EurOCEAN 2010

Sustainable harvest of Biotic Ocean Resources

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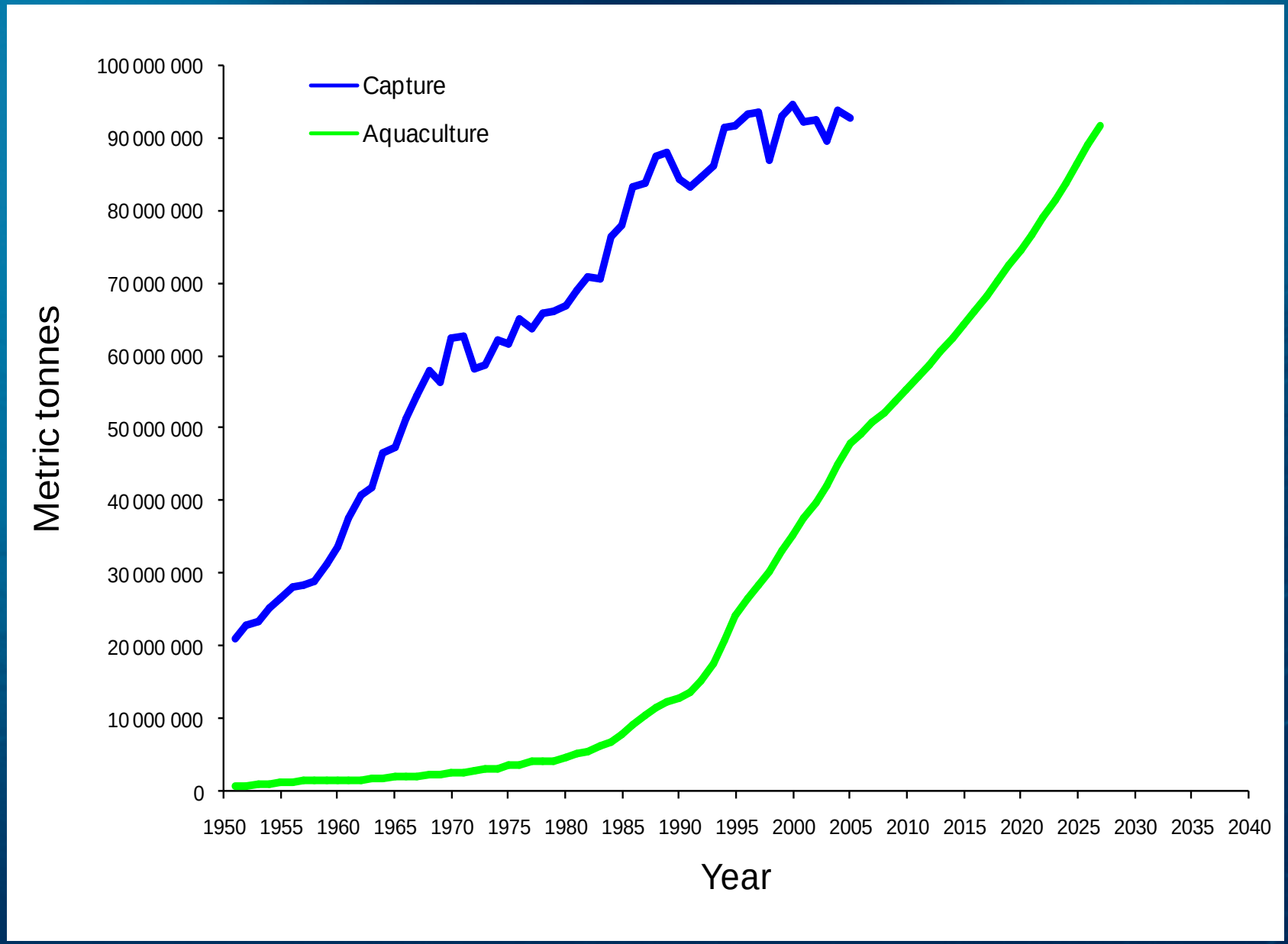
INSTITUTE OF MARINE RESEARCH

Thermae Palace (Oostende, Belgium, 12–13 October 2010)

World capture and aquaculture (FAO 2007)



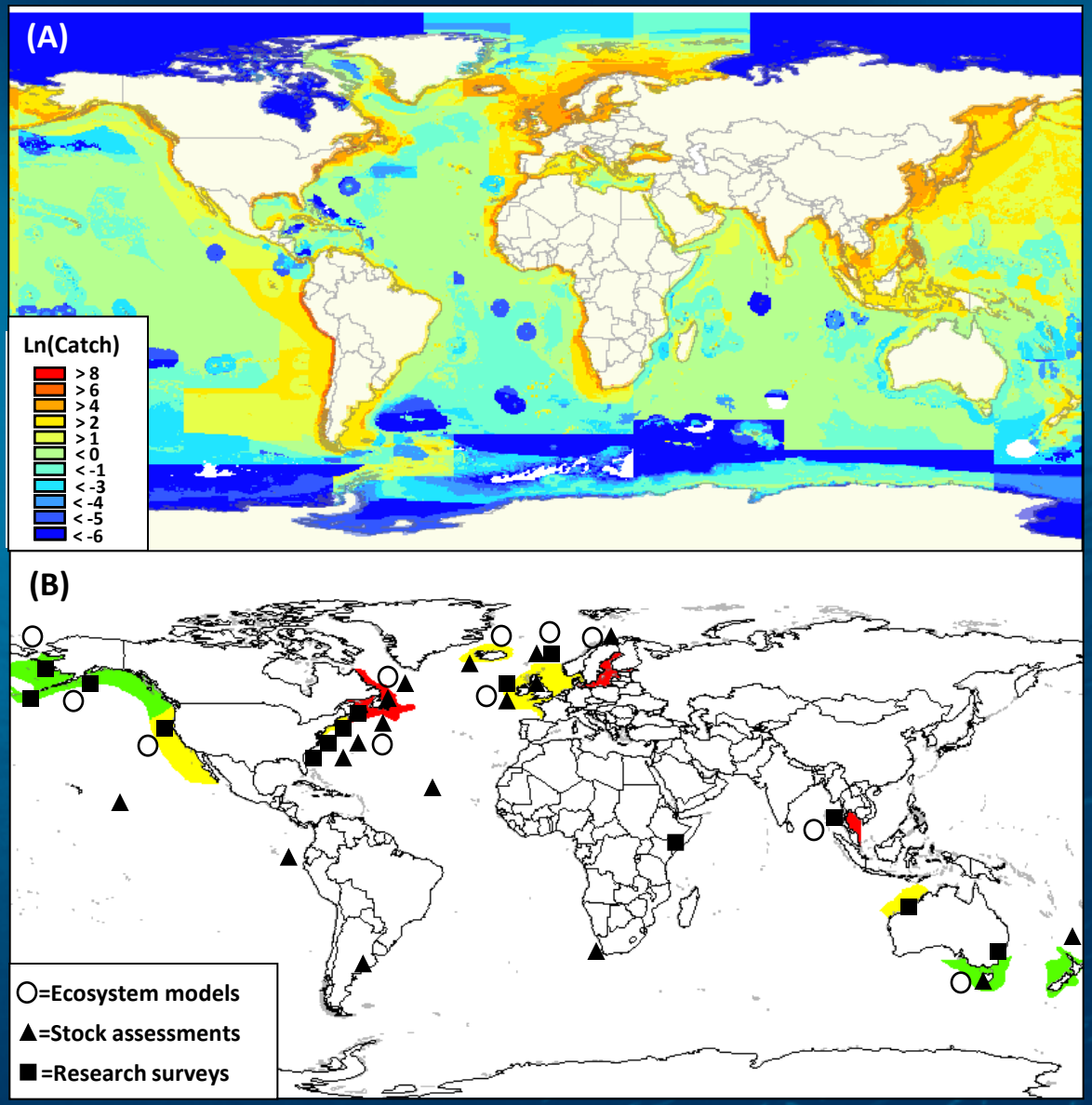
Impacts of fisheries - I

- Mean trophic level reduced in world fisheries (Pauly et al., Science 1998)
- The large fish of the oceans were depleted 80-90% by 1980 (Myers and Worm, Nature 2003)
- All fish gone by 2048 (Worm et al., Science 2006)

