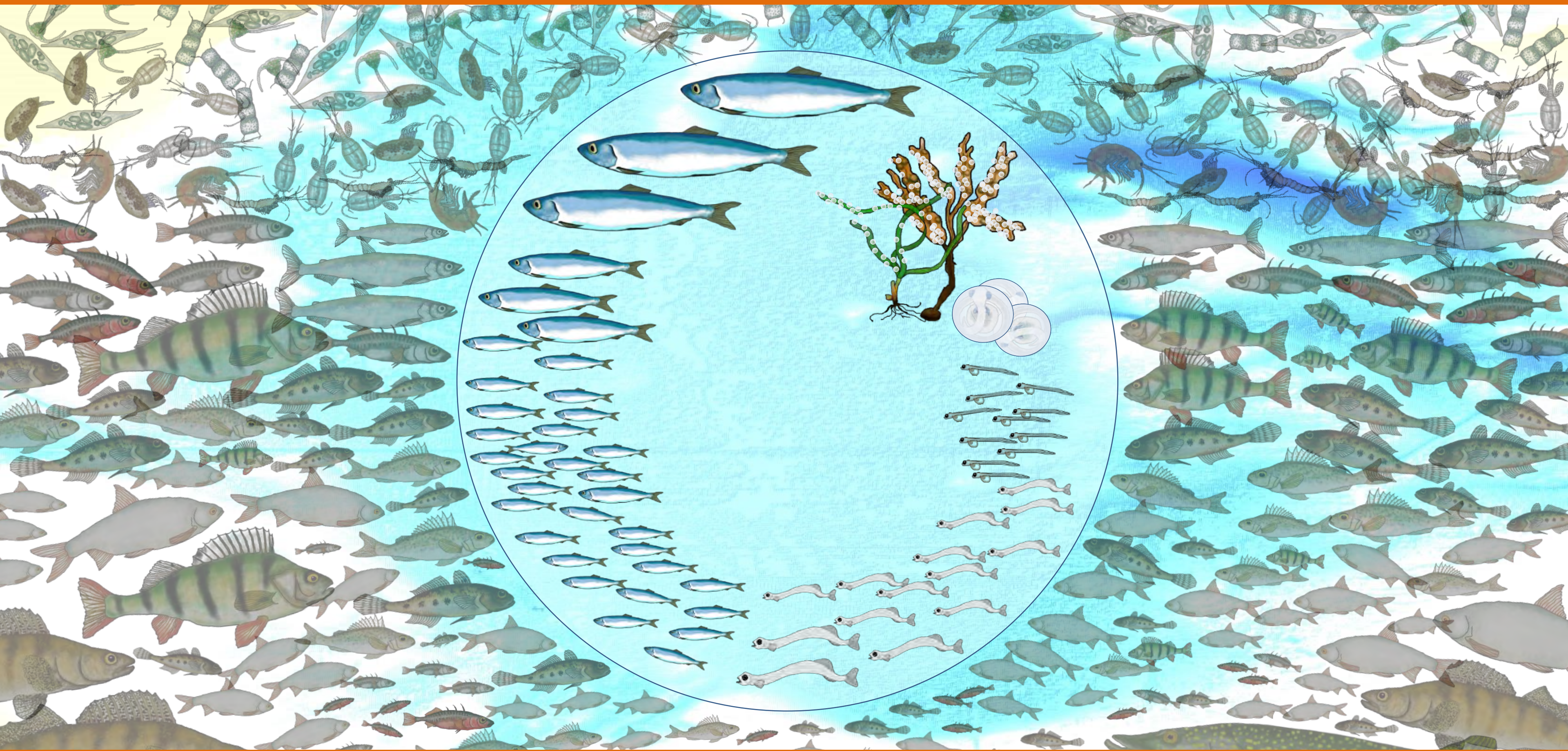
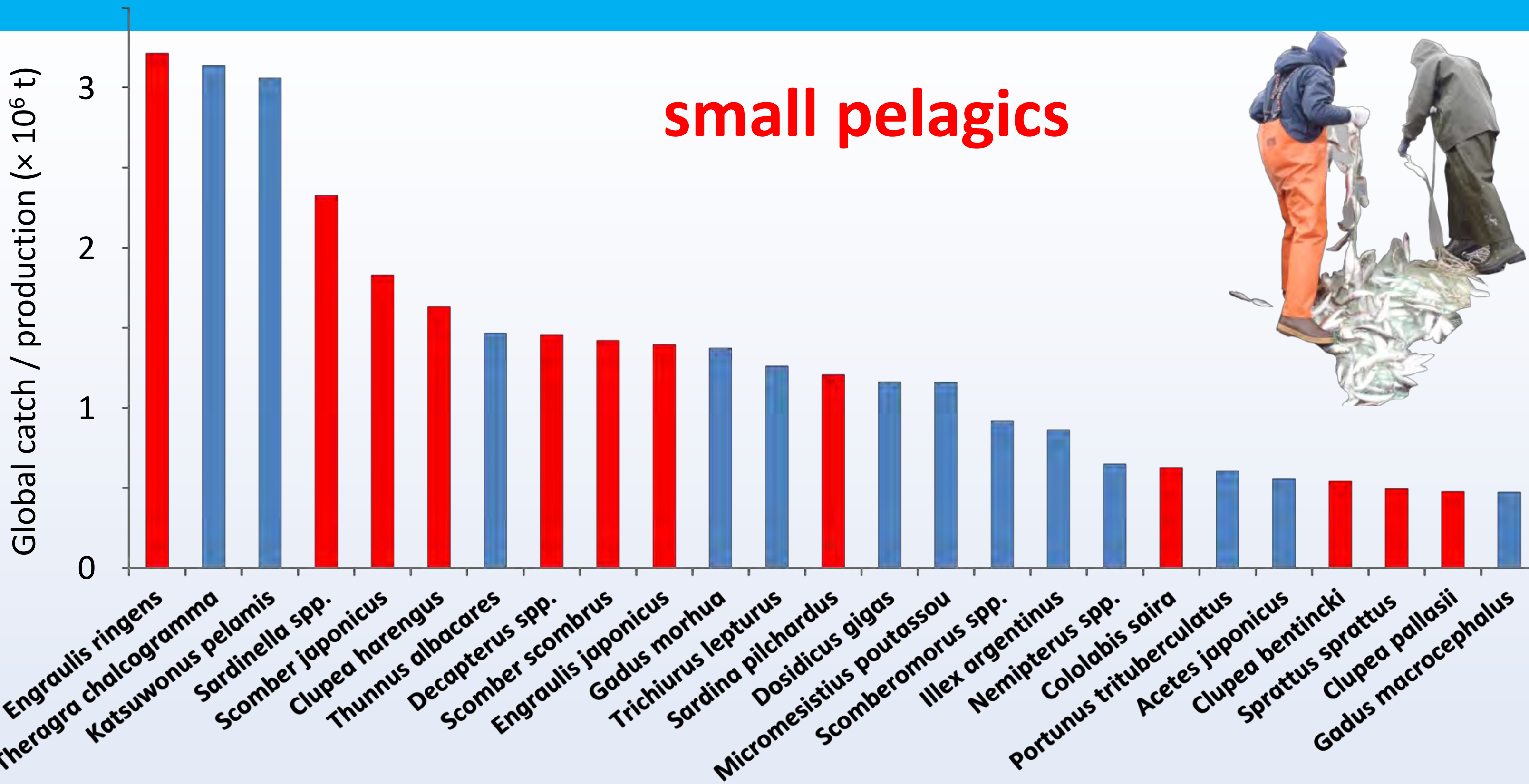
Atlantic herring *Clupea harengus* within the coastal food web of shallow inshore waters



