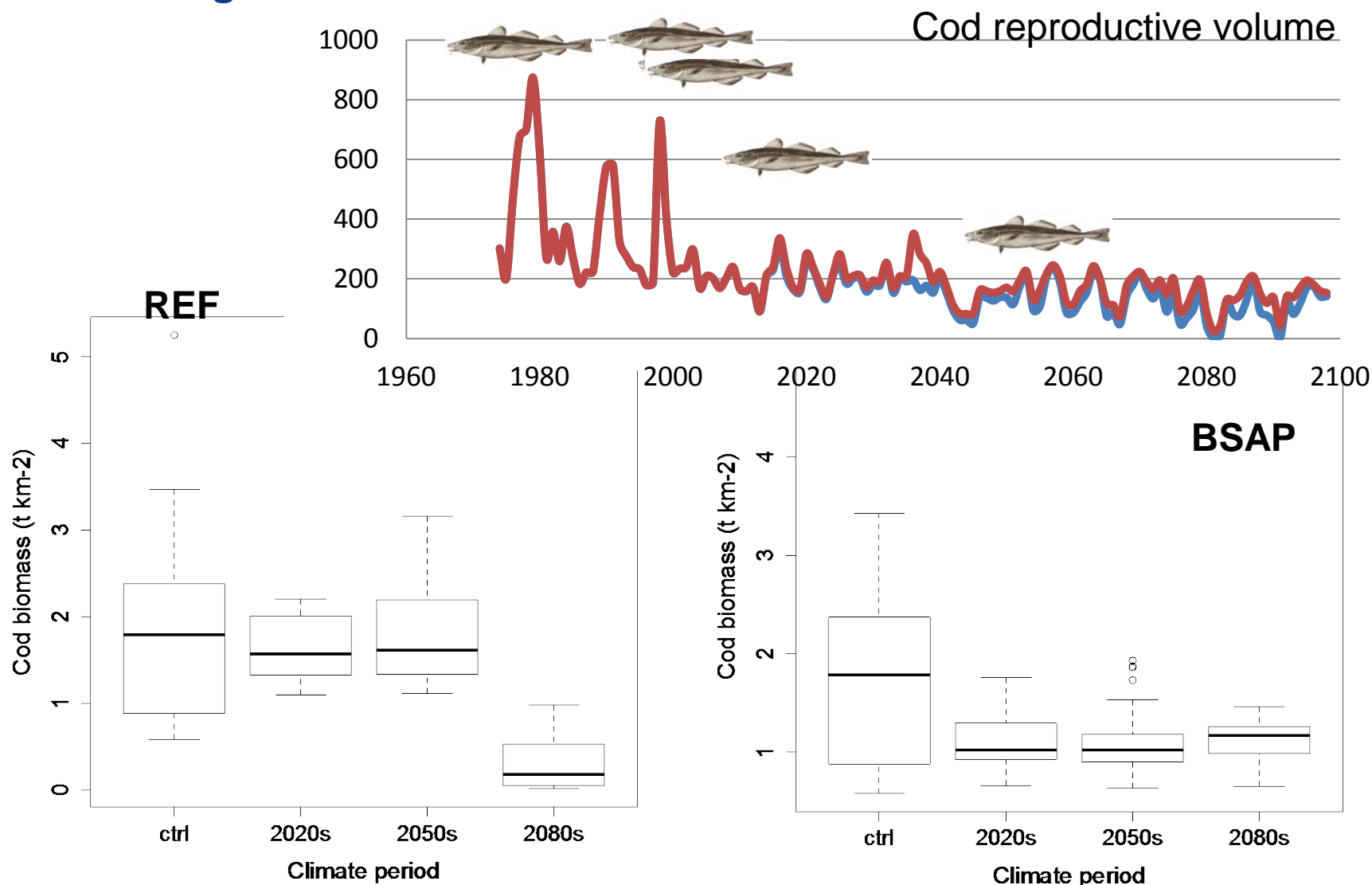


(Source: MacKenzie et al., AMBIO, 2012)

Projected spawner biomass of sprat in the Baltic Sea assuming a temperature – driven spawner-recruit relationship with temperatures estimated from three different climate-oceanographic models. Fishing mortality of sprat was at a currently defined sustainability level and natural mortality was assumed equal to the mean level during 2008-2010.

