NSS herring feeding dynamics in the Norwegian Sea

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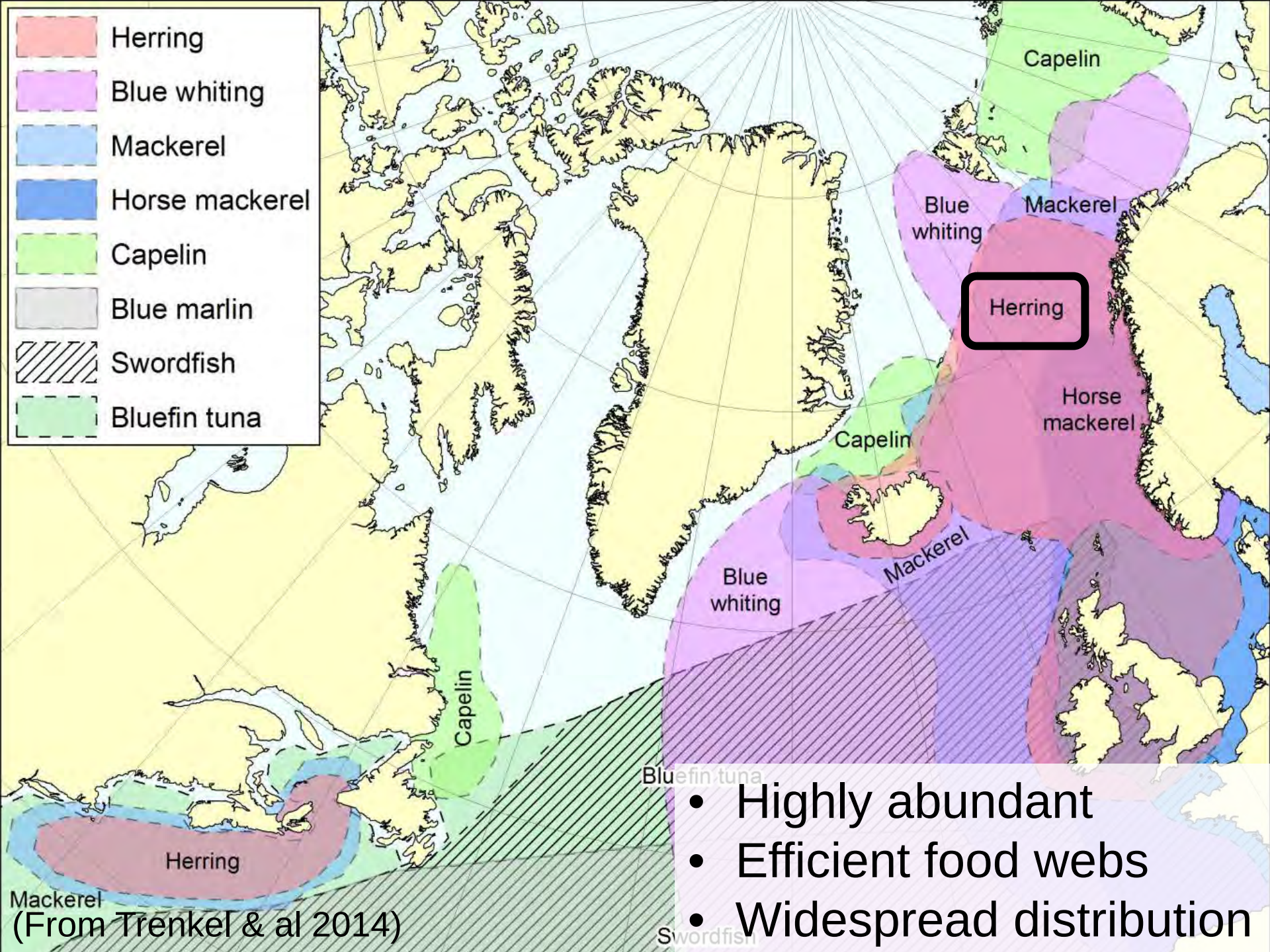
Introduction

- The Norwegian Sea is an important feeding ground for planktivorous stocks
- Prey availability is a key driver of dynamics of small pelagic fishes
- Objective:

  Explore the effect of planktivorous fish feeding on prey dynamics in the Norwegian Sea on large and small spatial scales



- Highly abundant
- Efficient food webs
- Widespread distribution

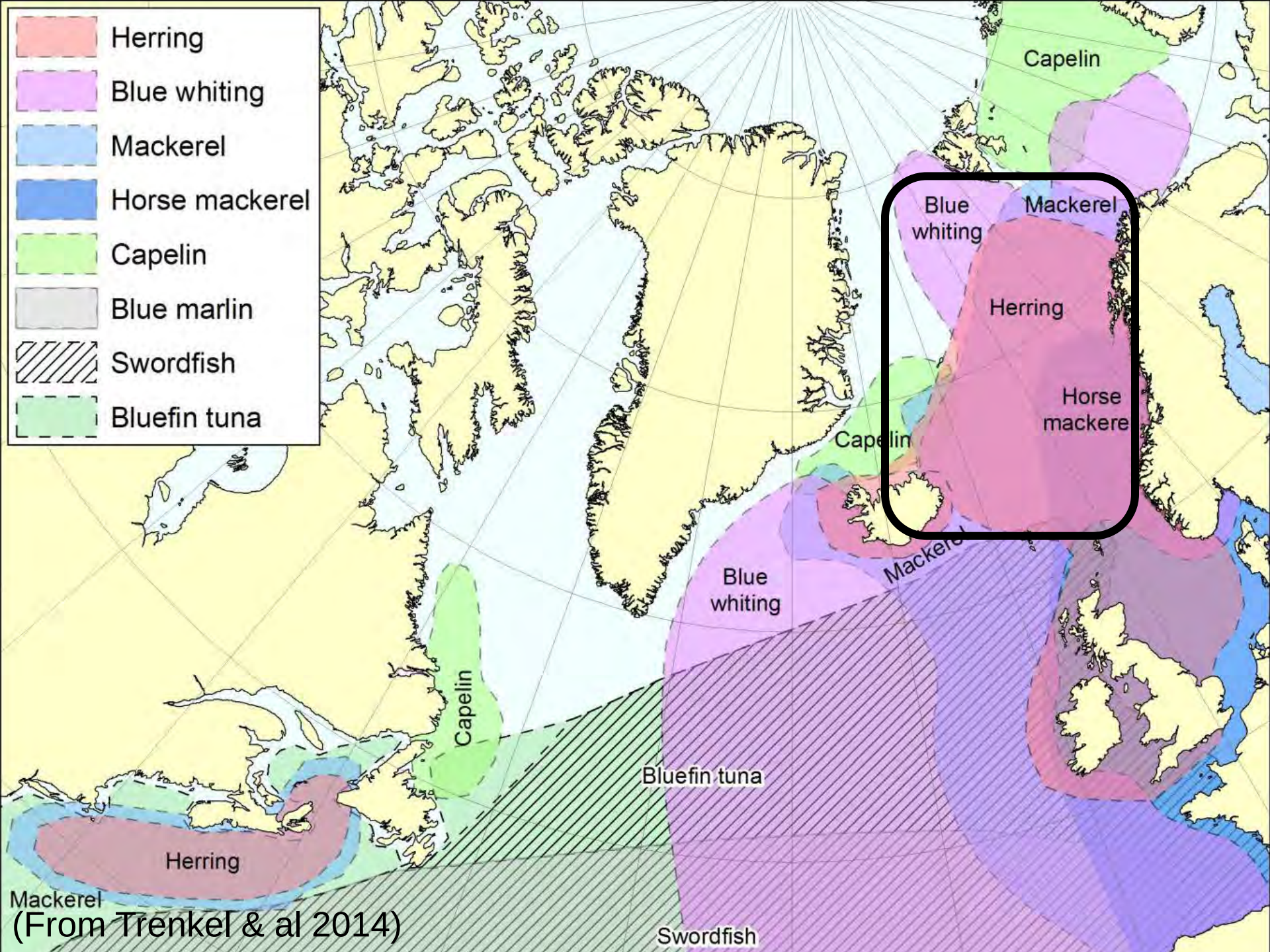
(From Trenkel & al 2014)

Norwegian spring spawning herring:

- Vast spawning areas along the Norwegian coast
- Nursery areas in the Barents Sea and fjords
- Adults perform feeding migrations into the Norwegian Sea

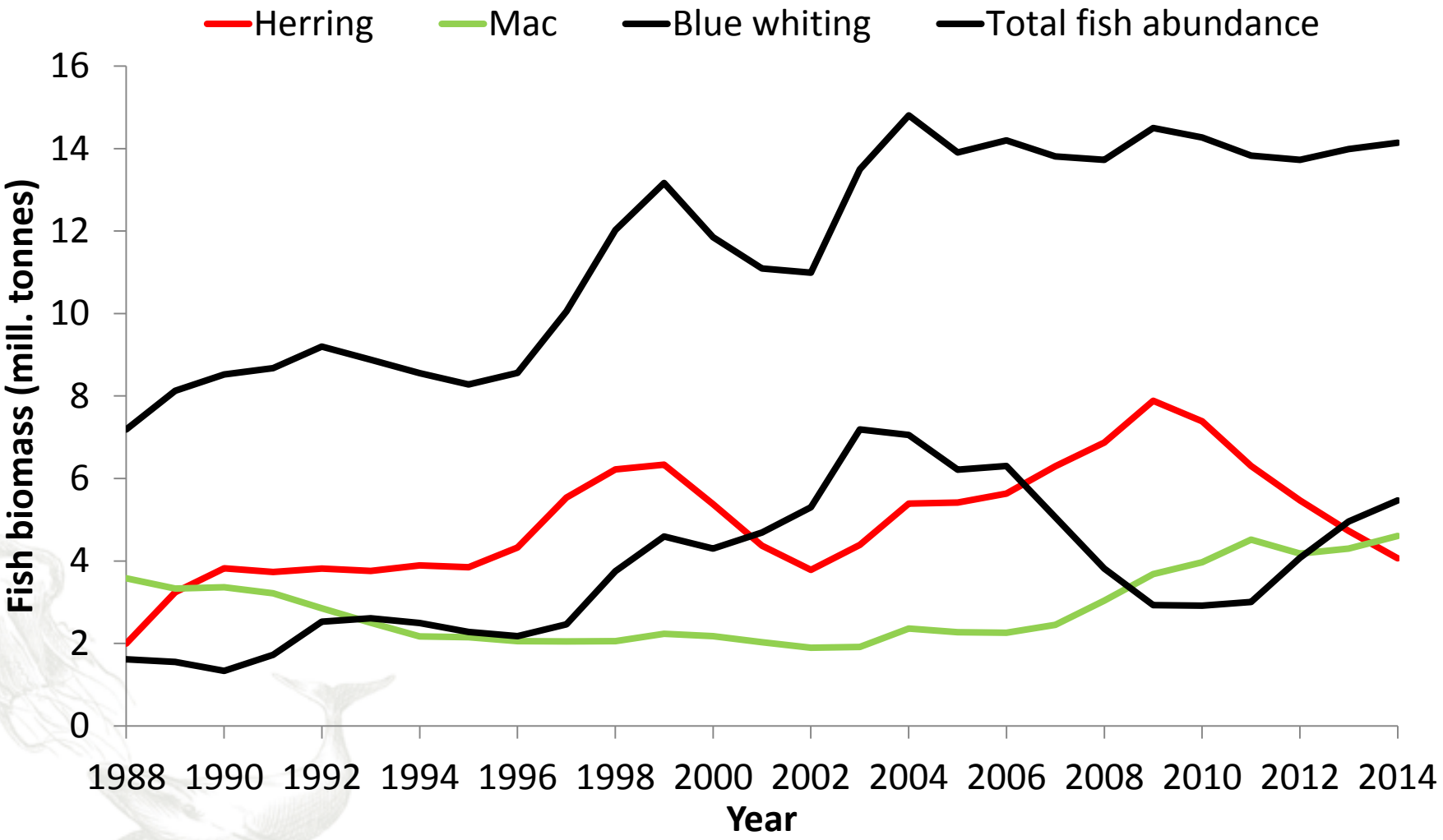
Feeding area
Spawning area
Overwintering area
Nursery area