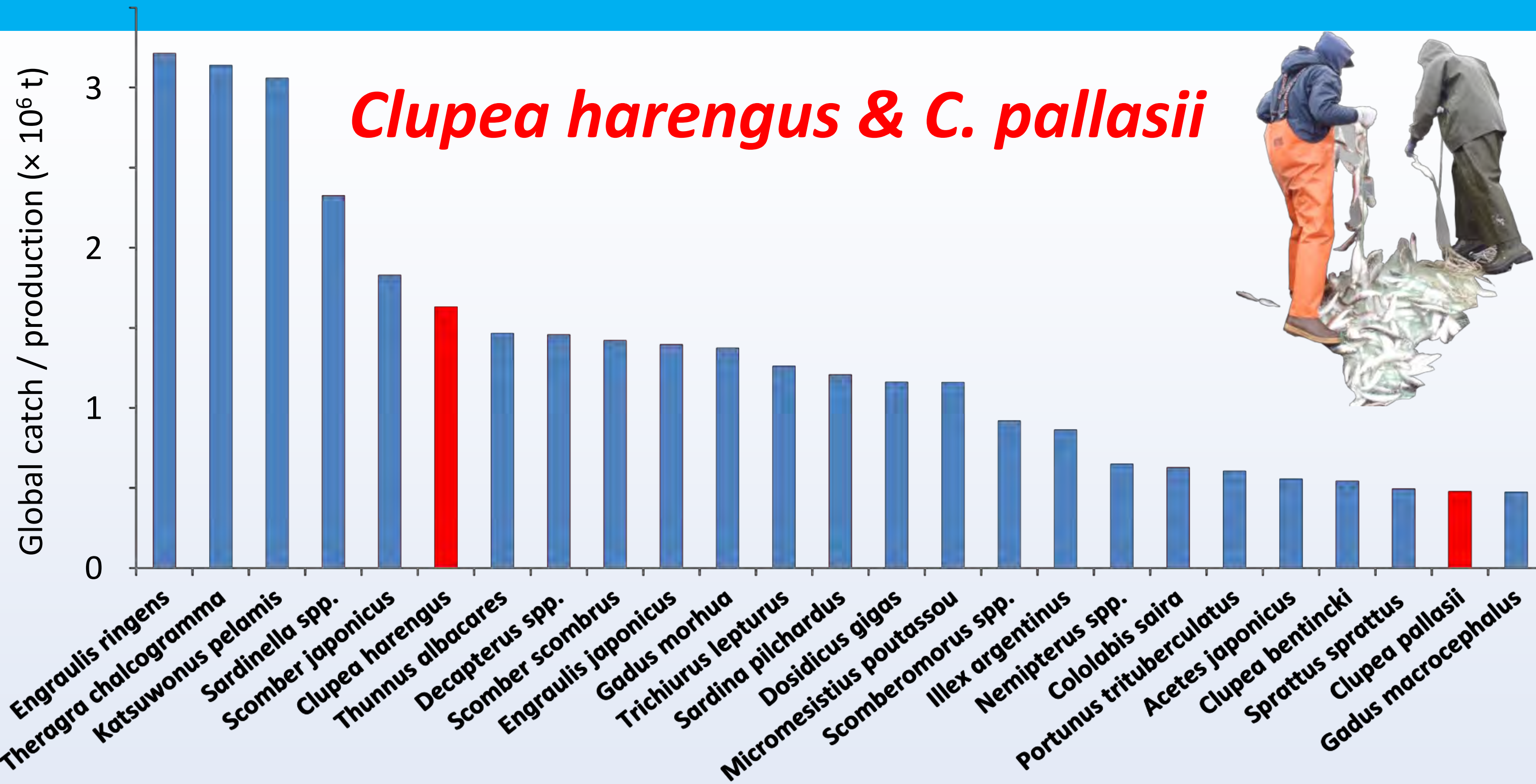
Kotterba P., Polte P., Moll D., von Nordheim L., Hammer C., Oesterwind D., Peck M. A.

Global marine catches – Top 25 in 2014



Data source: FAO. 2016. The State of World Fisheries and Aquaculture 2016.