Impacts of Fisheries - II

A data base of abundance, catch, fishing mortality, recruitment and SSB from 350 stocks

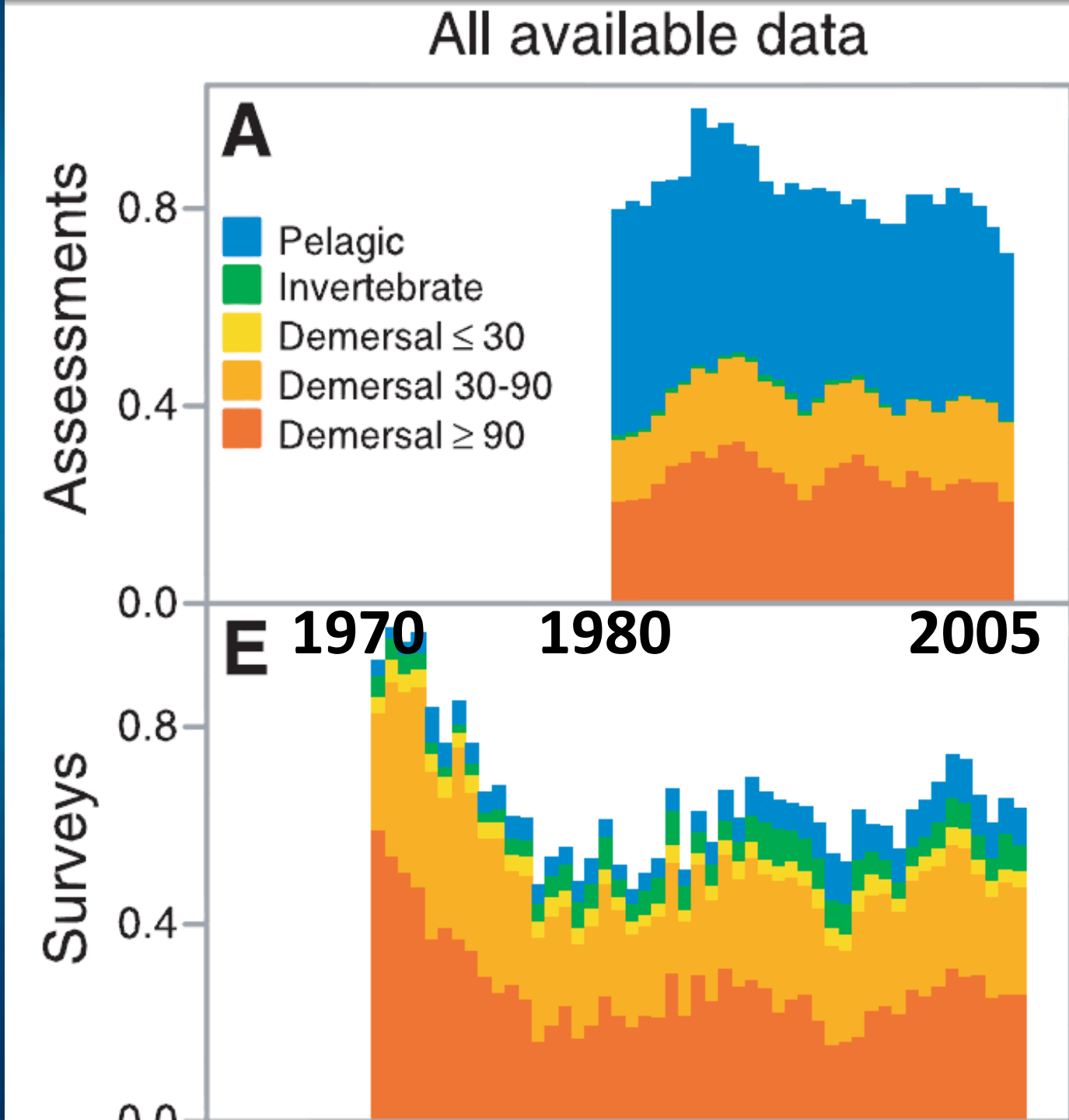
(courtesy of prof. Hilborn, Univ. of Seattle)



Impacts of Fisheries - III

Fish stock development 1970 - 2005

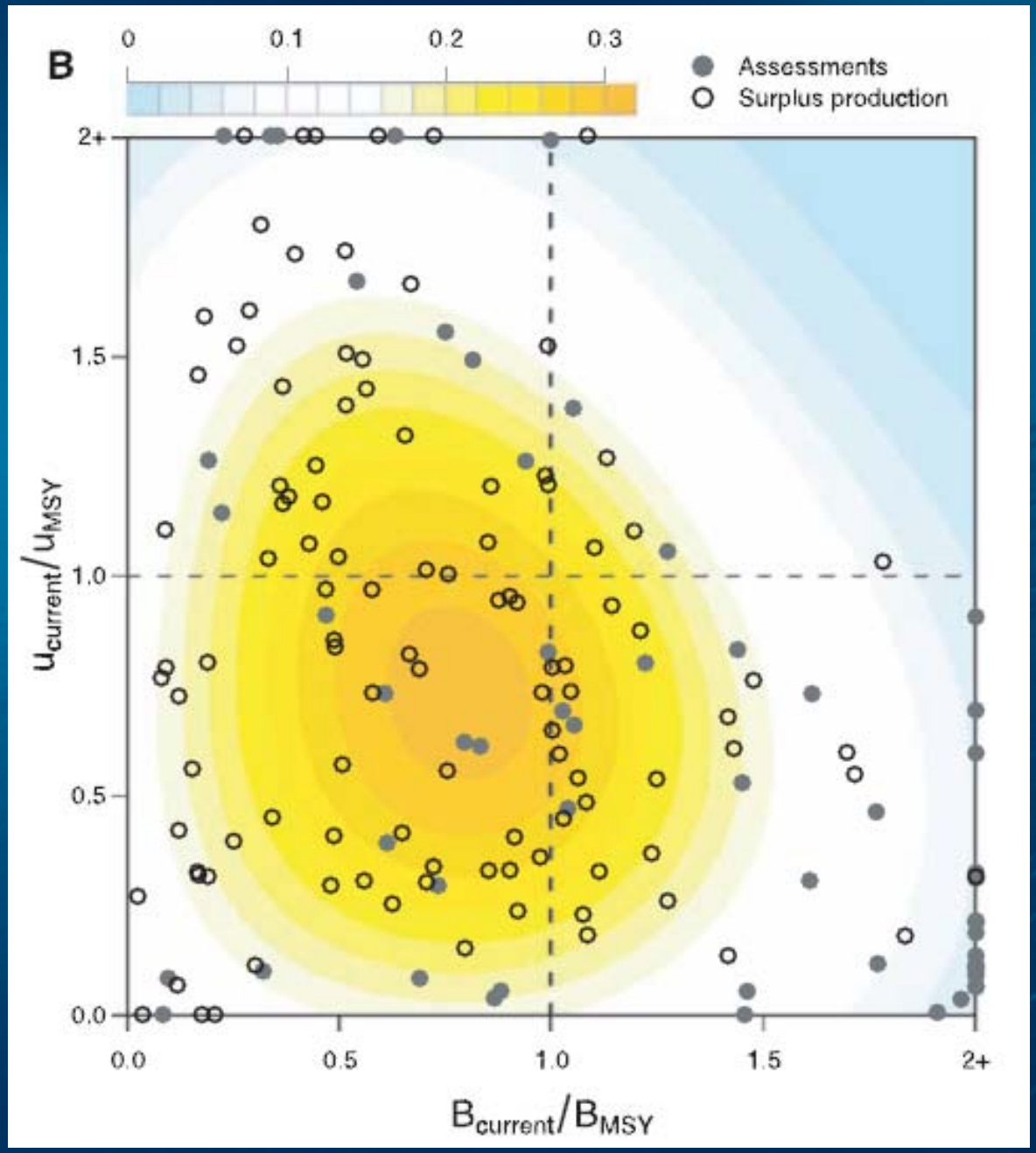
(courtesy of prof. Hilborn, Univ . of Seattle)



Impacts of Fisheries - IV

Current yield and stock biomass related to MSY

(Fisheries not doing that bad, but room for improvement!)