Norway

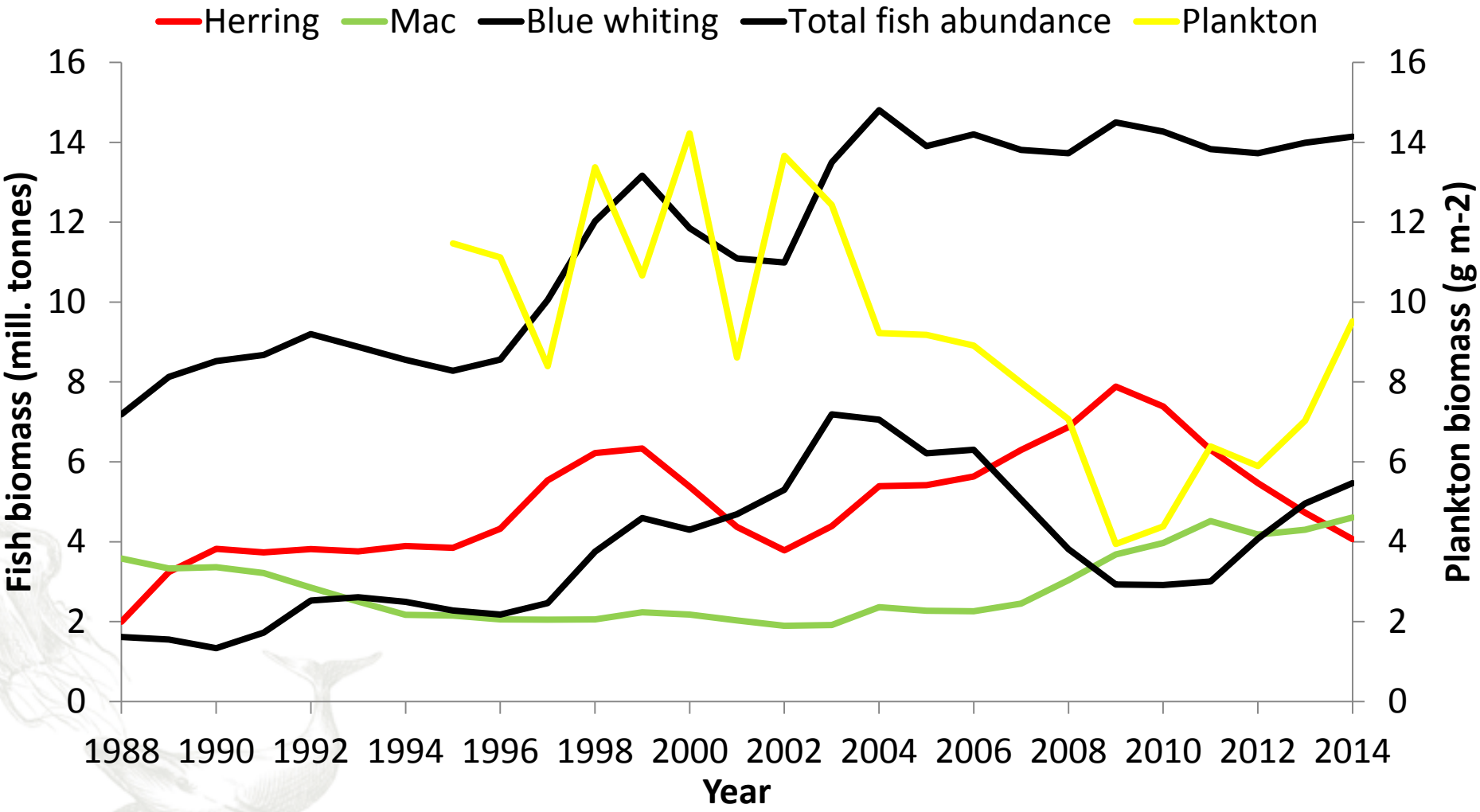


(From Trenkel & al 2014)

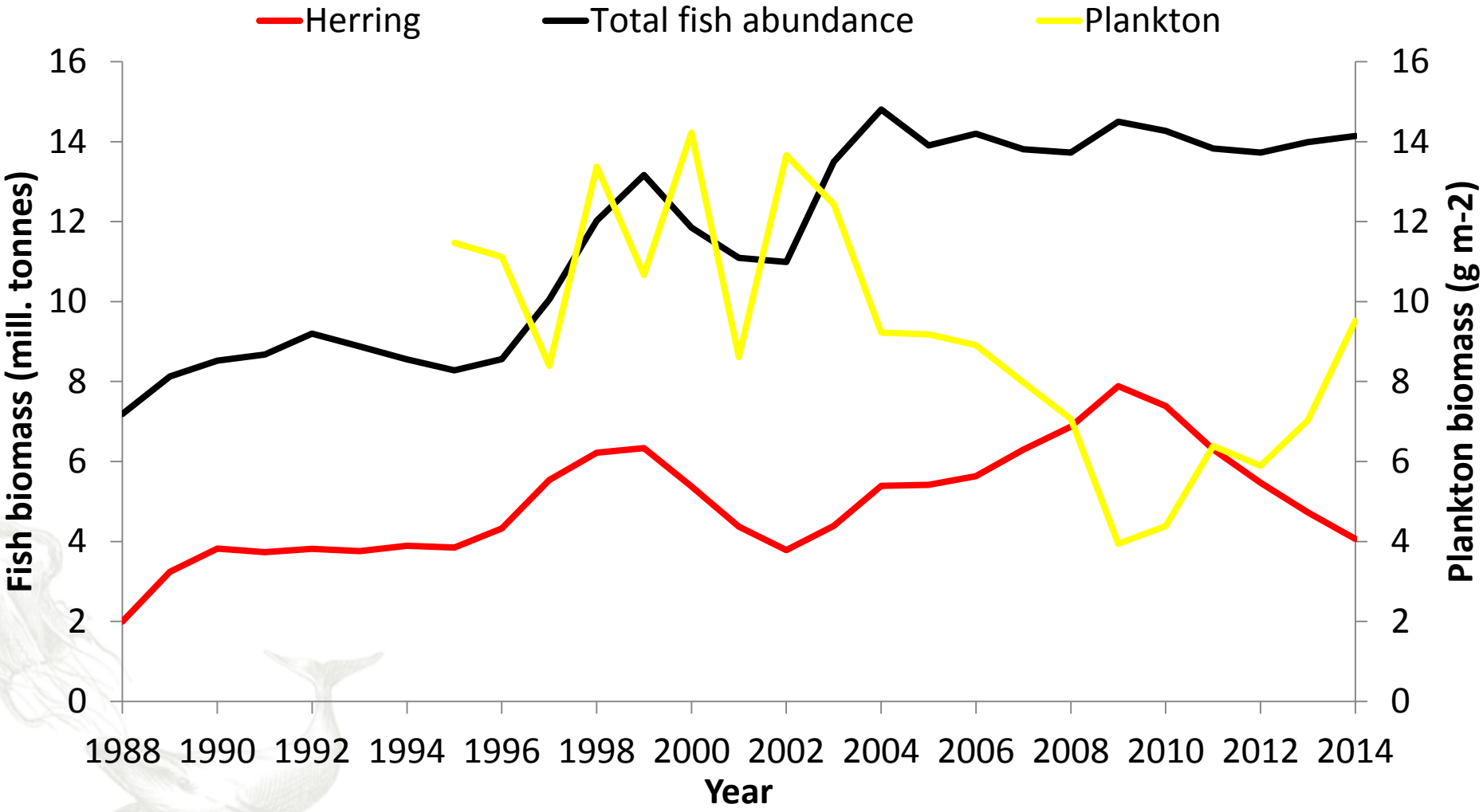
Pelagic fish biomass in the Norwegian Sea