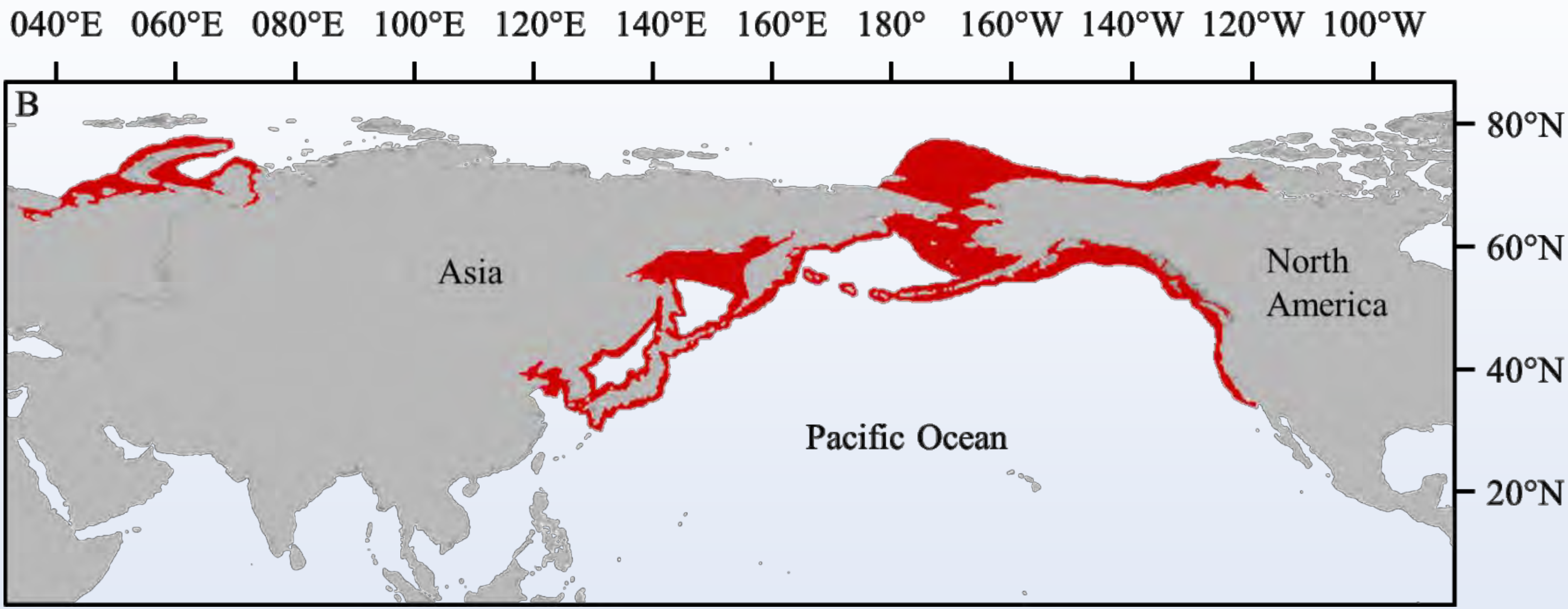
Global marine catches – Top 25 in 2014



Data source: FAO. 2016. The State of World Fisheries and Aquaculture 2016.