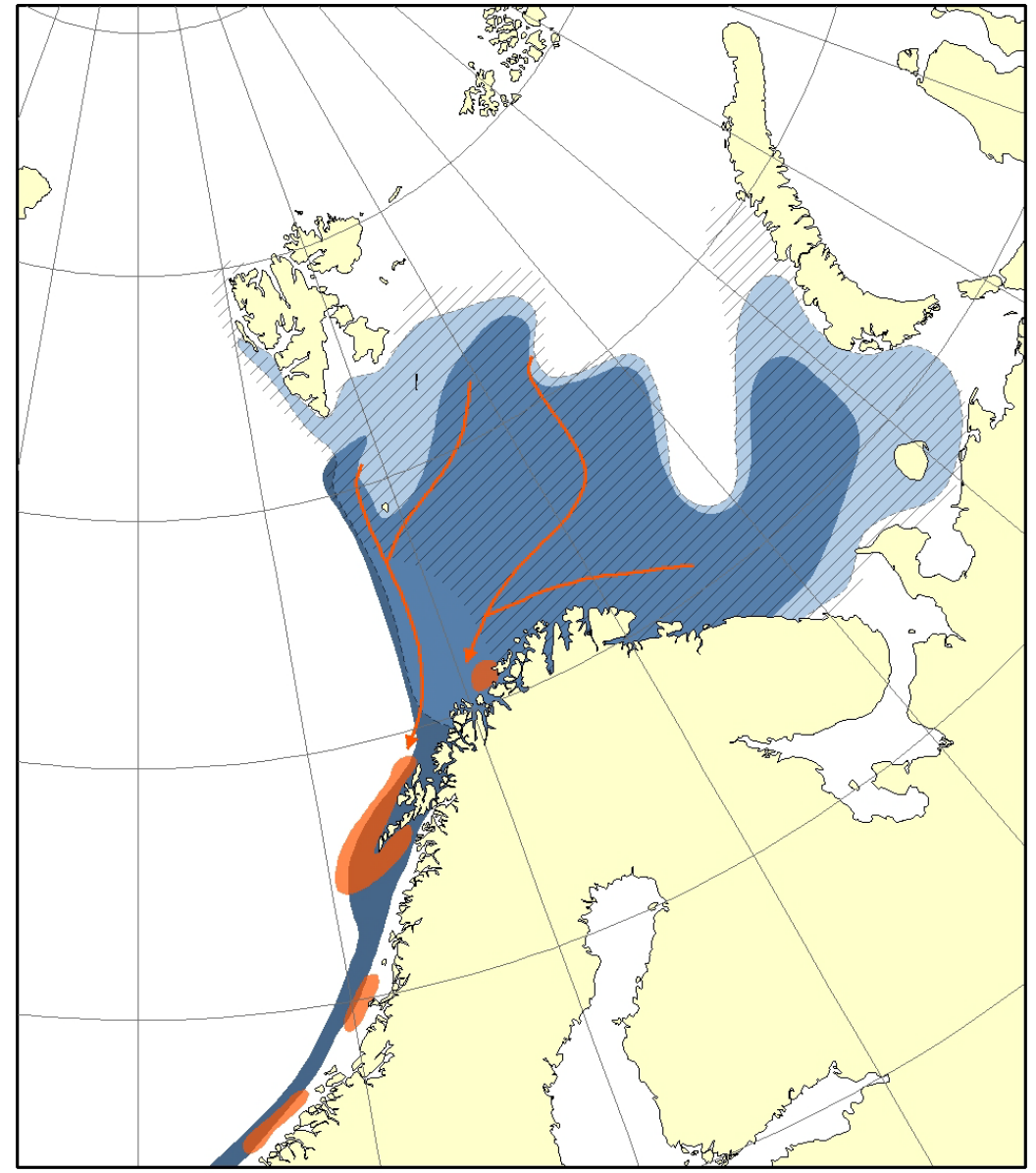


(courtesy of prof. Hilborn, Univ. of Seattle)

North Easth Arctic cod:

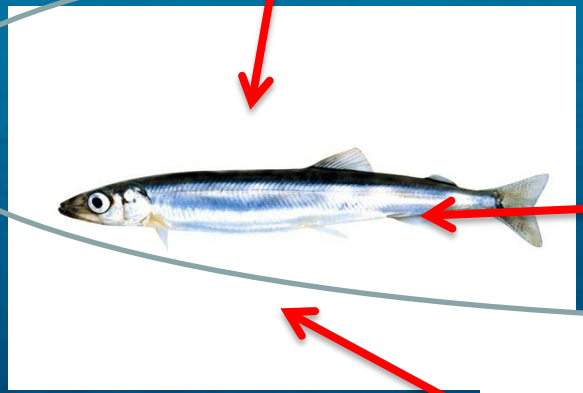
- Managed by the Joint Norw. – Russian Fishery Commission

- Quotaes shared equally between Norway and Russia and 14 % to third countries.

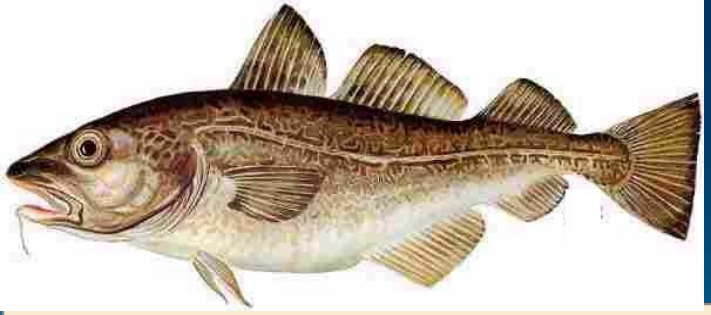


Ecological interactions in the Barents Sea

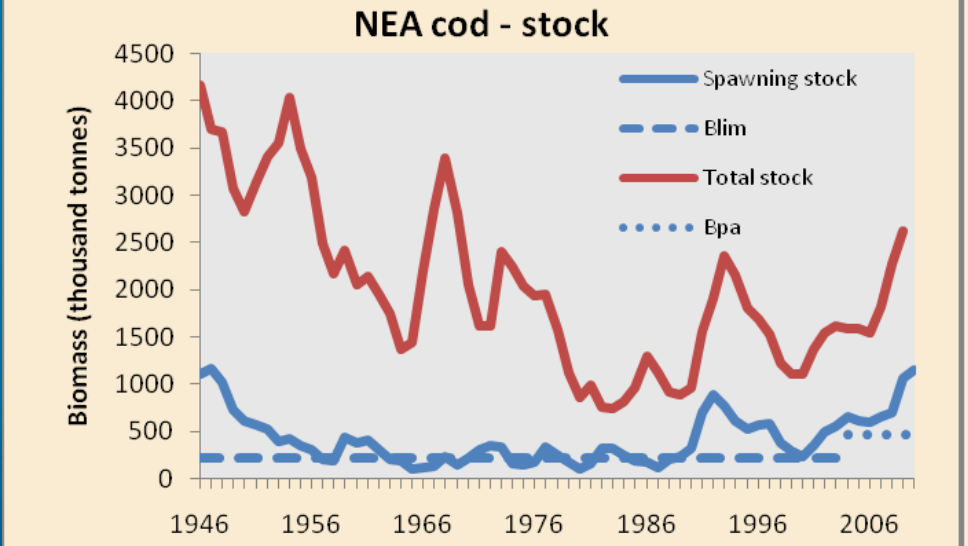
Towards an MSY based management of fish stocks in an ecosystem context