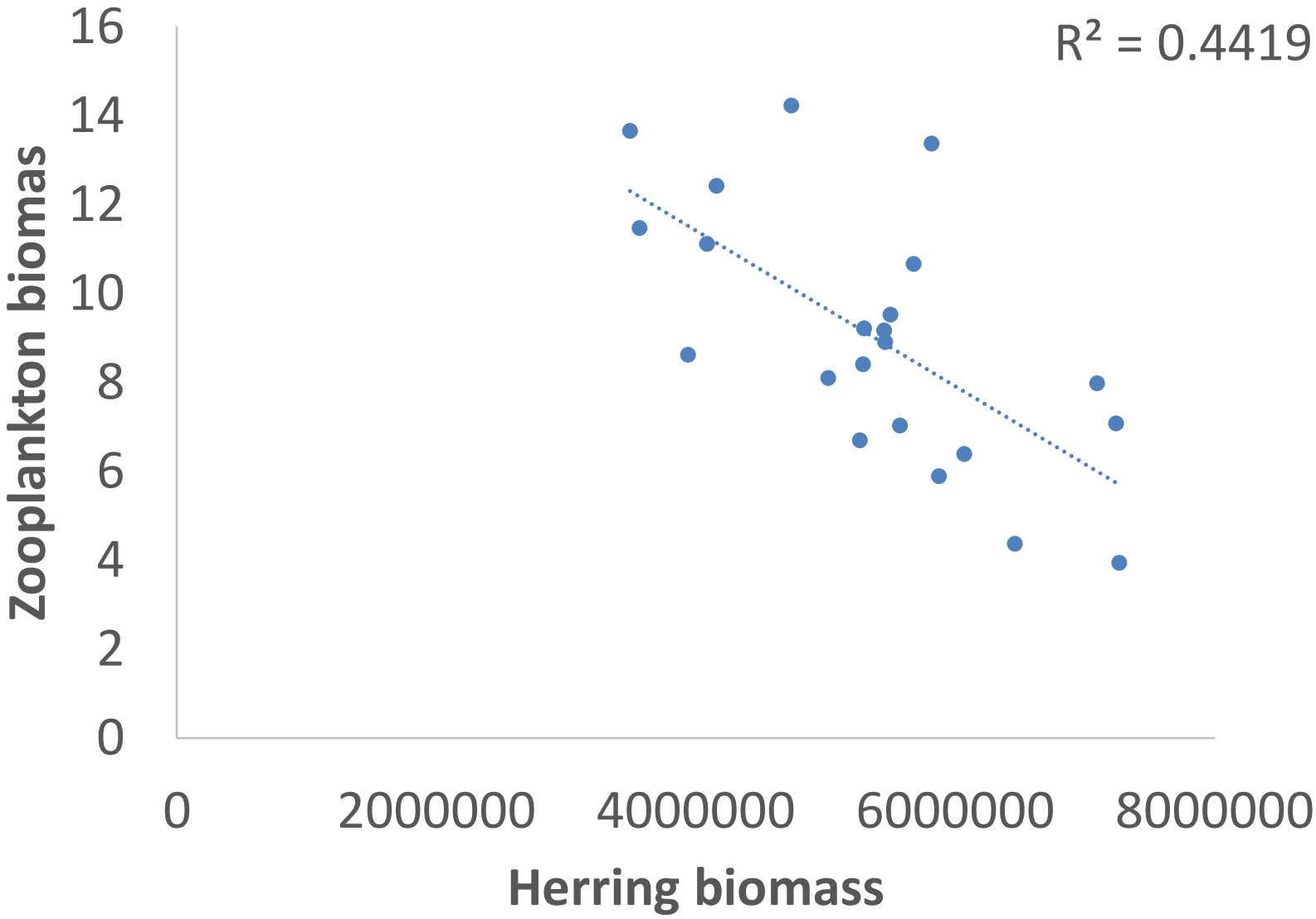
Plankton and fish biomass



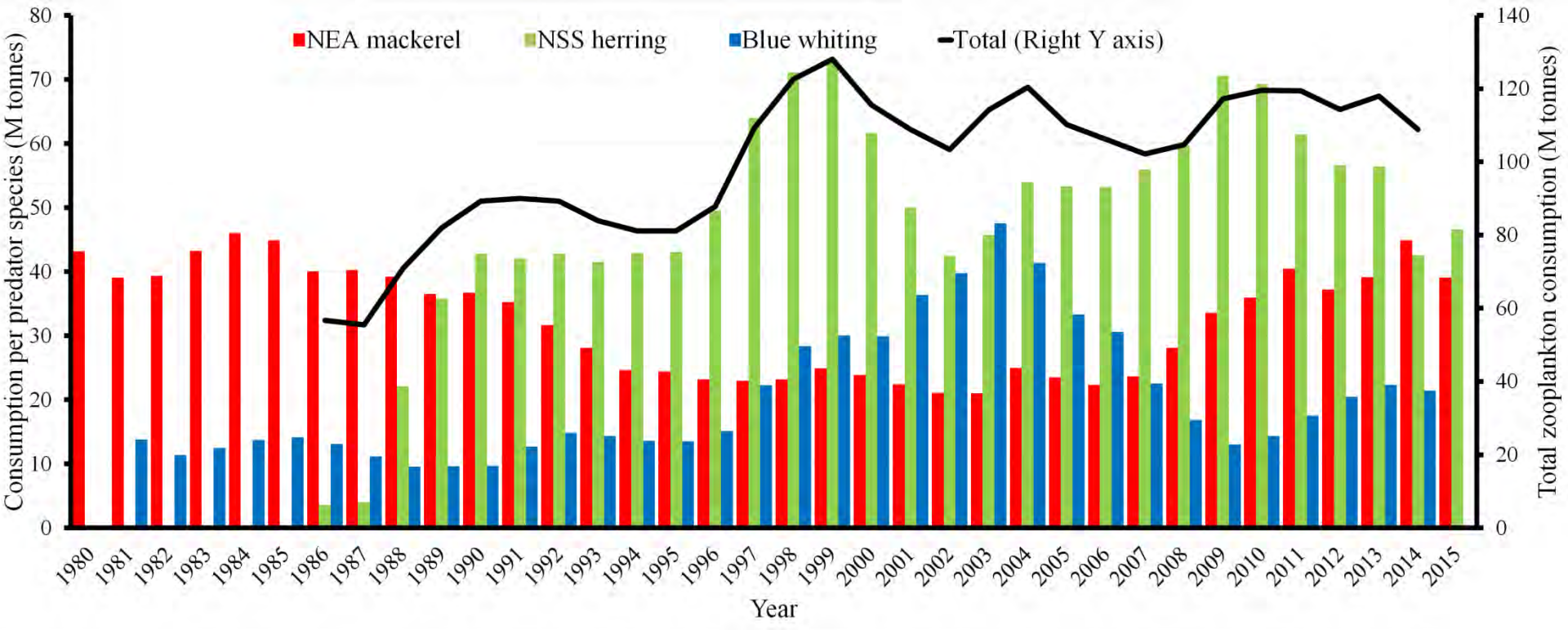
Plankton and herring biomass



Negative relation between zooplankton and NSS herring biomass



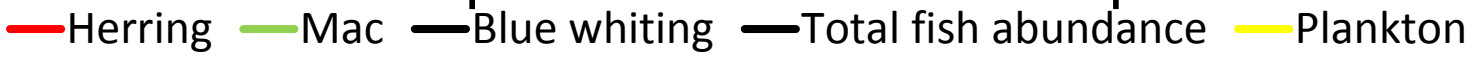
Pelagic fish prey consumption in Nordic Seas