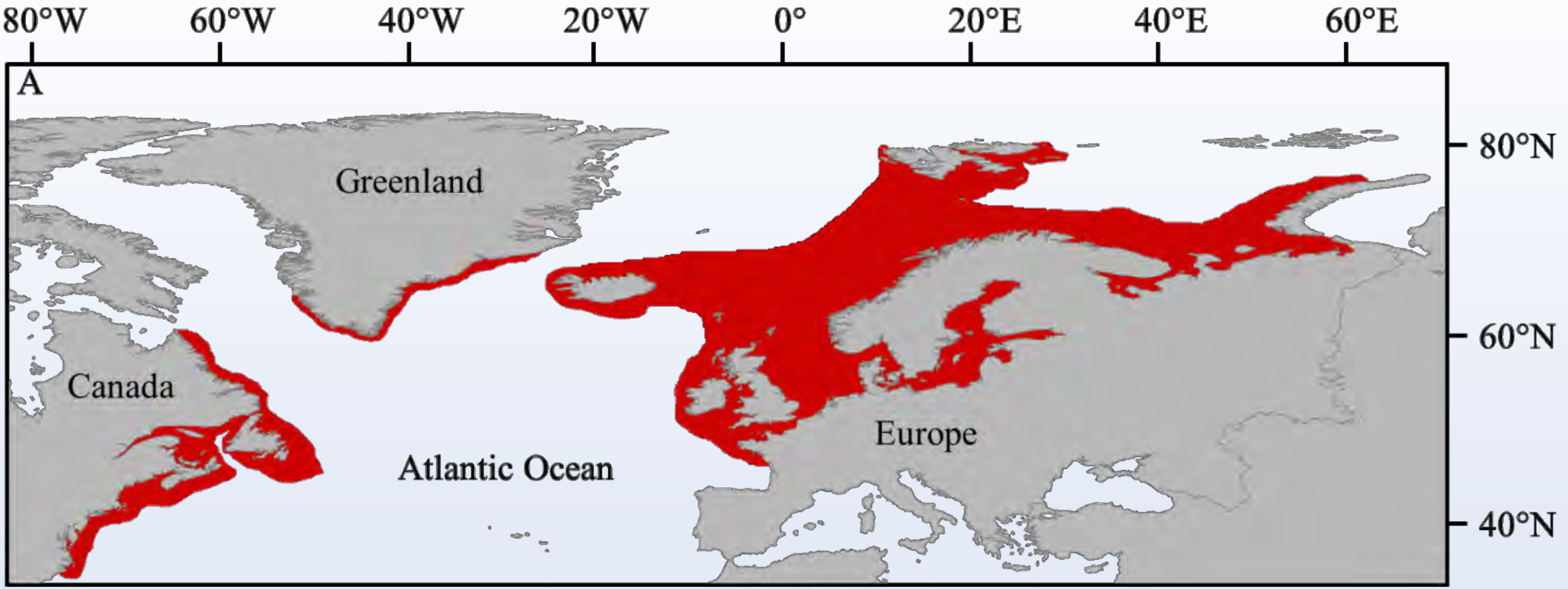
Herring – a cosmopolitan

Clupea pallasii



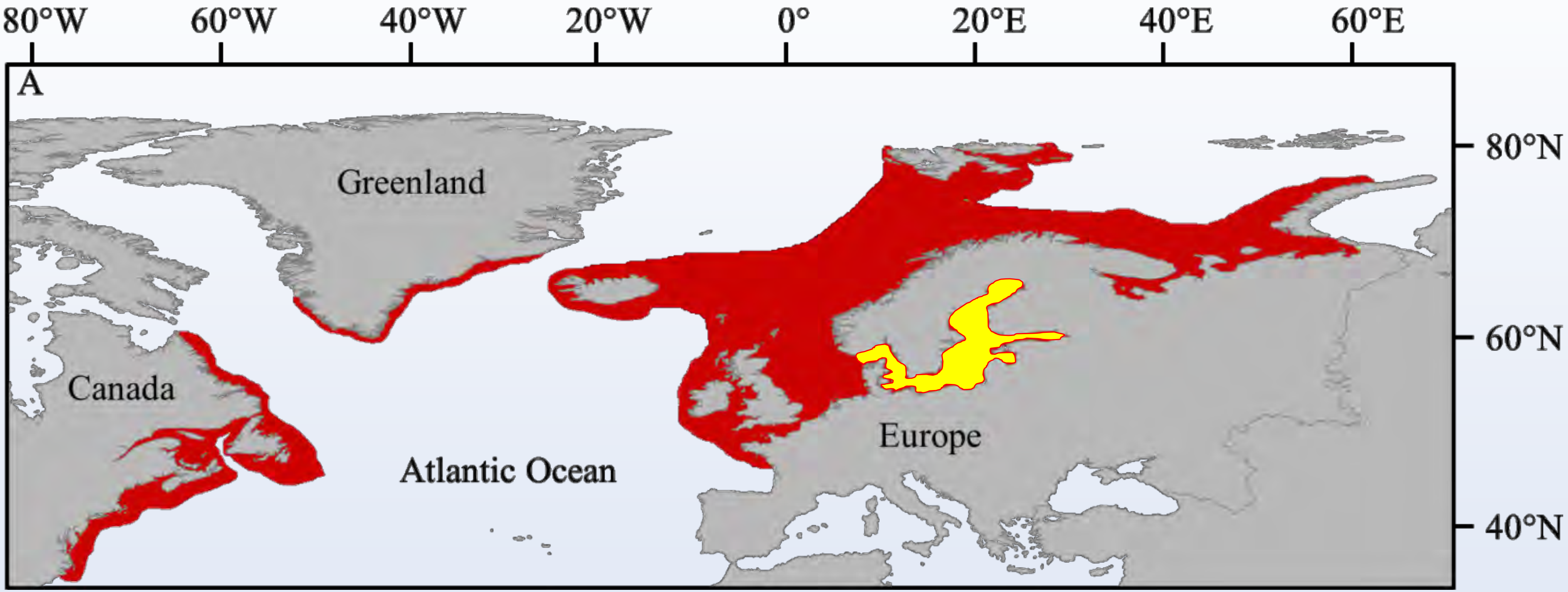
Herring – a cosmopolitan

Clupea harengus

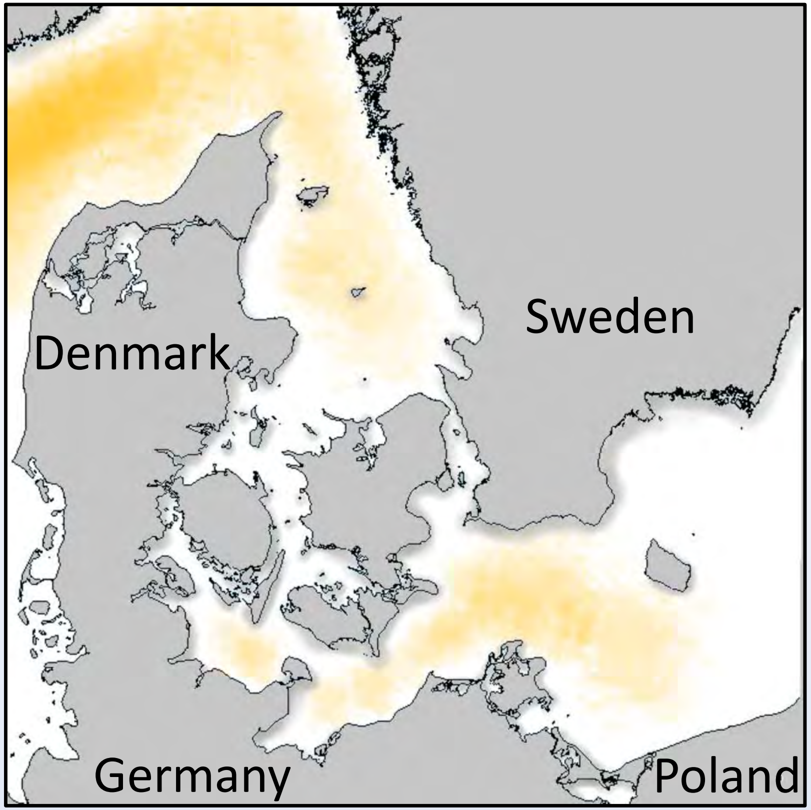


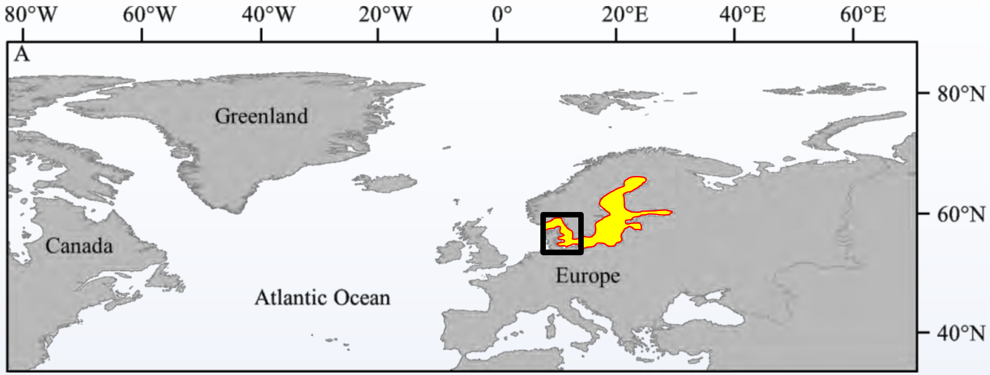
Herring – a cosmopolitan

Clupea harengus



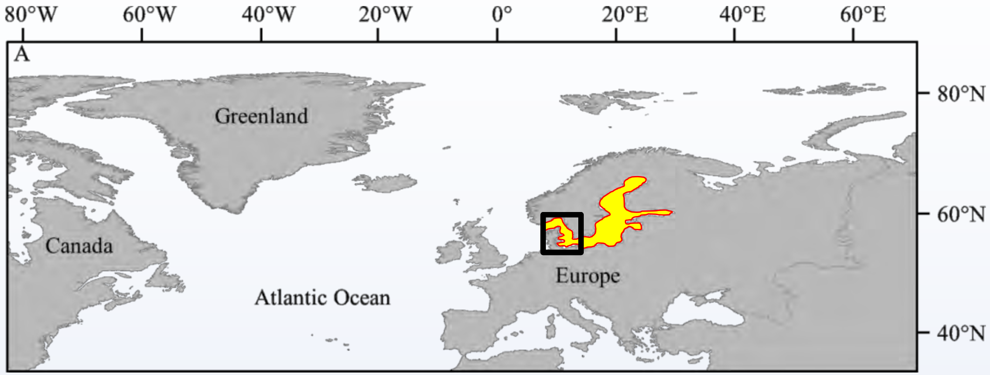