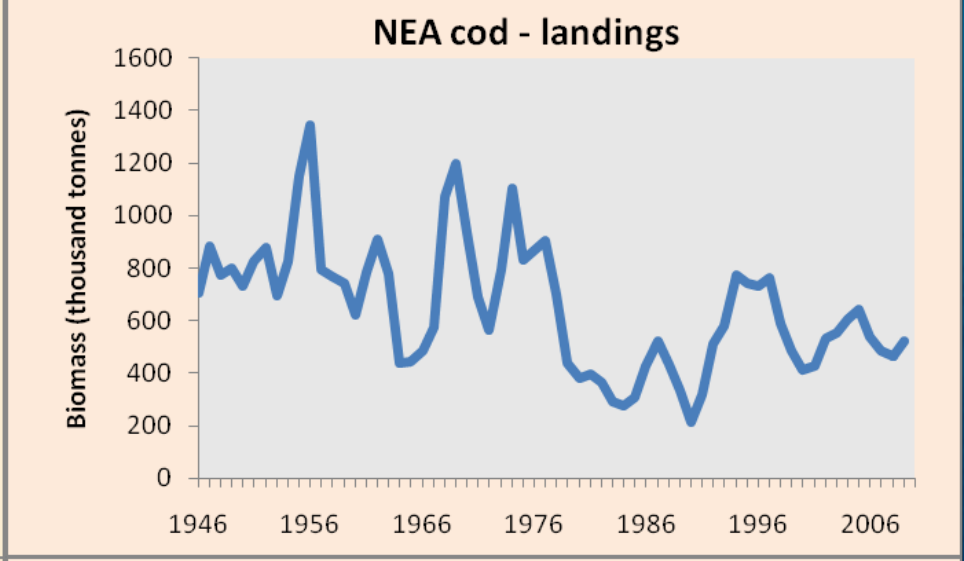


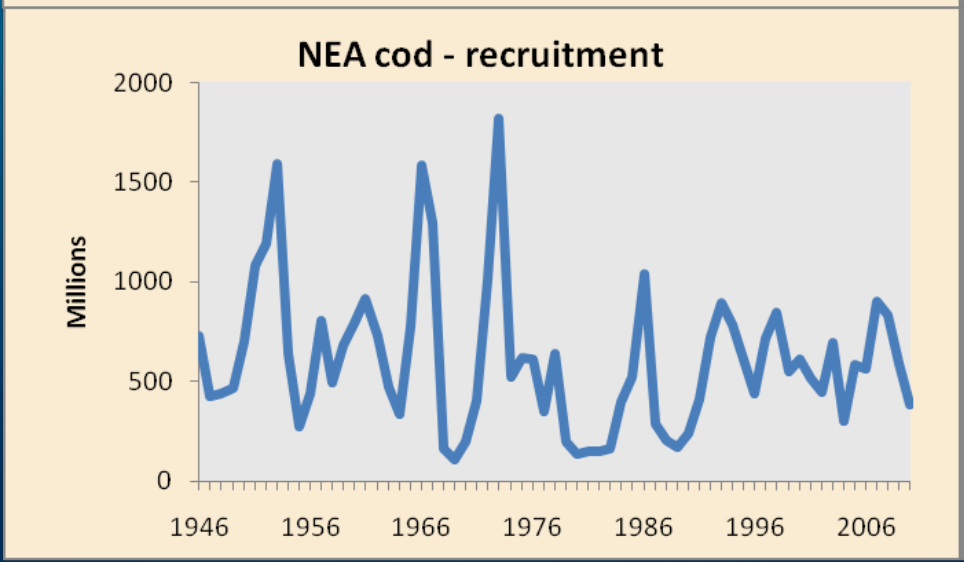
(Røttingen and Tjelmeland 2009)