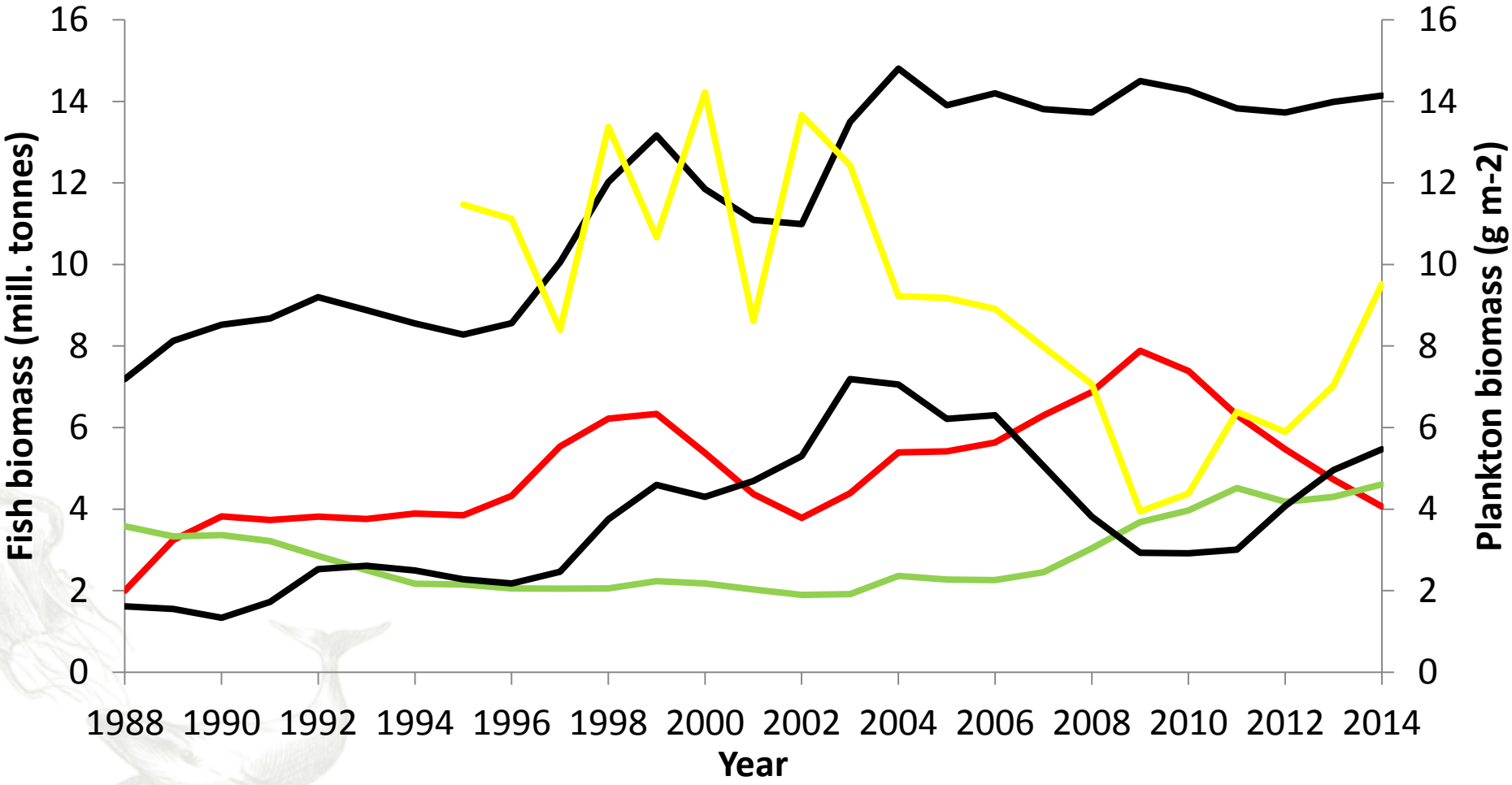


From Bachiller & al. submitted

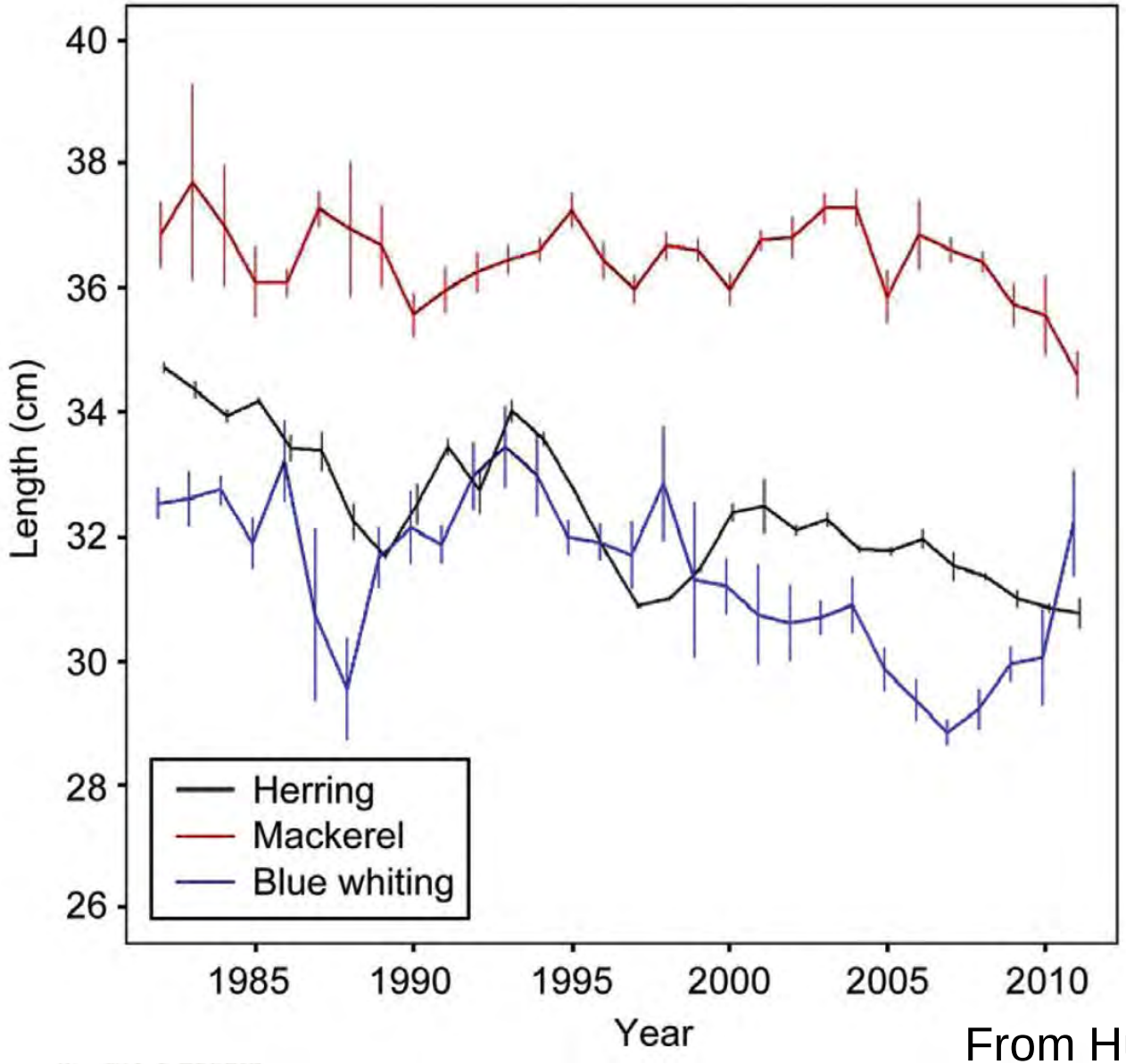
Plankton and fish biomass

”Bottom up” ”Top down”



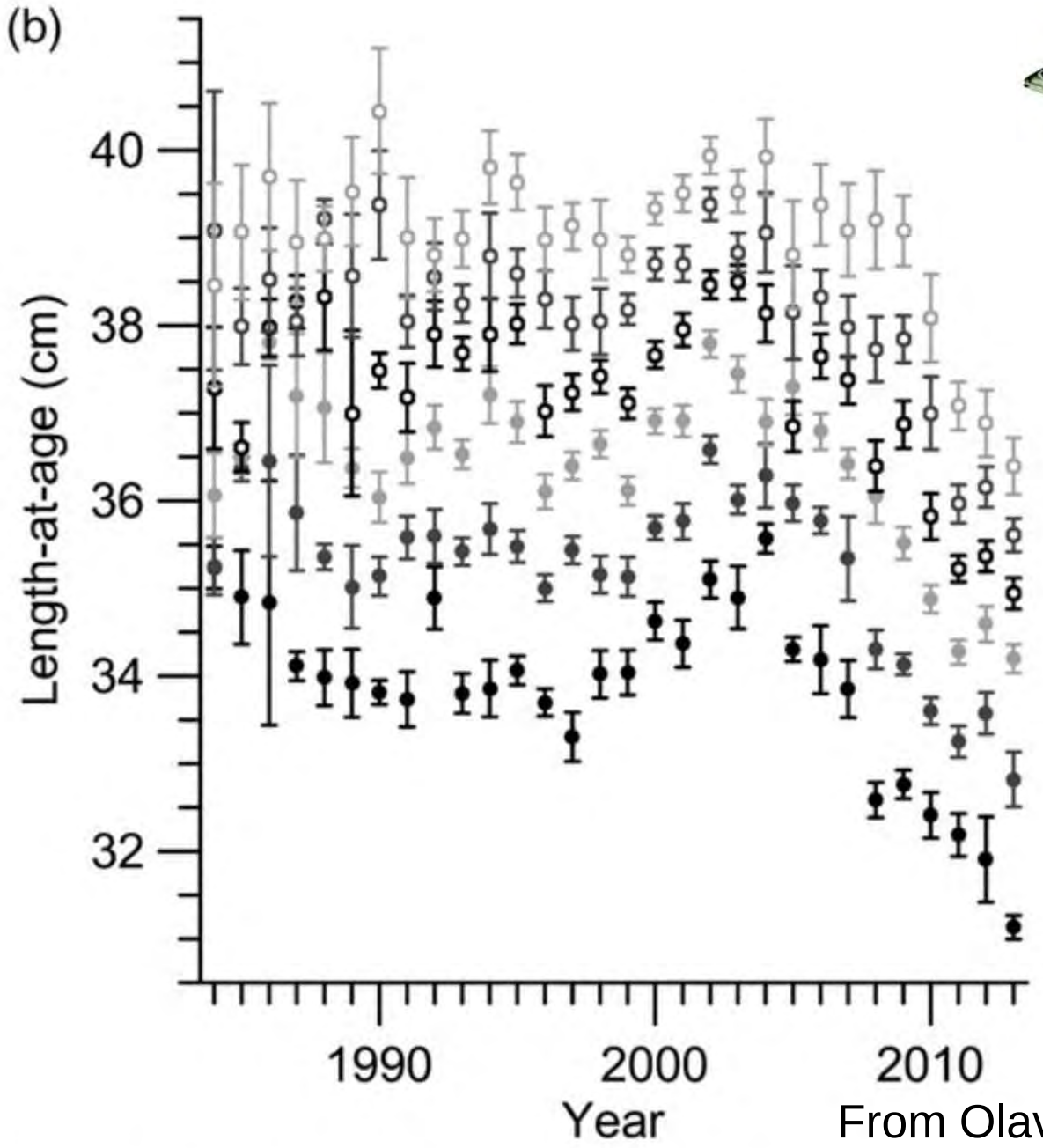


Reduced length growth of herring, mackerel and blue whiting (age 6)