Atlantic herring in the Baltic Sea





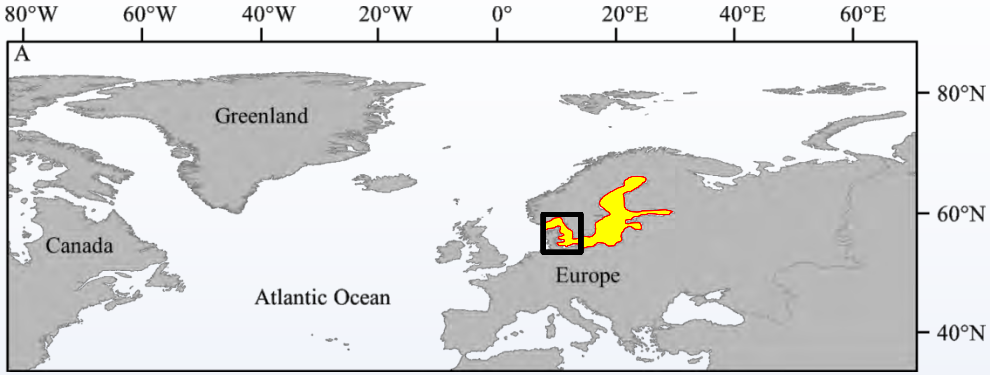
summer/fall feeding grounds

Atlantic herring in the Baltic Sea

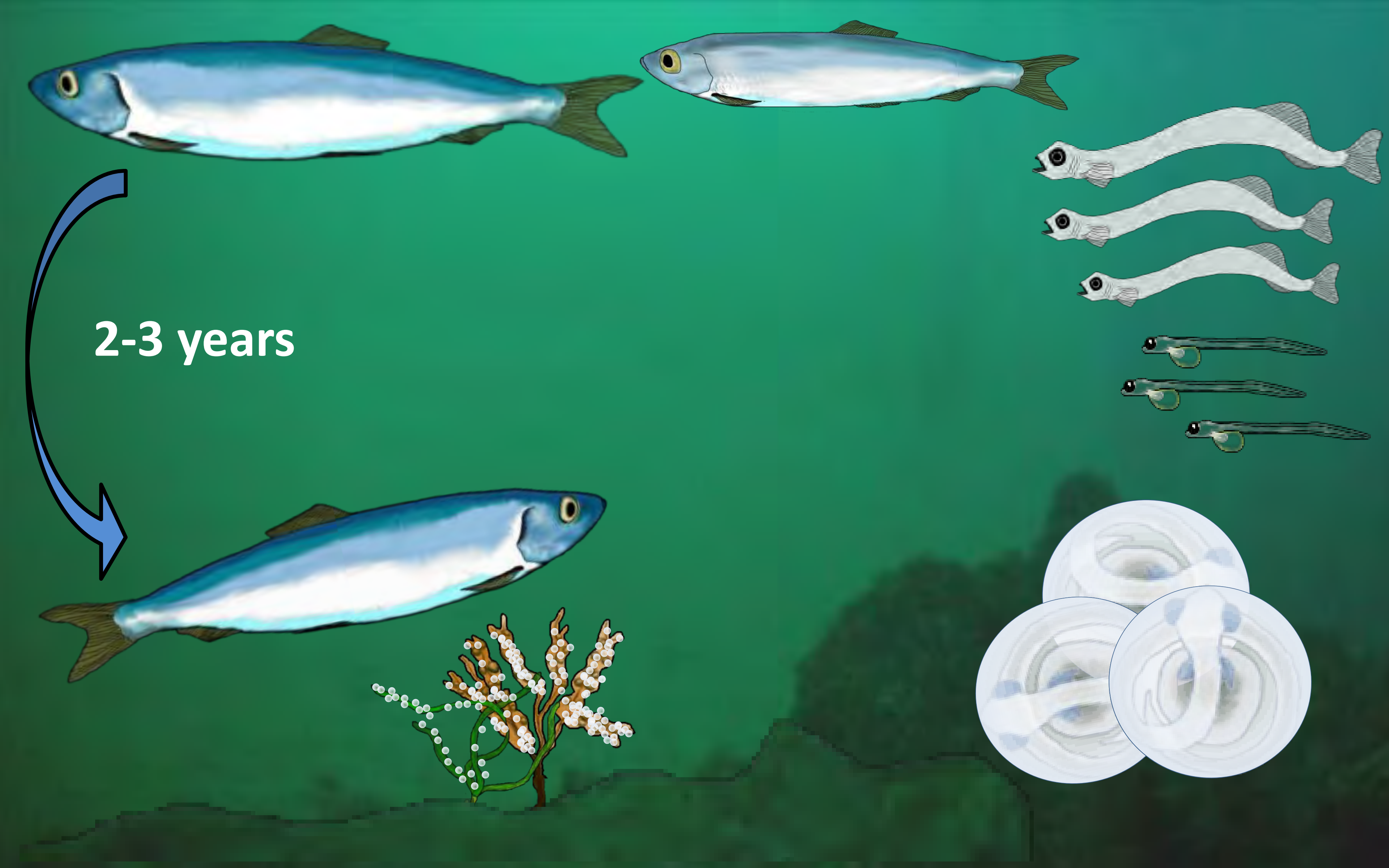


overwintering area

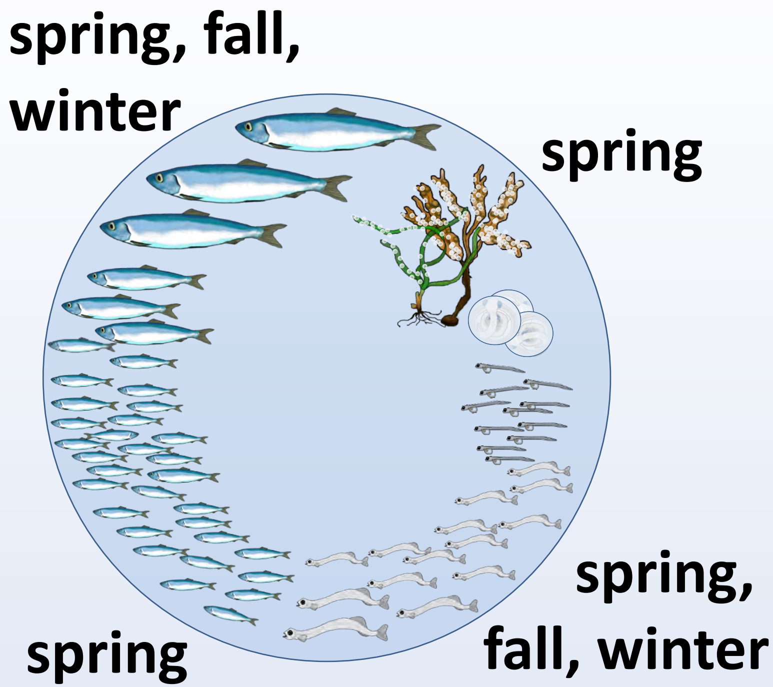
Atlantic herring in the Baltic Sea



shallow inshore spawning beds (spring)