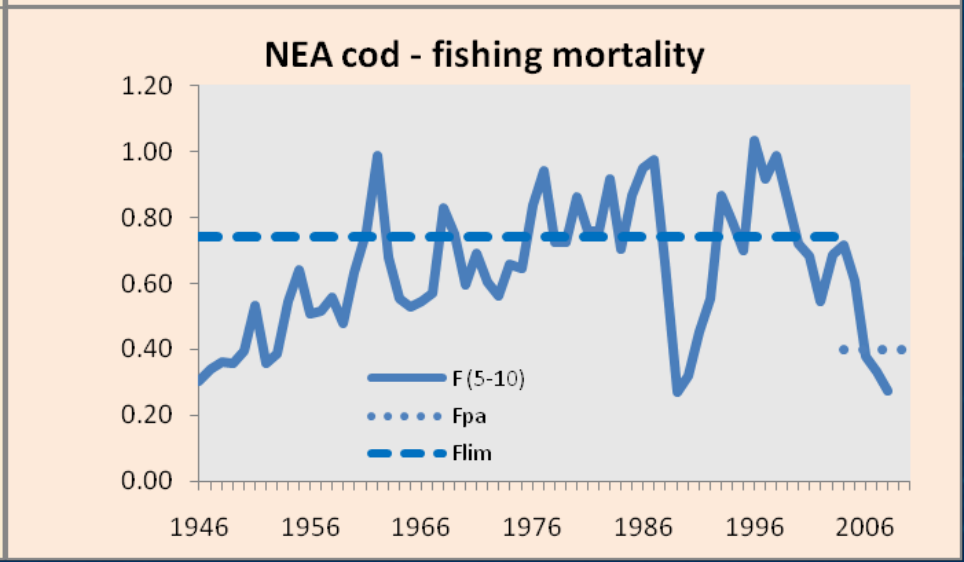


Northeast arctic cod





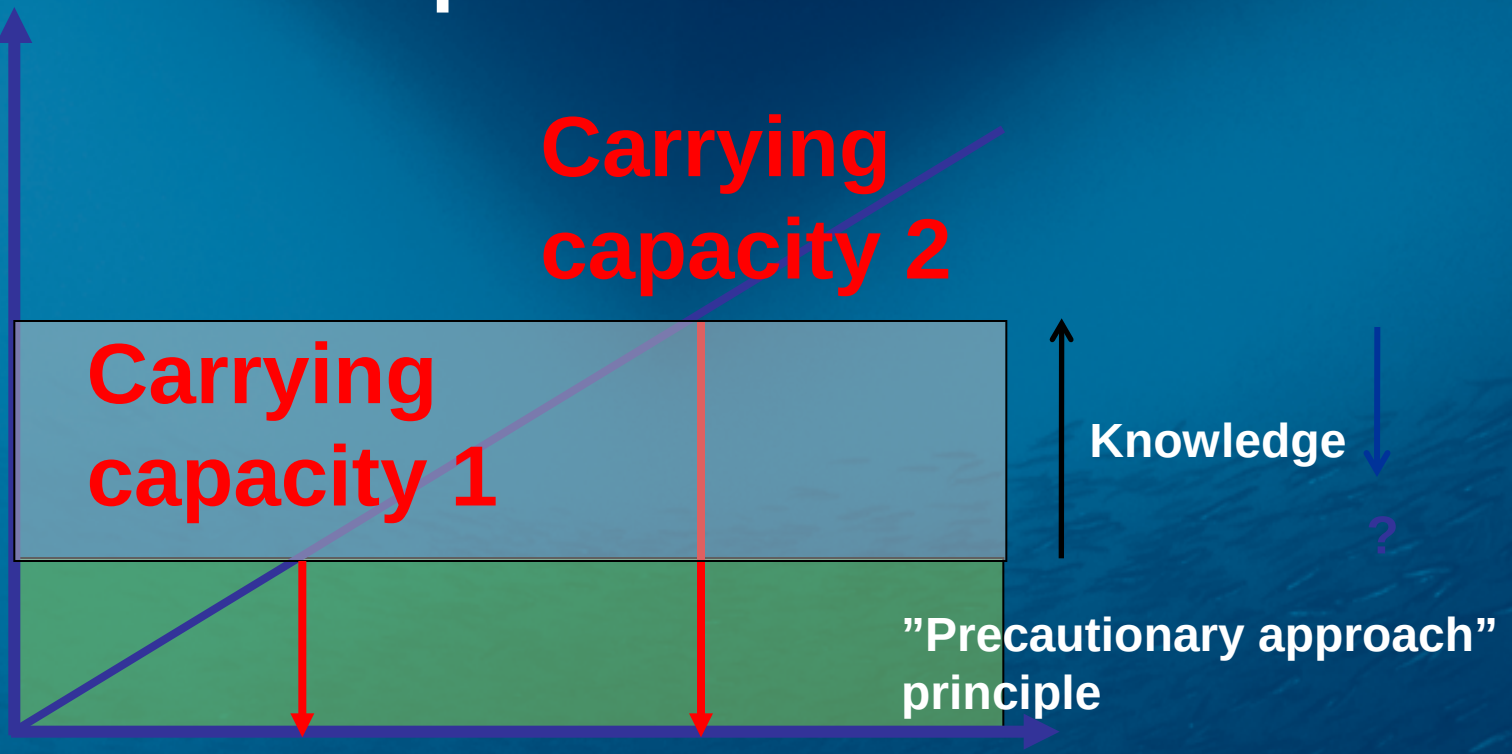




Sustainable Aquaculture

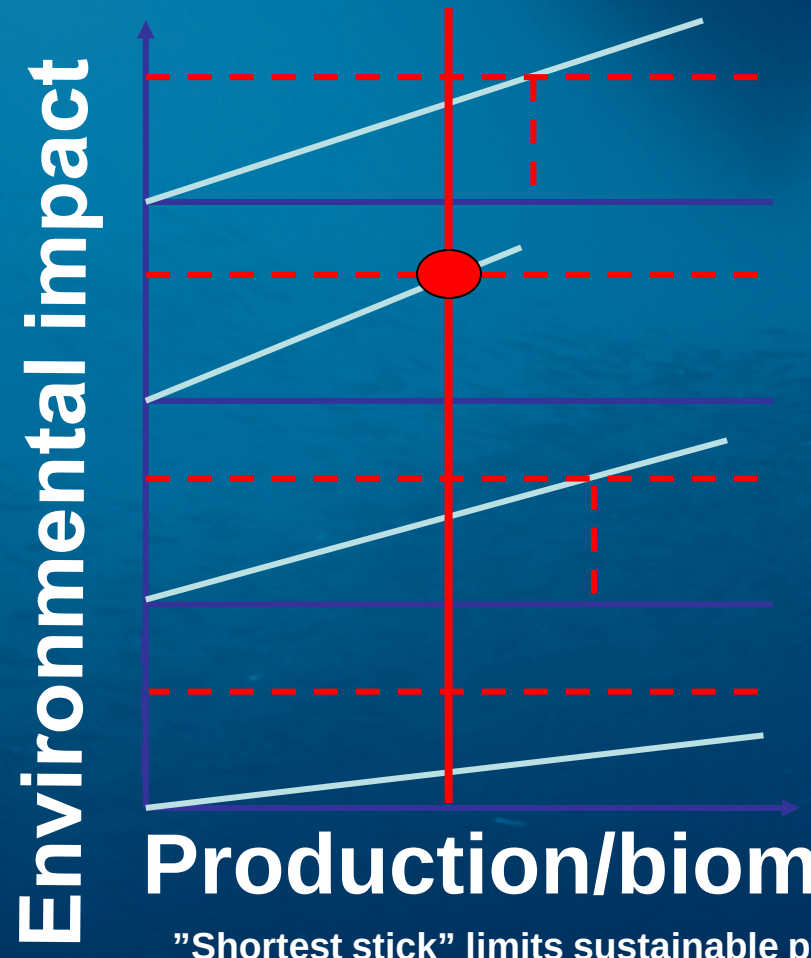
- Beeing able to run production over long time with acceptable environmental impact
- Supply factors must be sustainable (e.g. feed)
- Animal welfare within acceptable criterias

Environmental impact



Regulations according to carrying capacity necessary for further sustainable expansion of aquaculture production

Regional carrying capacity, e.g.: salmon lice as limiting factor



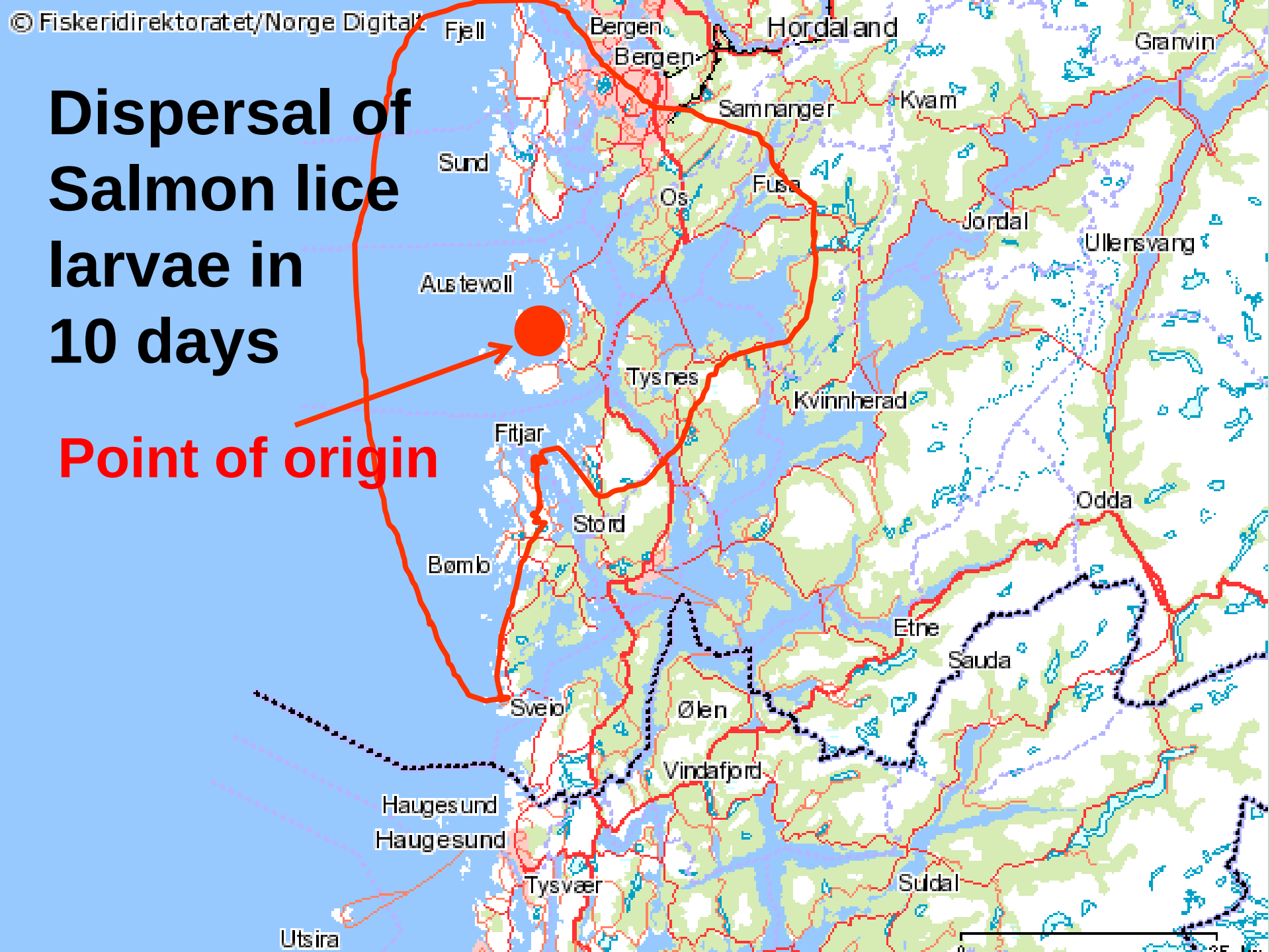
Genetic influence

Paracites (e.g. salmon lice)