Different population and food web models. All projections use the A1B emission scenario, ECHAM5 climate forcing and the RCO-SCOB oceanographic-biogeochemical model.

Resultat: indikationer på sämre förhållanden för torsk vilket ger minskning i beståndet.



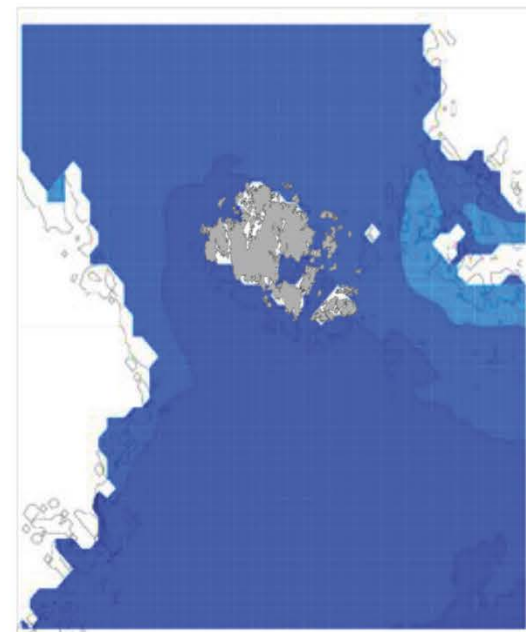
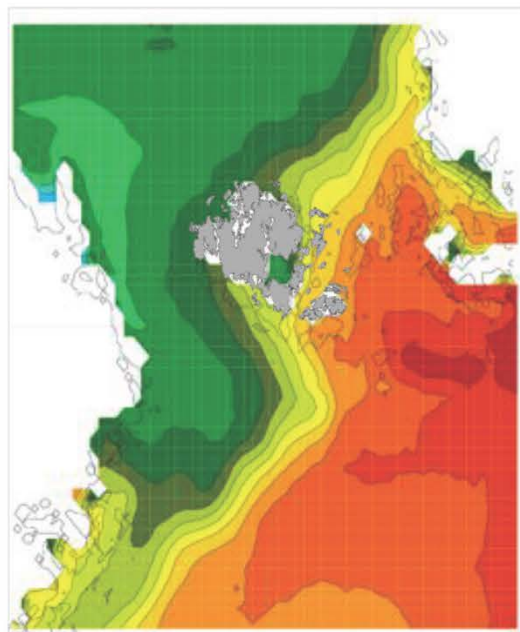
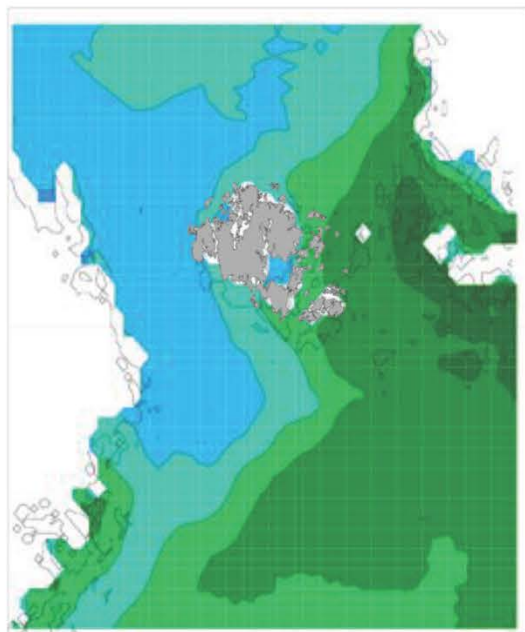
Phytoplankton Chl-a

Spring, upper 10 m

REF

BAU

BSAP



Ensemble mean changes between 2070–2099 and 1978–2007 of spring (March–May) phytoplankton concentration [mgChl-a/m^3], vertically averaged for the upper 10 m