2-3 years

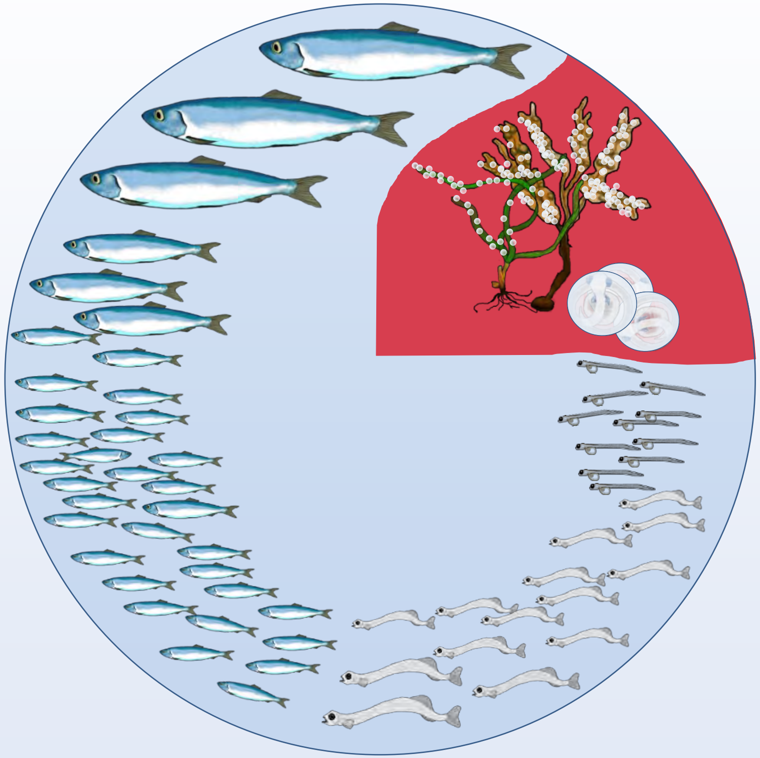
Herring in inshore waters



Each life-stage of Baltic herring can be found in inshore waters

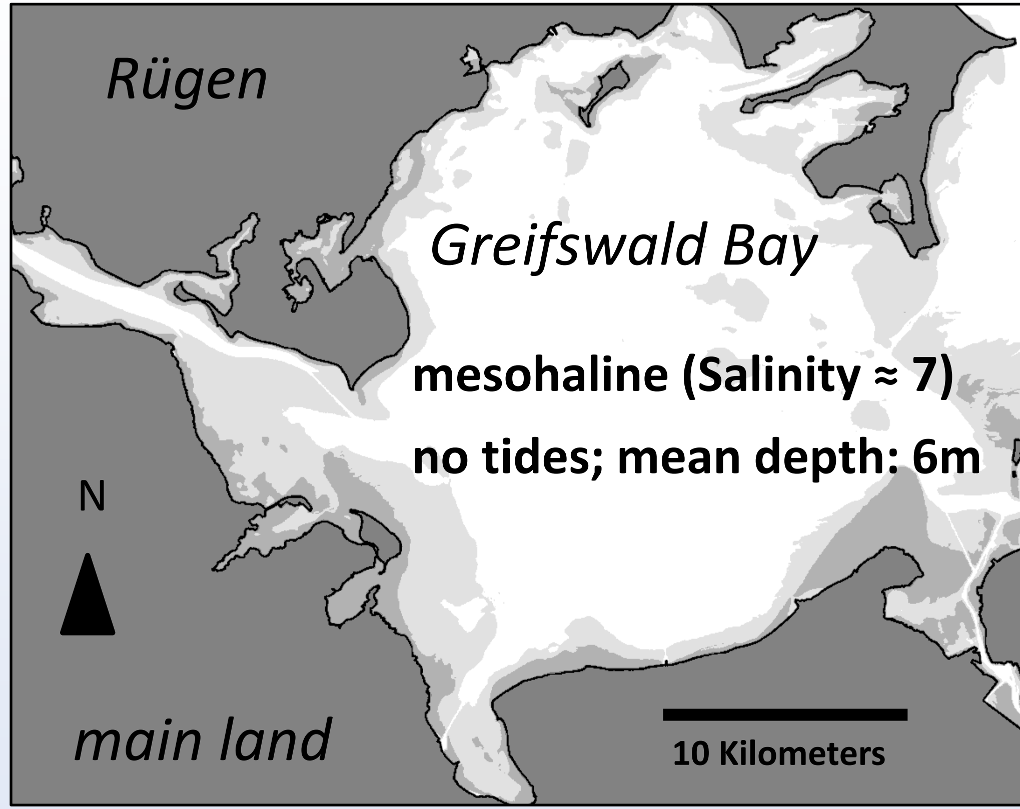
Does this result in specific interactions with the resident community?

Herring in inshore waters



Is herring egg mortality driven by top-down mechanisms?