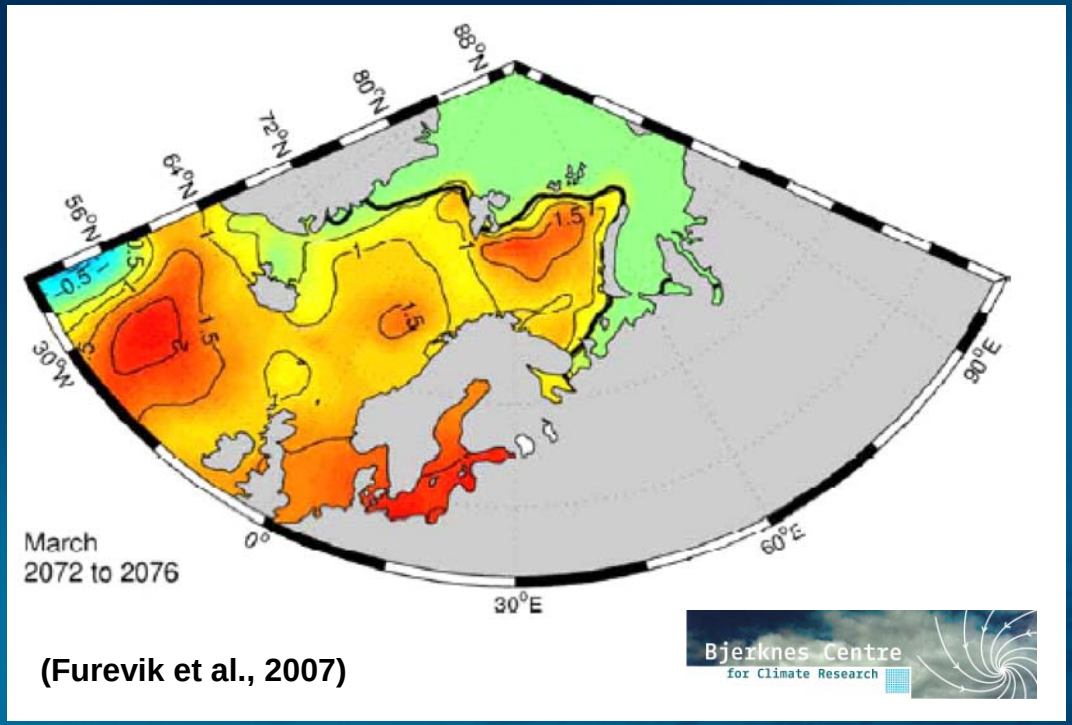
Bacteria, virus

Eutrophication

”Shortest stick” limits sustainable production

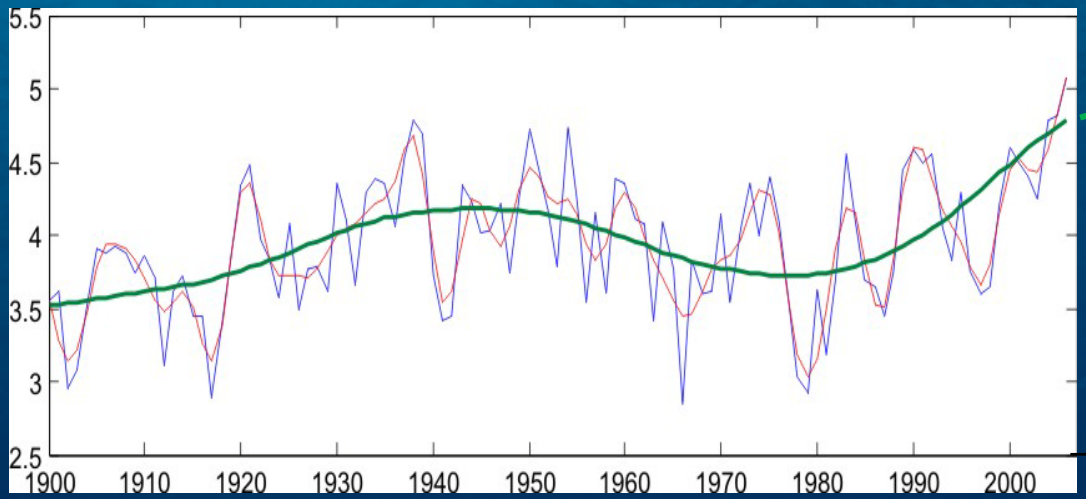

© Fiskeridirektoratet/Norge Digitalt
Dispersal of Salmon lice larvae in 10 days
Point of origin
Fjell
Bergen
Bergen
Hordaland
Granvin
Samnanger
Kvam
Sund
Os
Fusa
Jordal
Ullensvang
Austevoll
Tysnes
Kvinnherad
Fitjar
Stord
Odda
Bømlo
Etne
Sauda
Sveio
Ølen
Vindafjord
Haugesund
Haugesund
Tysvær
Suldal
Utsira

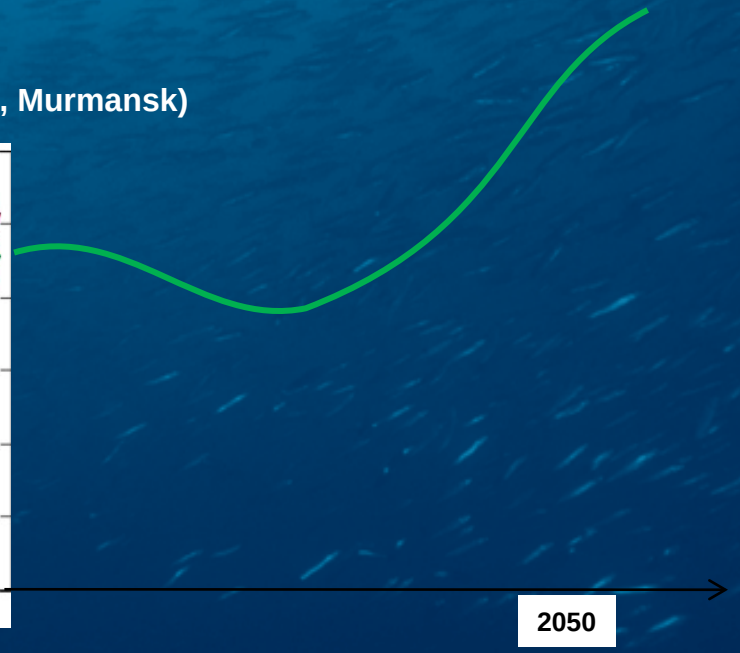
Climate change: observed and modelled temperature increase in the Northern Atlantic



(Furevik et al., 2007)

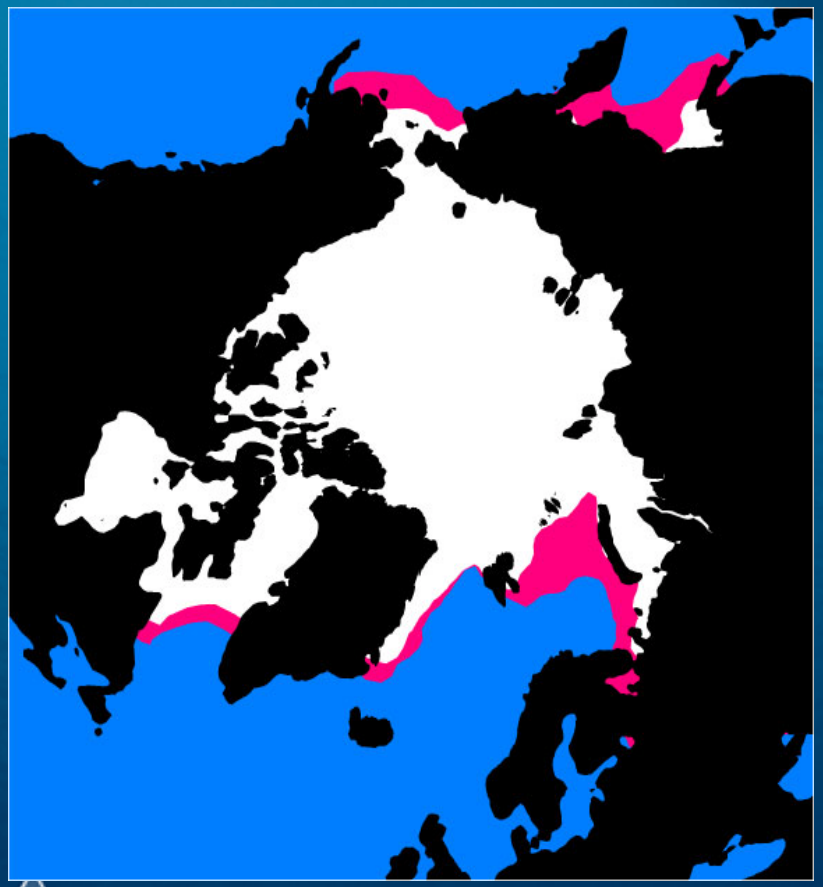
Temperature of the Kola section in the Barents Sea (courtesy PINRO, Murmansk)