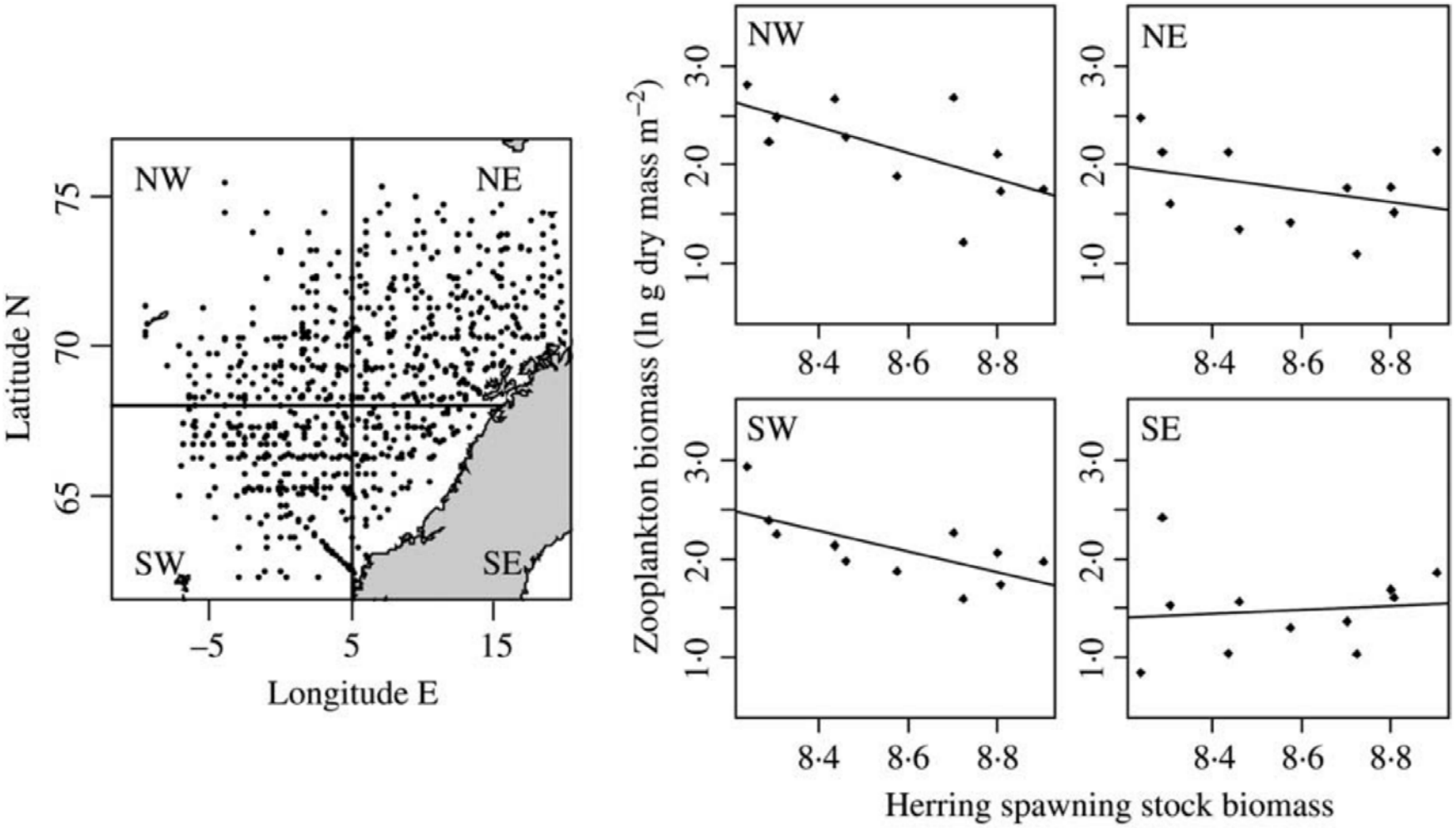
From Huse & al. 2012

Reduced length at age in mackerel



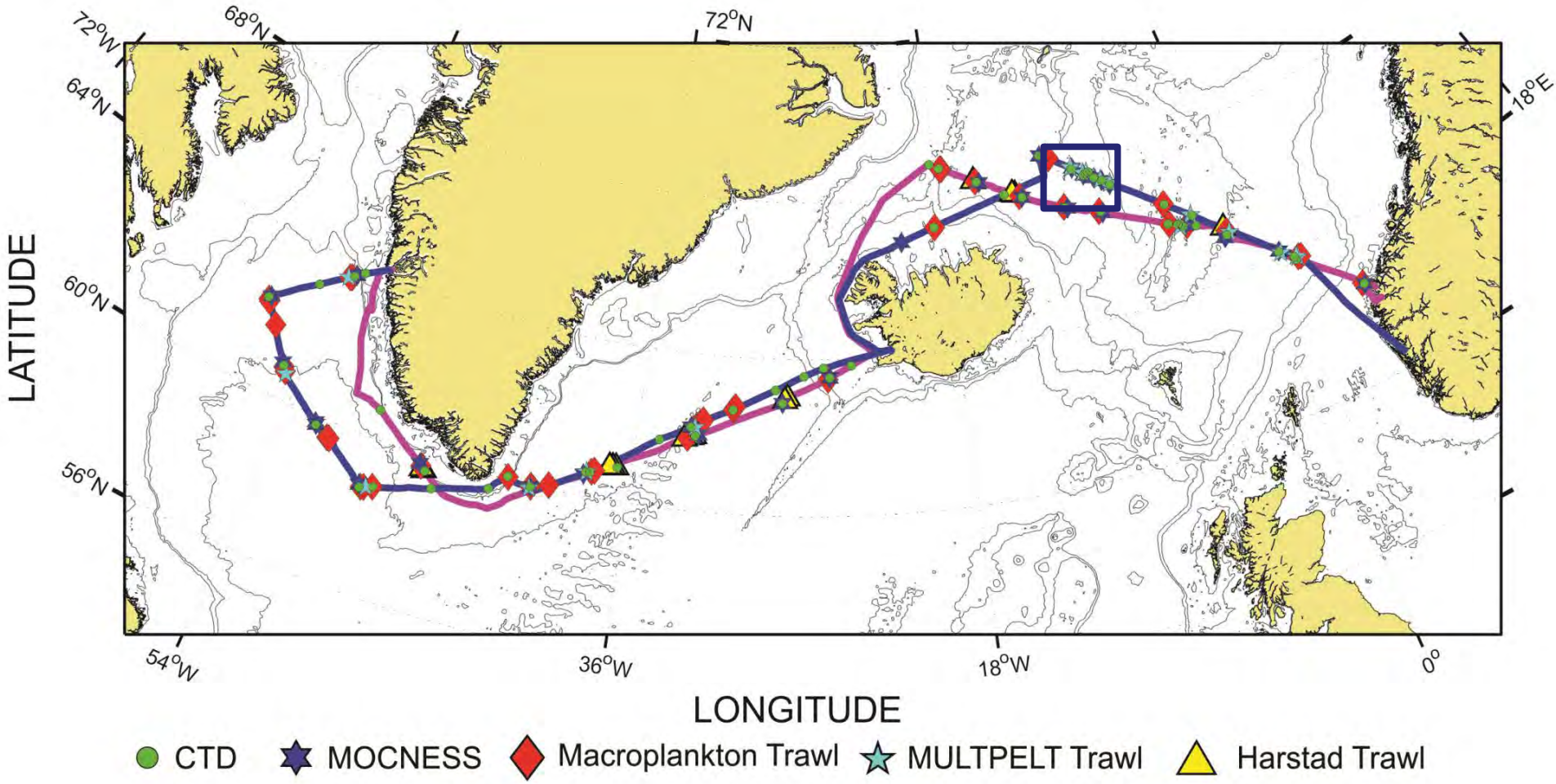
From Olavsdottir & al. 2015

Negative correlation between herring and zooplankton in frontal area



From Olsen & al 2007

Trans-Atlantic cruise onboard G.O. Sars, May-June 2013



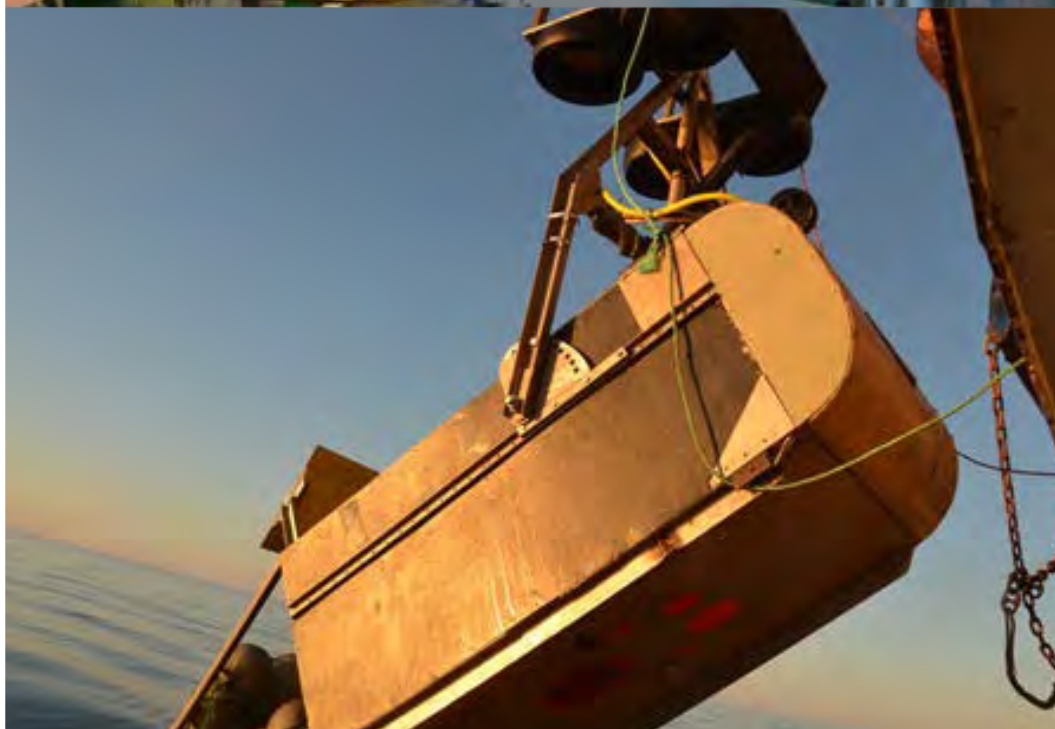

G. O. SARS
G. O. SARS
BERGEN

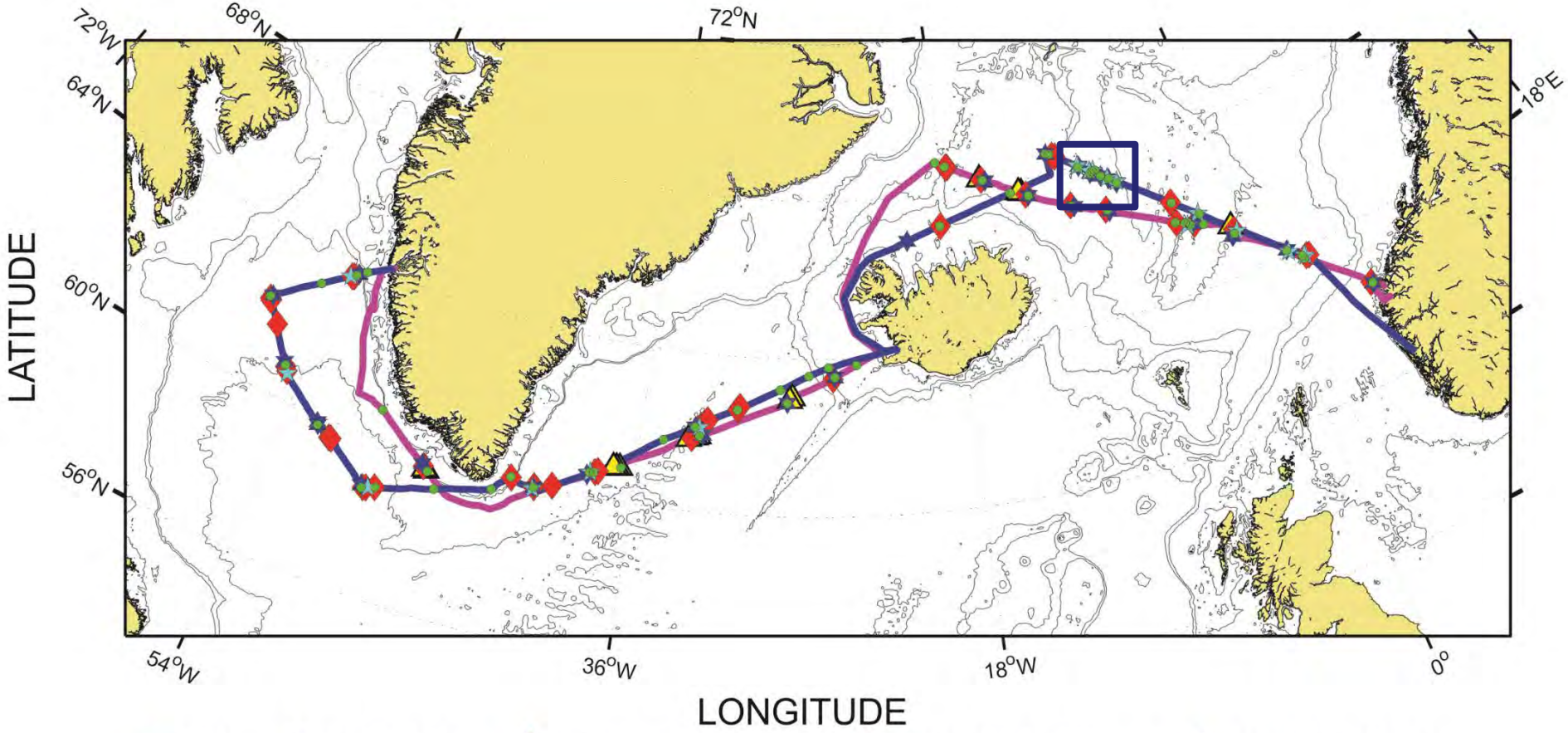
Towed platform

Messor-sensors:

- CTD
- Fluorometer
- OPC
- VPR
- Acoustics (38, 70, 120, 333 khz)

- Speed: 4 knots

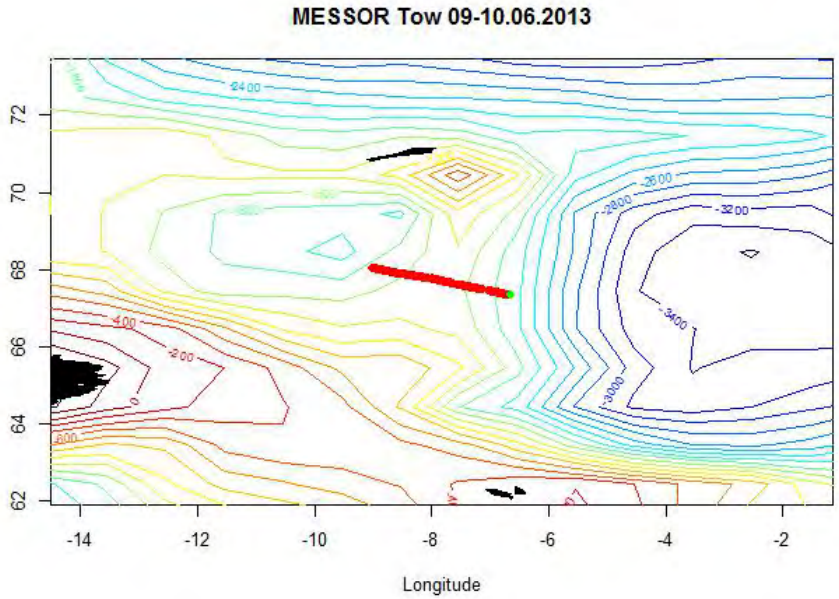


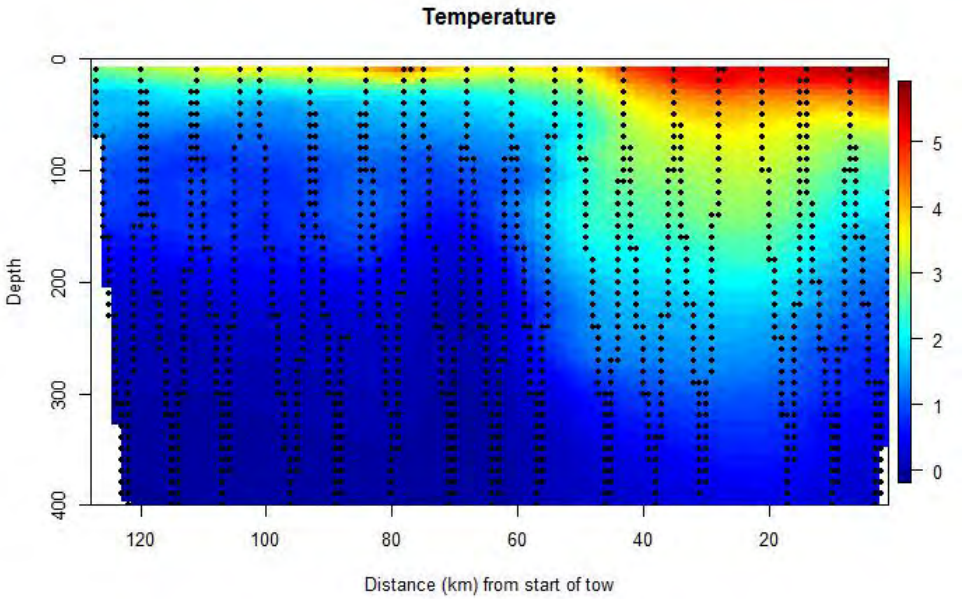


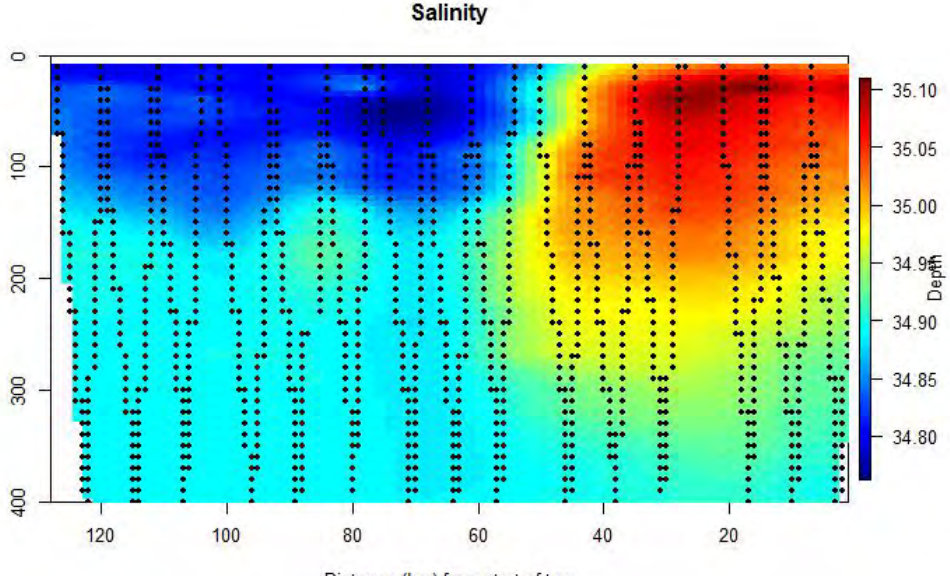
Sampling design

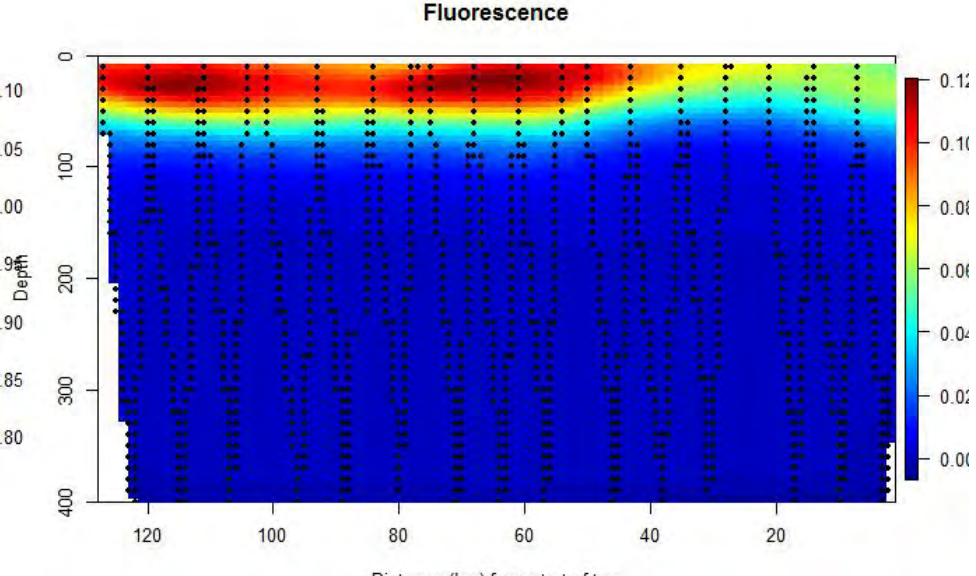
- Three crossings of the front towing the MESSOR platform obliquely between 0 and 400 m
- Studying herring distribution, plankton, hydrography
- MOCNESS and pelagic trawl hauls
- Stomach content analysis