Herring egg predation



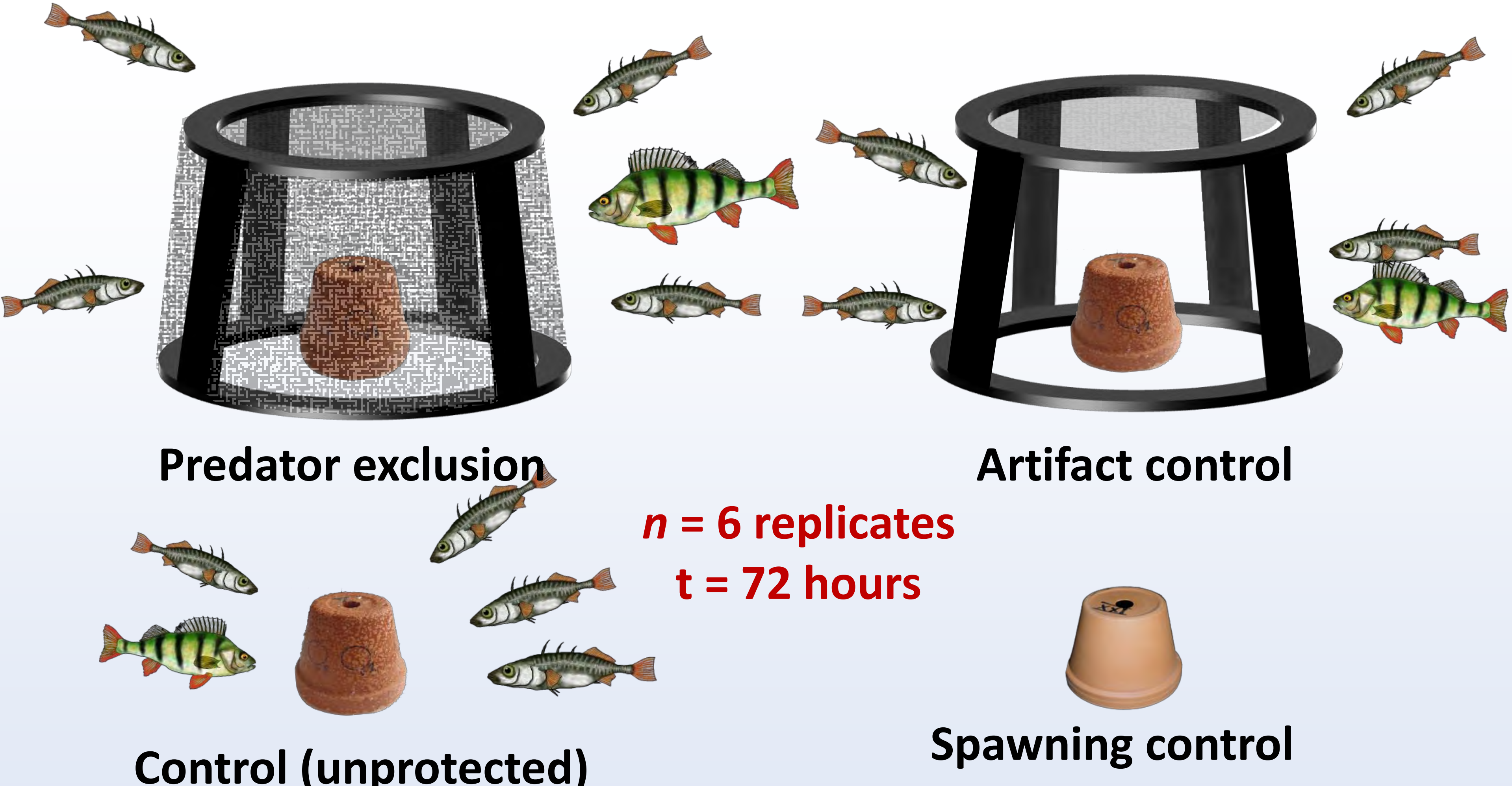
Predator exclusion experiments

Clay flower pot

strip spawning & fertilization

artificially-spawned experimental unit (ASEU)

Kotterba et al., 2014 : *Limnology & Oceanography*



Kotterba et al., 2014 : *Limnology & Oceanography*

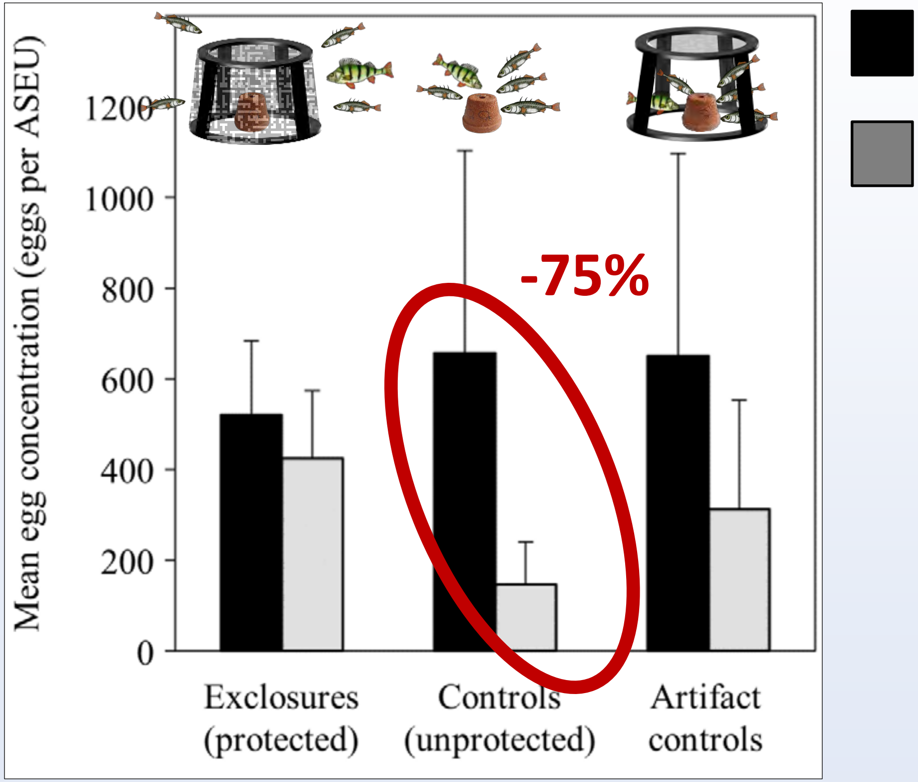
Herring egg predation

t = 0 hours

t = 72 hours

Kotterba et al., 2014 *Limnology and Oceanography*

Herring egg predation



significant predation on herring eggs

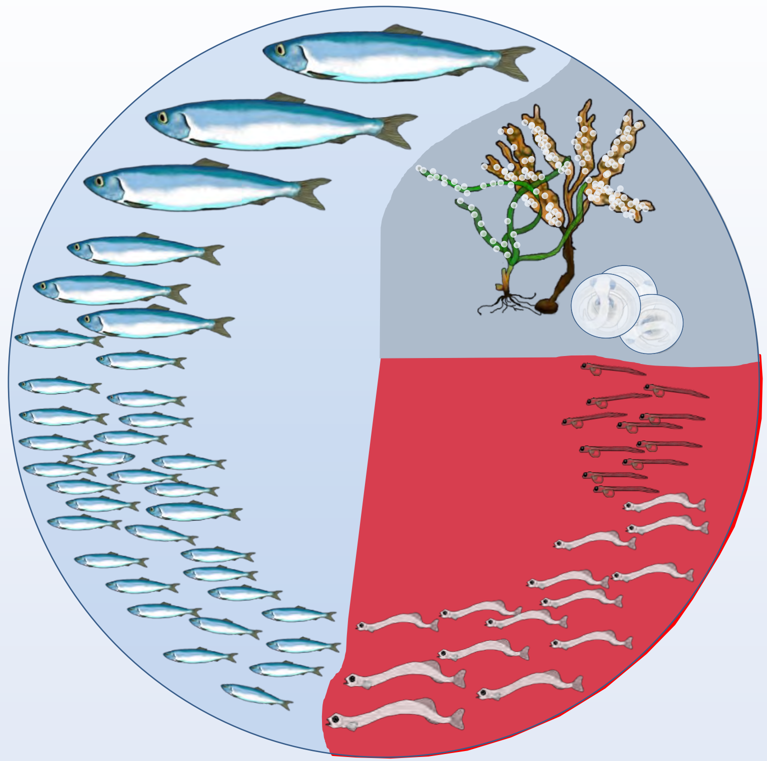
Kotterba et al., 2014 *Limnology and Oceanography*