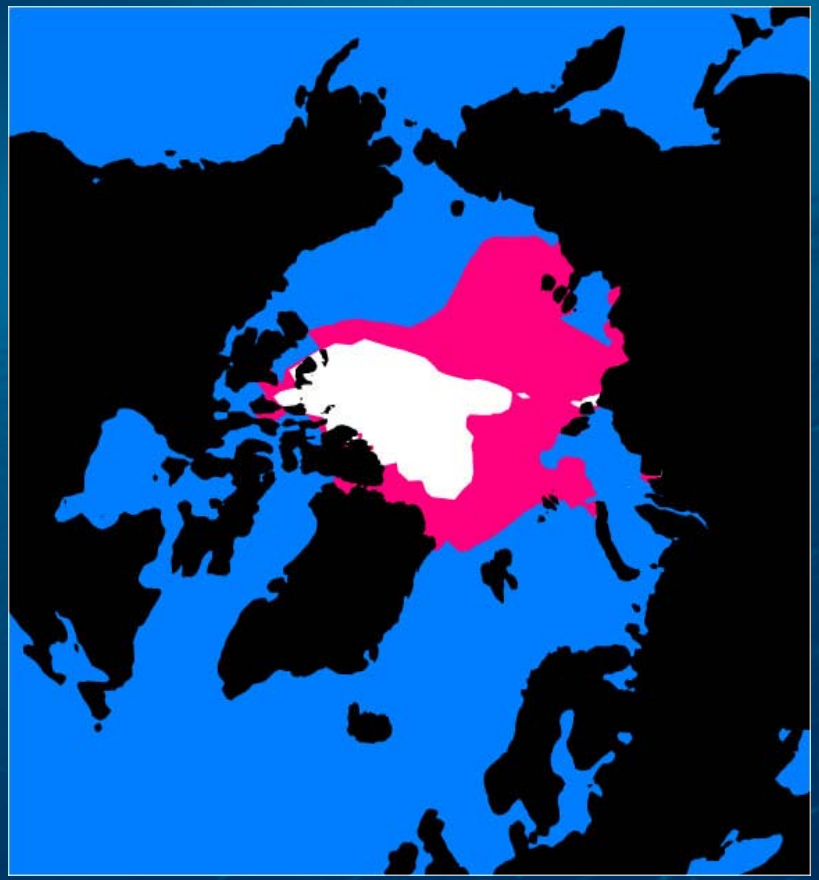


Simulated change of ice distribution by doubbling of CO_2-concentration

Pink: Control
White: Dobling of atmospheric CO_2

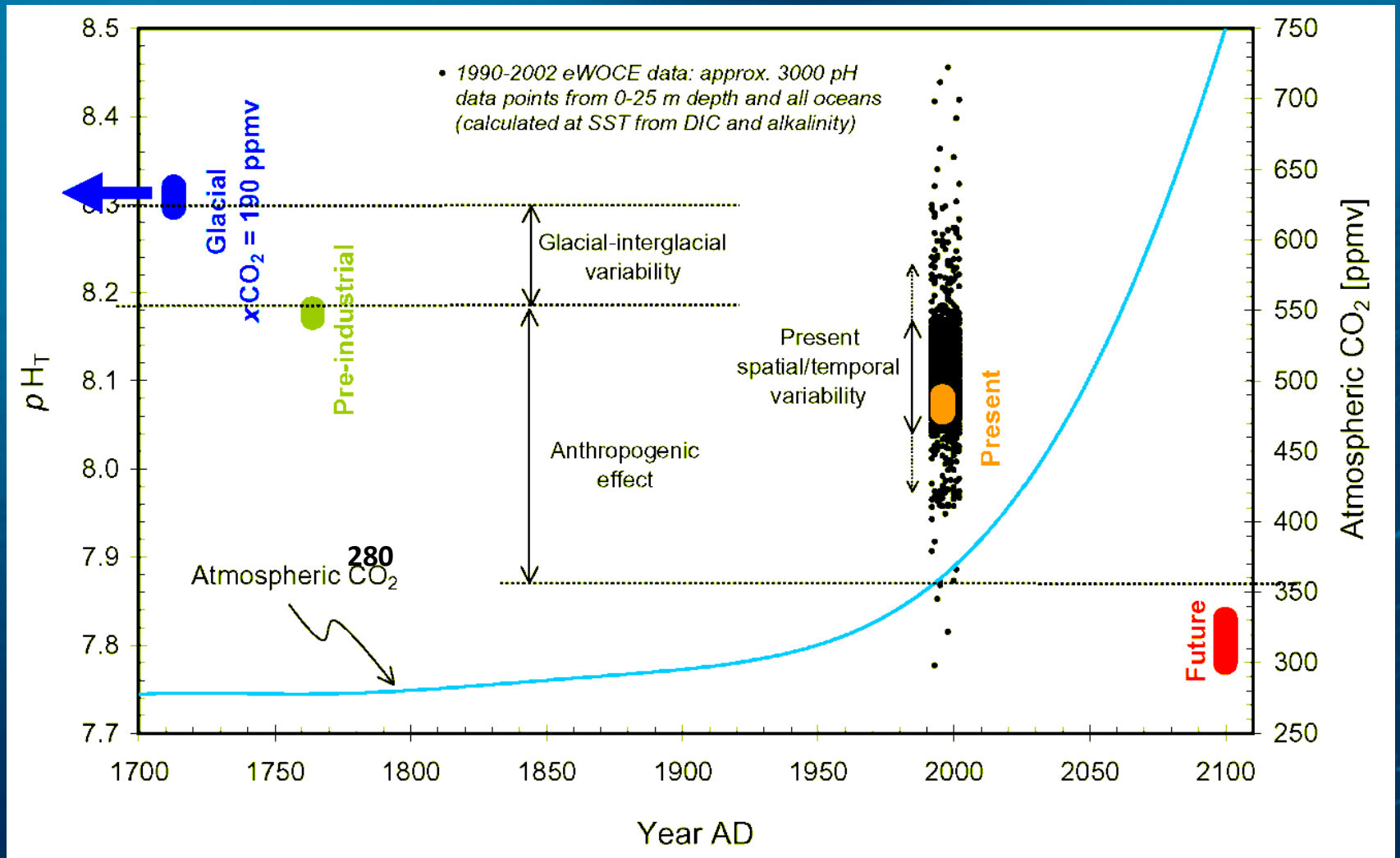


Winther



Summer

Ocean acidification – transformation of sea water towards a more acid like condition – but the ocean will not be "acidic"