Hydrography and fluorescence along transect

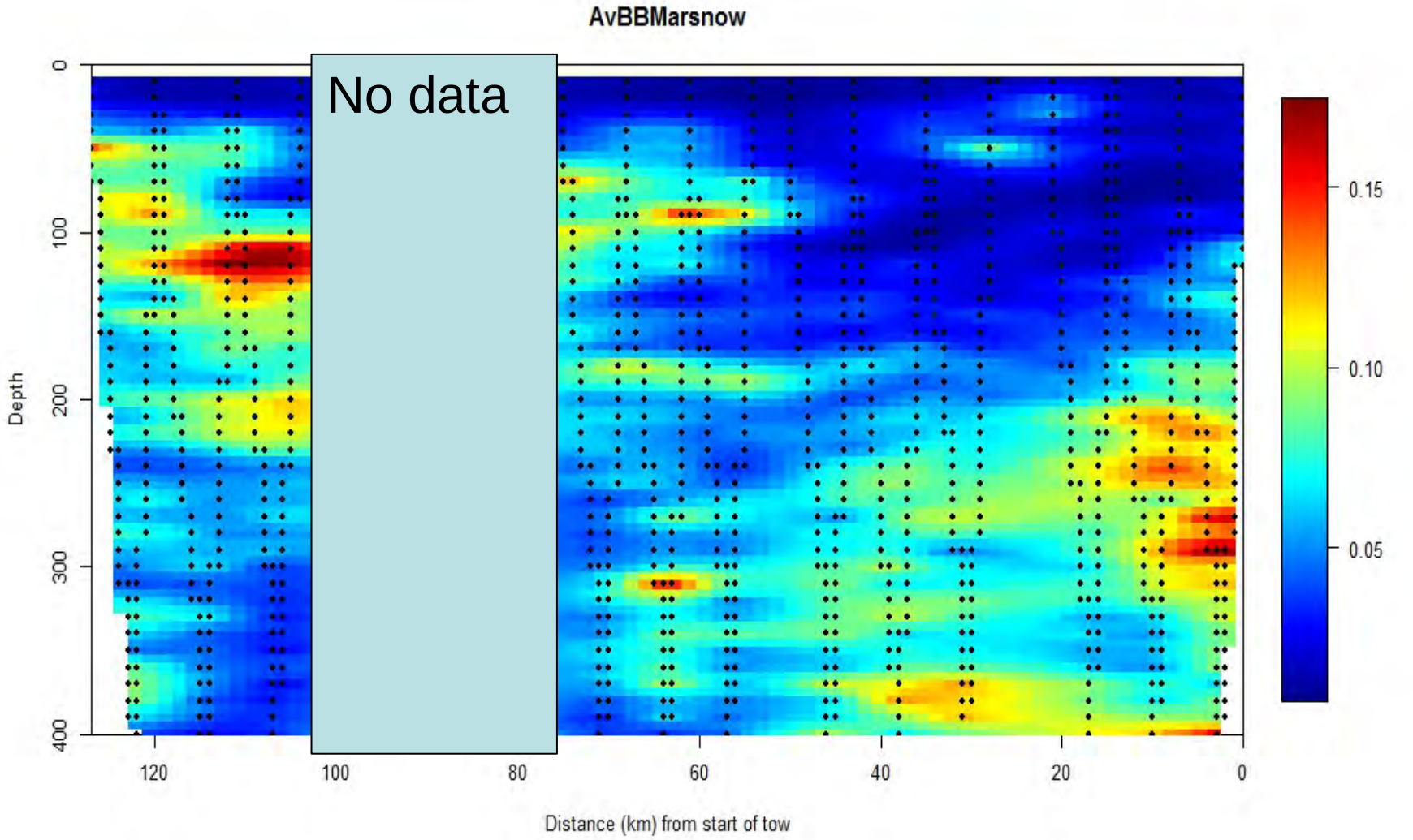




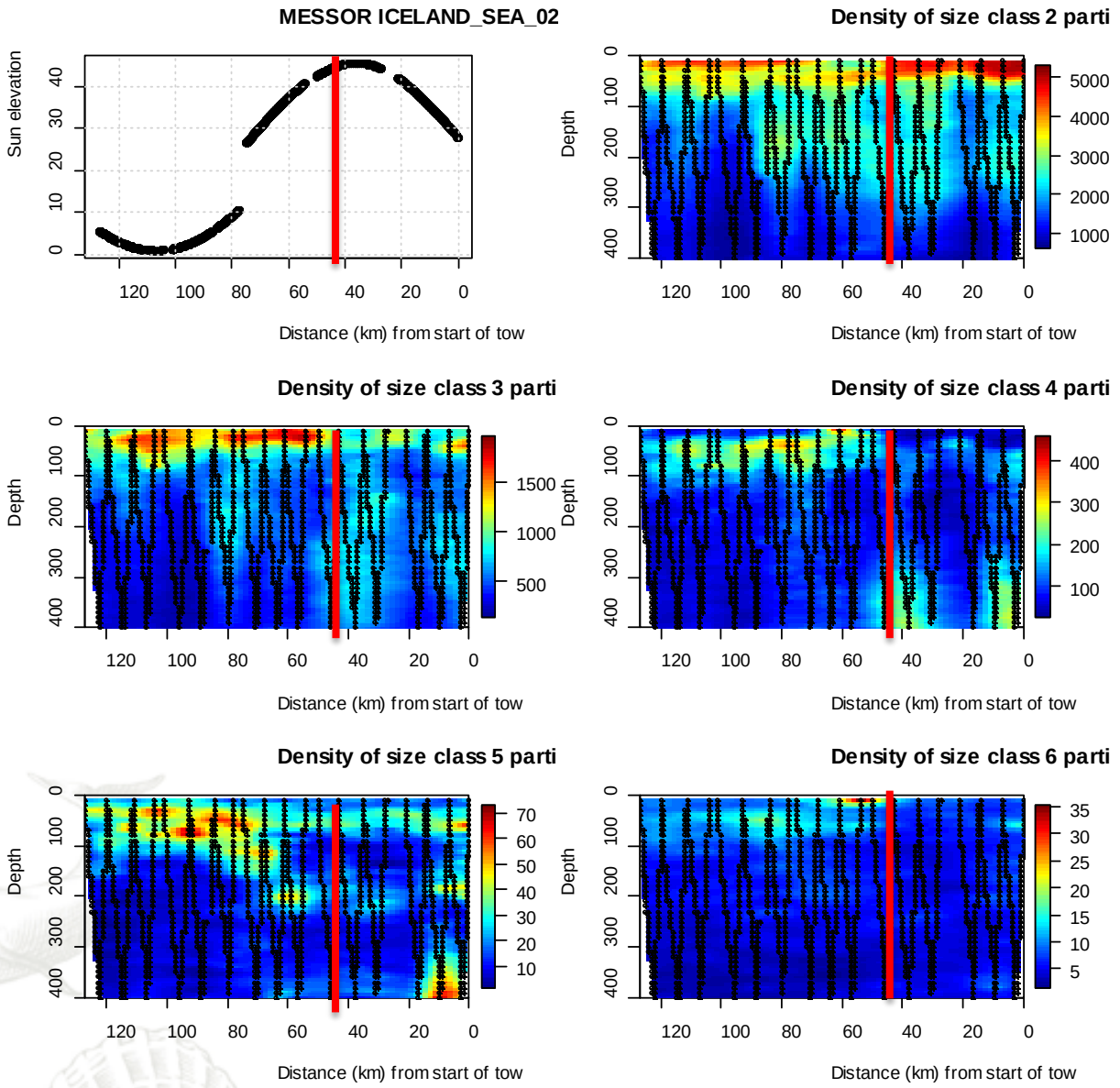




Distribution of marine snow from VPR (#m^{-3})