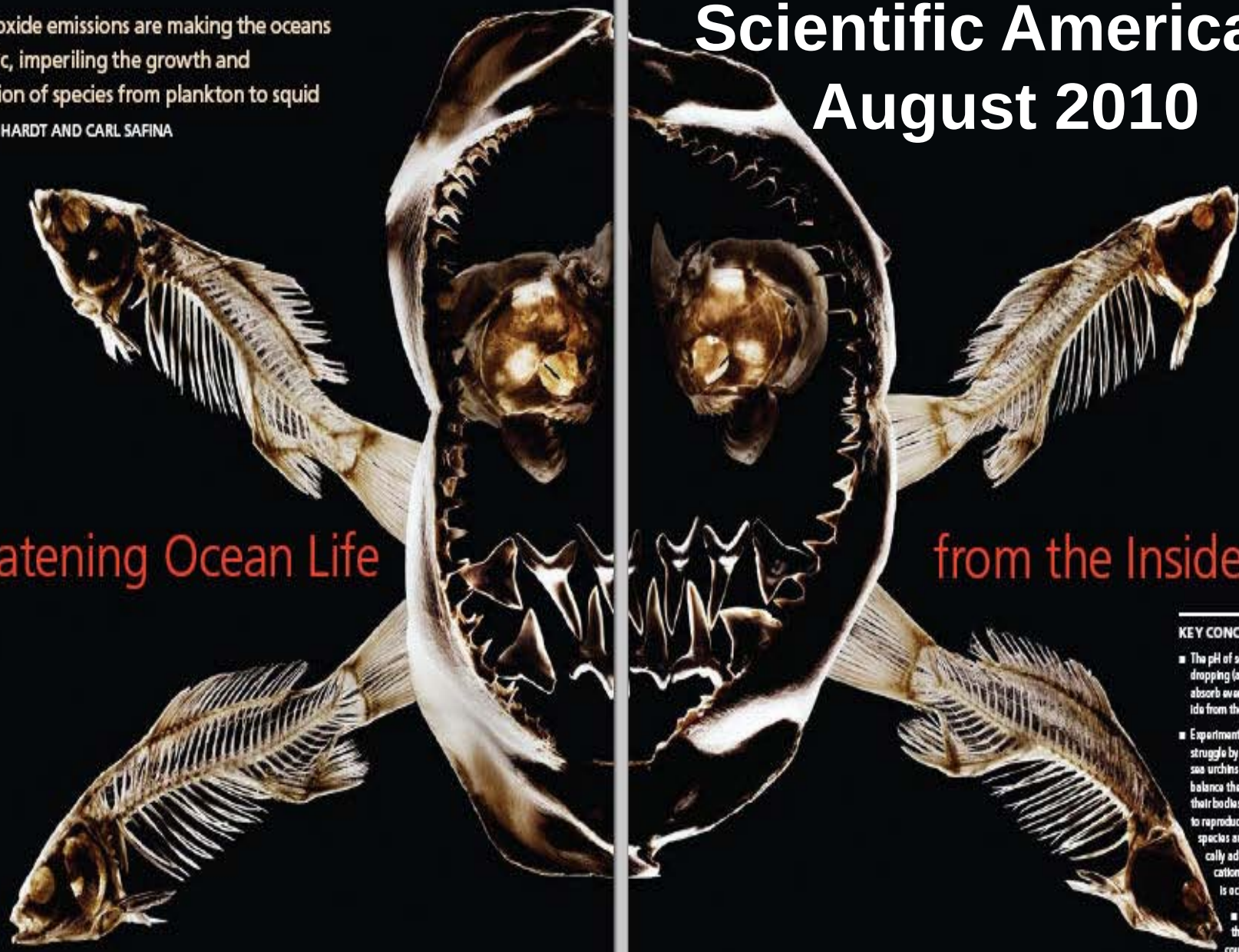
(Imber, 2005)

Scientific American, August 2010

Carbon dioxide emissions are making the oceans more acidic, imperiling the growth and reproduction of species from plankton to squid

BY MARAH J. HARDT AND CARL SAFINA

Threatening Ocean Life from the Inside Out



PHOTOGRAPH BY JAMIE CHUNG

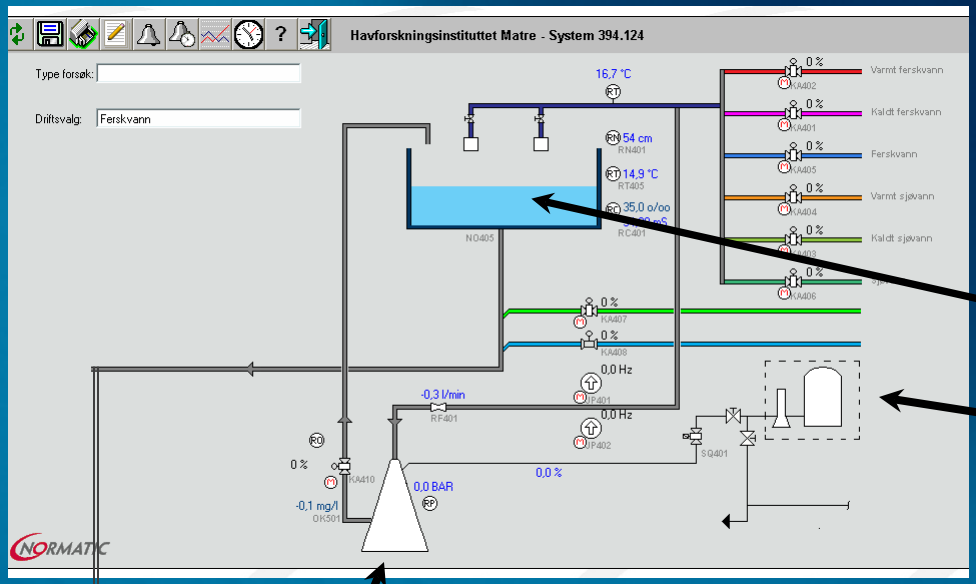
KEY CONCEPTS

- The pH of seawater worldwide is dropping (acidifying) as oceans absorb ever more carbon dioxide from the atmosphere.
- Experiments show that the struggle by copepods, snails, sea urchins and brittlestars to balance the changing pH inside their bodies impairs their ability to reproduce and grow. Many species are unlikely to genetically adapt to ocean acidification, because the change is occurring too quickly.
- As species wither, the marine food chain could be disrupted; human action is needed to curtail further acidification.

—The Editors

Matre CO_2 exp. facility

(5000 l and smaller tanks)

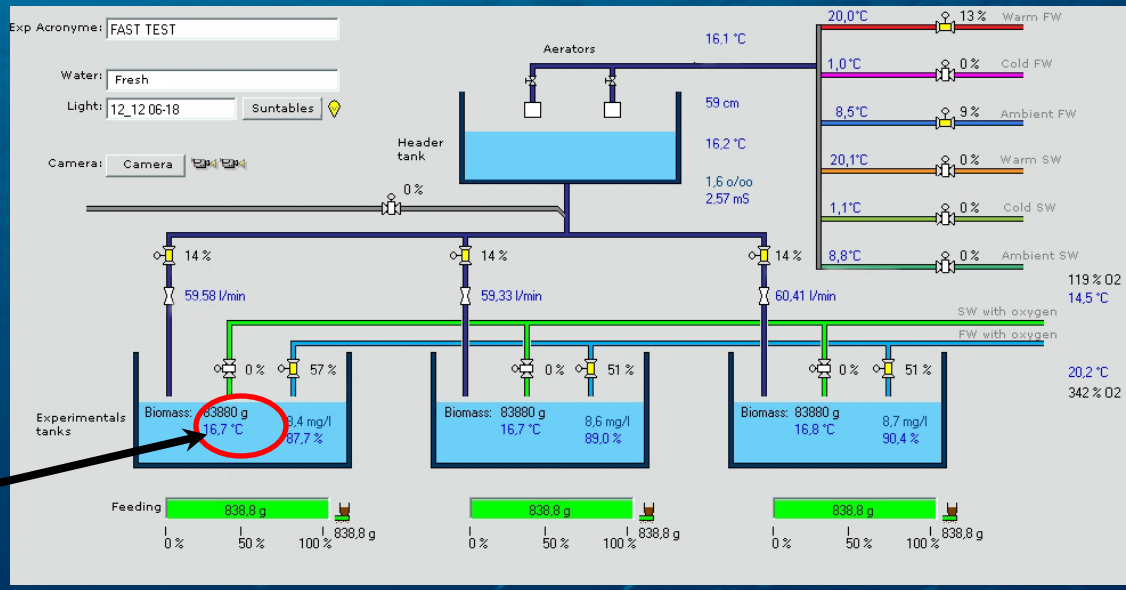


pH measurements

CO_2 bottles

System for addition of acid and bicarbonate will also be installed

Mixing cone



Today regulation by O_2

Will also be regulated by pH


Biodiversity conservation - will have to change the way we manage fisheries!

EUROPE's marine science community

- will deliver the knowledge needed if challenged and stimulated