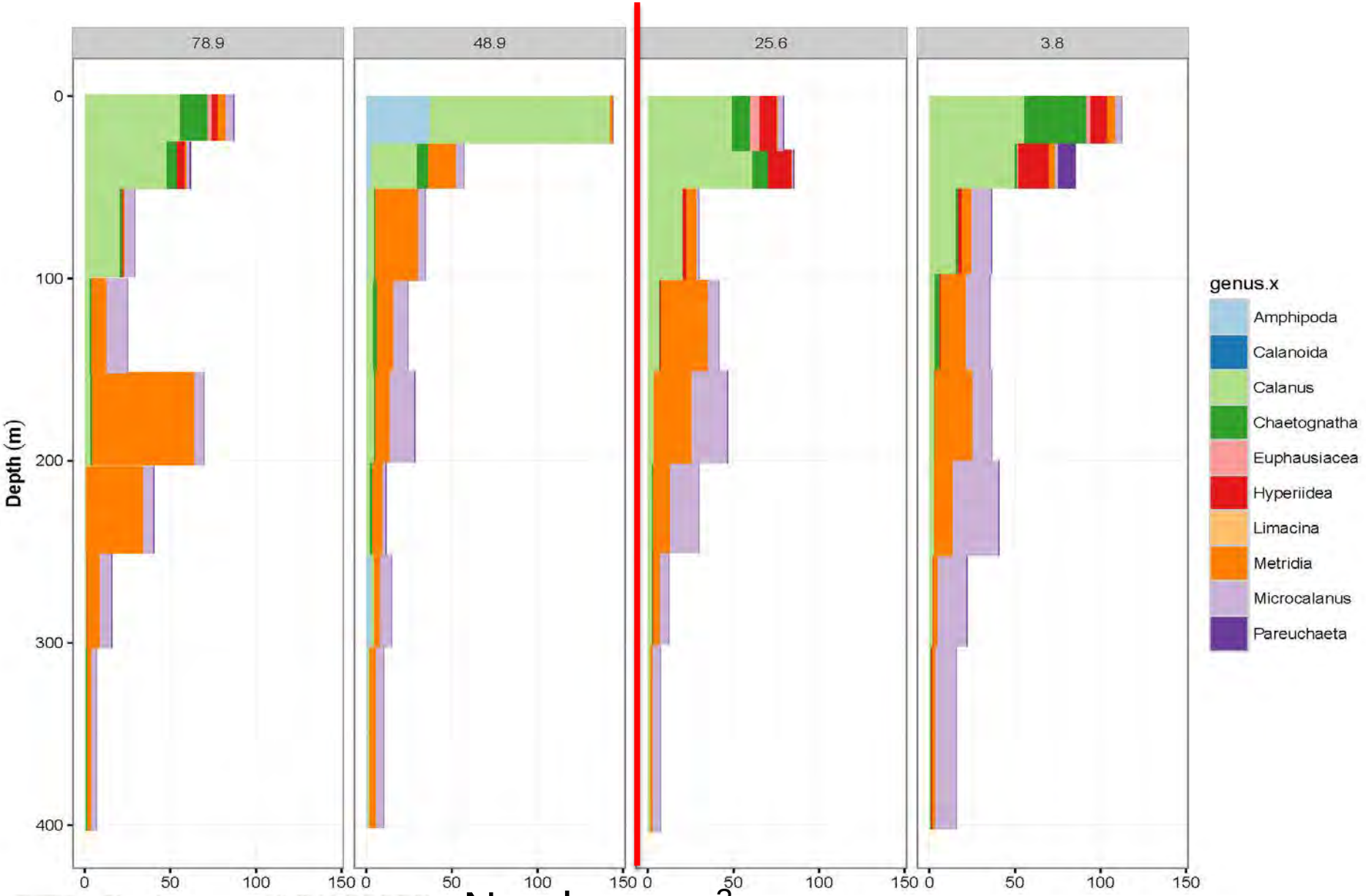


Density of particle size groups from OPC



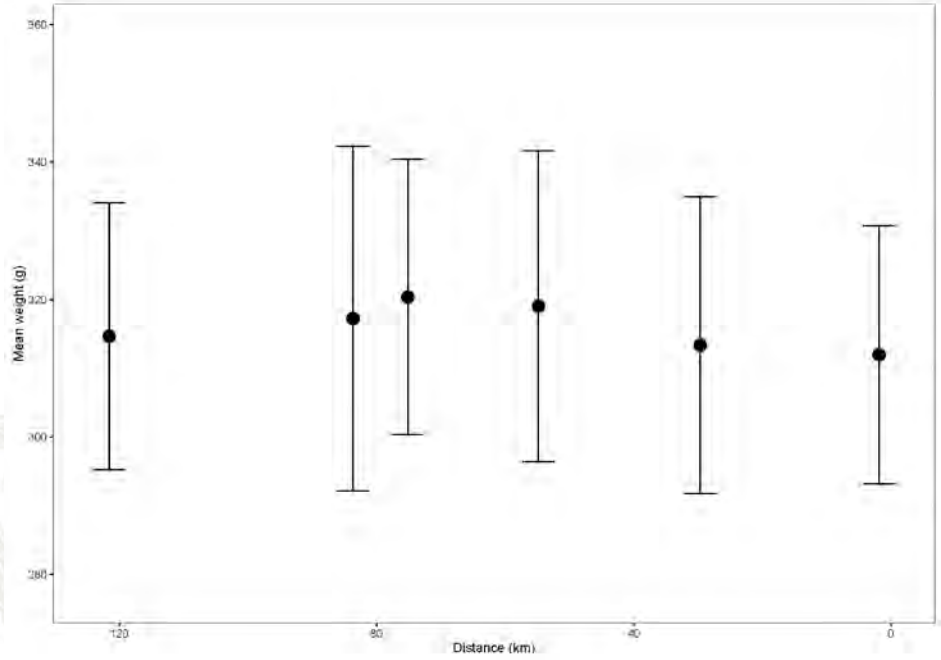
Front

Main herring diet items in MOCNESS catches

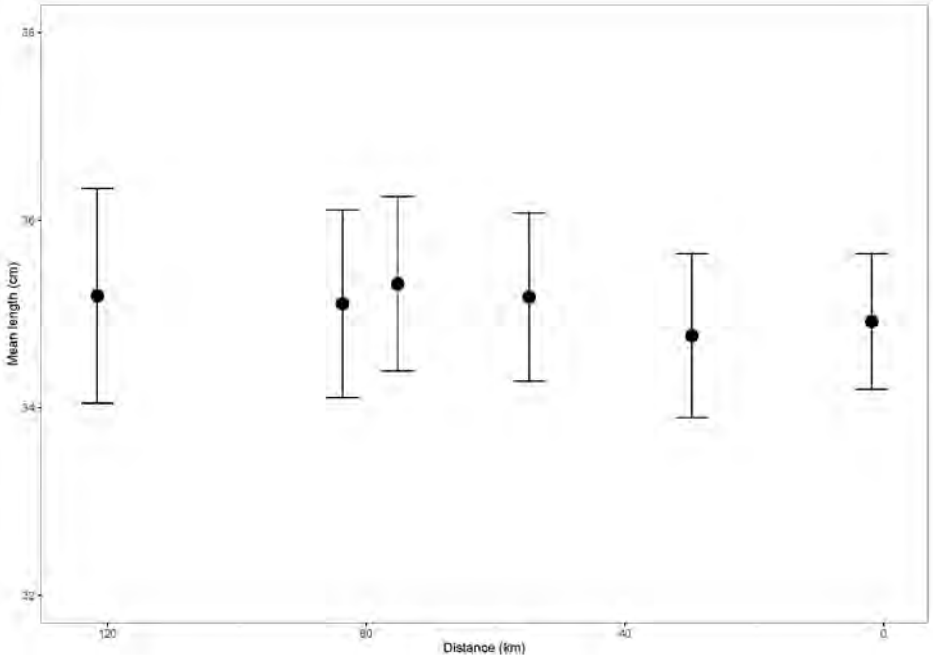


No change in length or weight of herring across the front

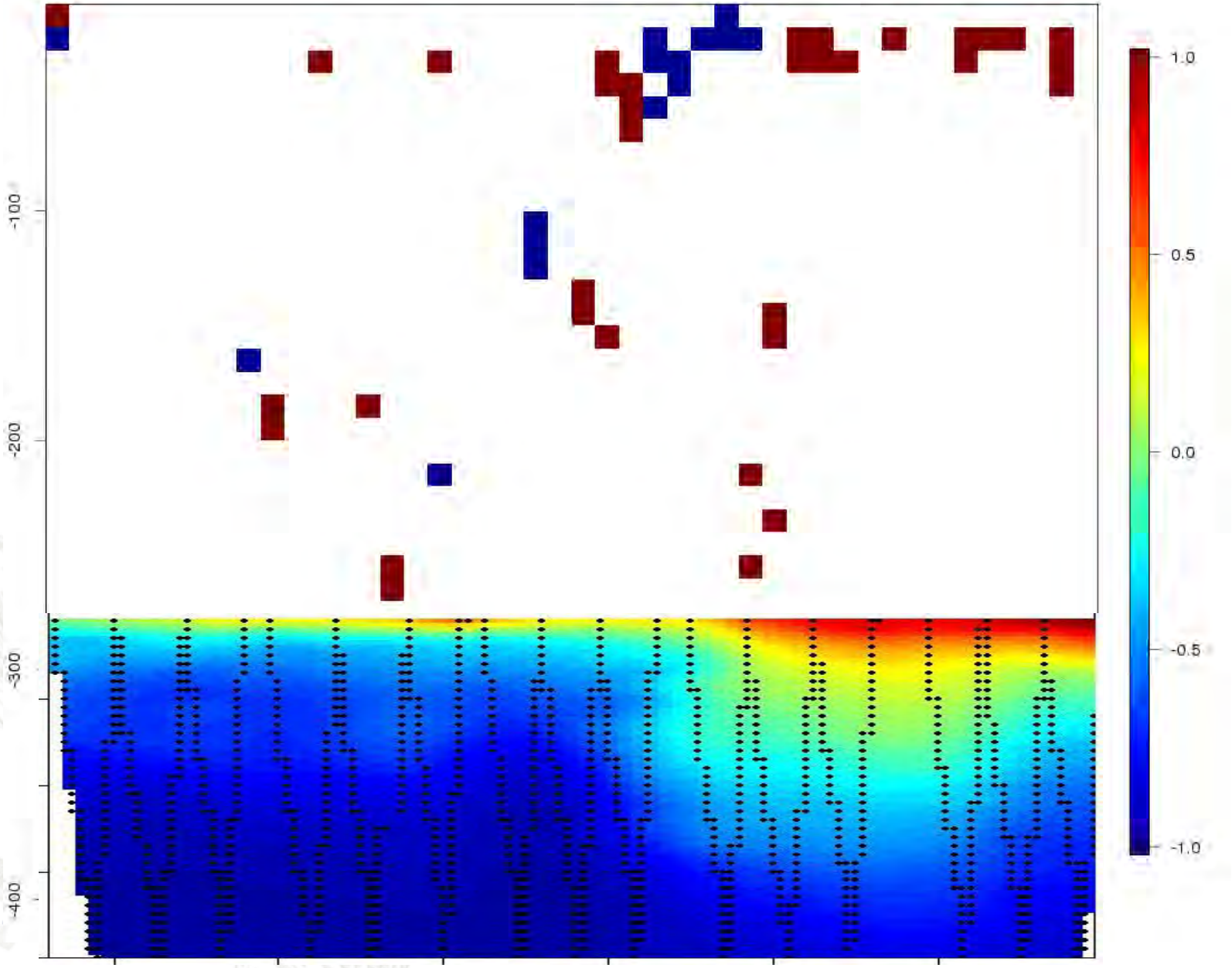
Weight



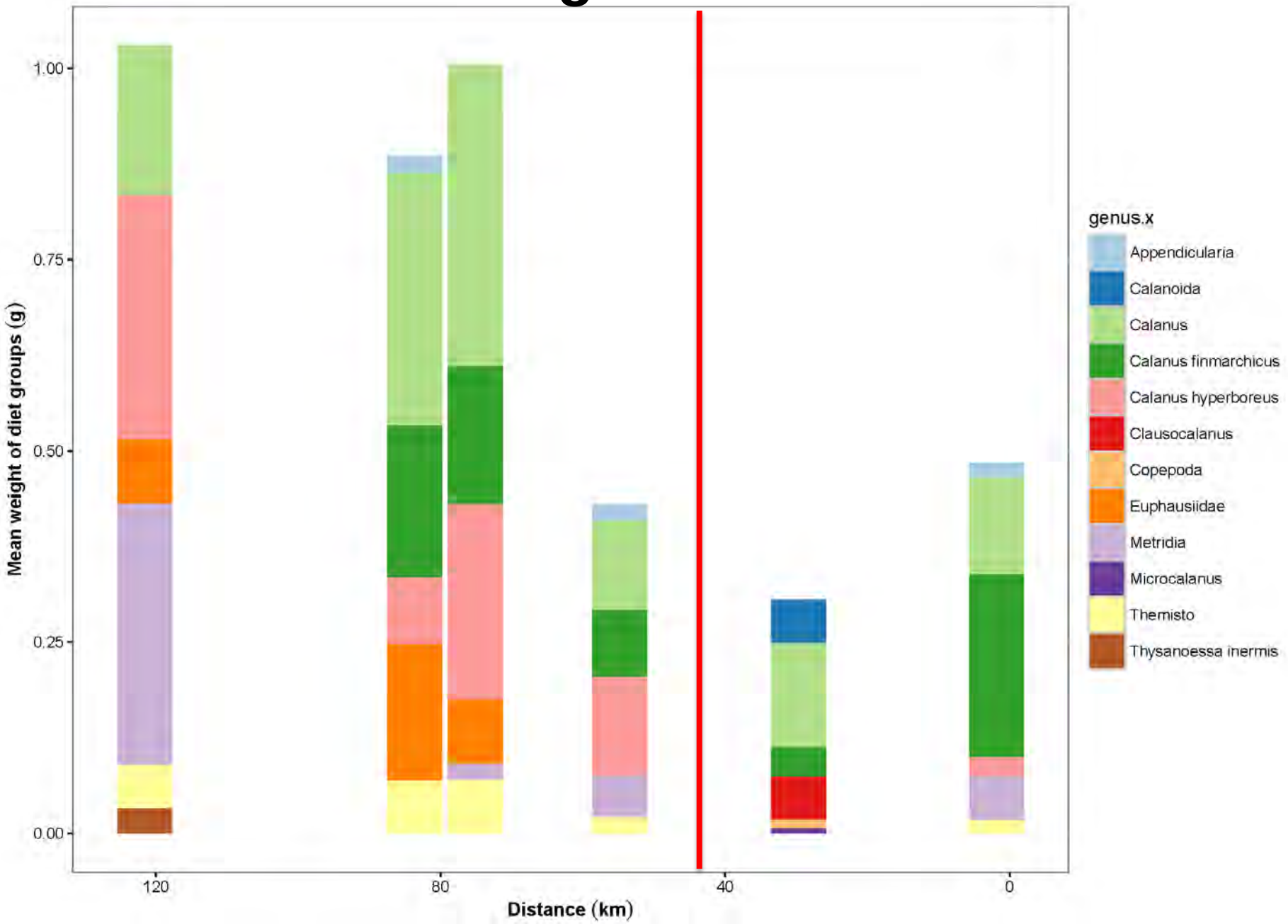
Length



Herring distribution from acoustics



Diet of herring across the front



Concluding remarks

- The potential prey was found in higher concentrations on the Arctic side than on the Atlantic side of the front
- Herring had two times higher stomach content on the Arctic side of the front
- Frontal areas valuable goal for feeding migration
- Herring feed opportunistic and eat where food is found and "disregards" the DVM rule

Concluding remarks

- The small pelagics in the Norwegian Sea exerts top down control on zooplankton at times of high fish biomass
- Indications for both intraspecific and interspecific competition between the small pelagics
- The study illustrate the valuable insight that can be gained using towed platforms from research vessels routinely in surveys

Thanks for your attention!