Herring egg predation

Camera surveillance:
Gasterosteus aculeatus
= main egg predator

stomach contents of stickleback dominated by herring eggs

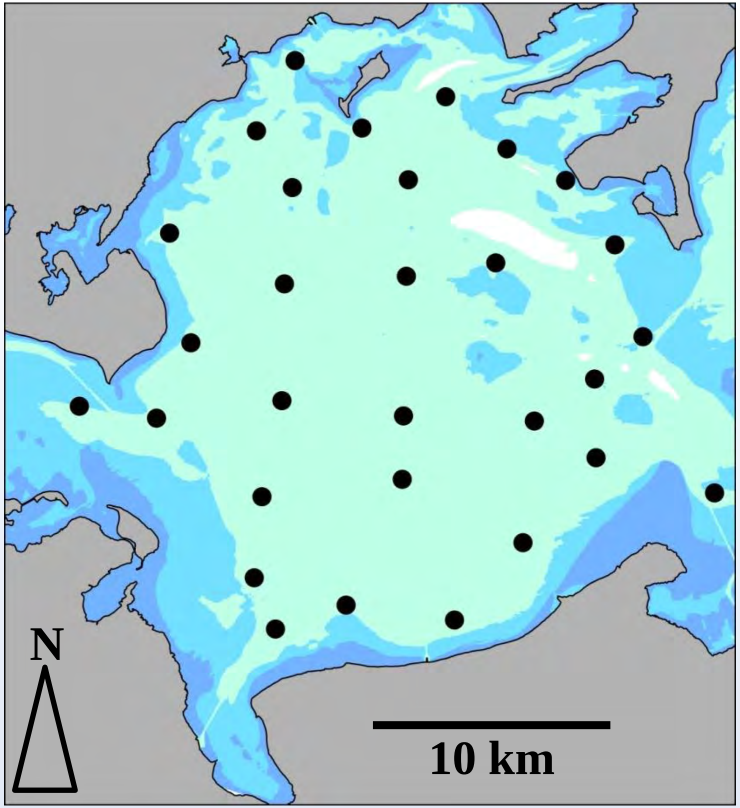
Herring in inshore waters

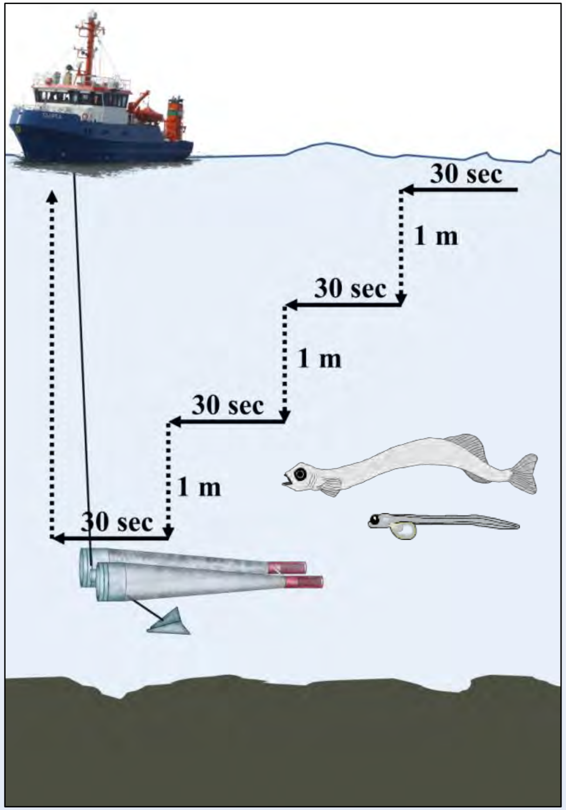


egg predation

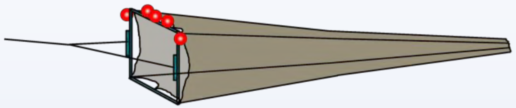
top-down control of larval stages?

Herring larvae predation

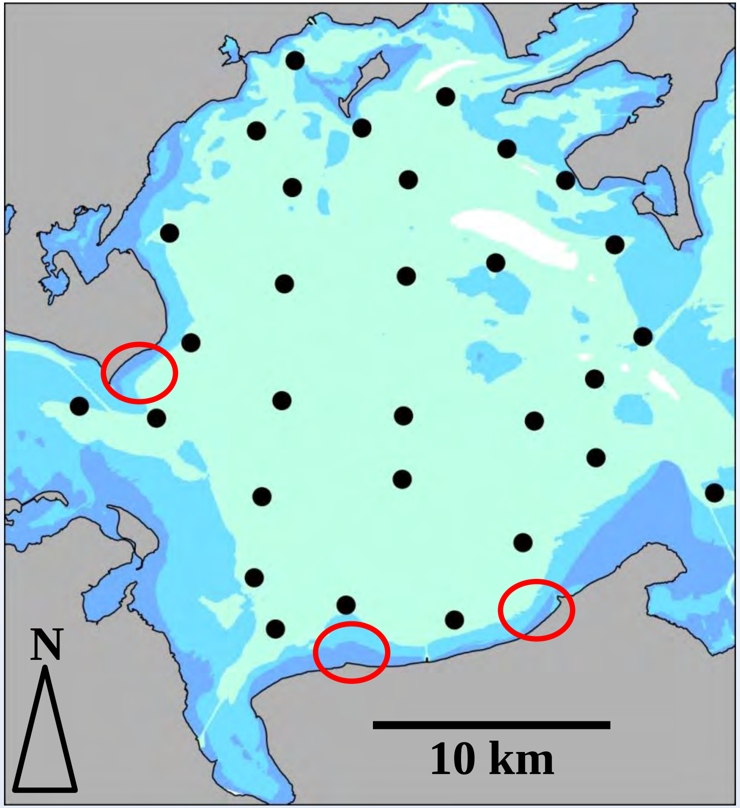




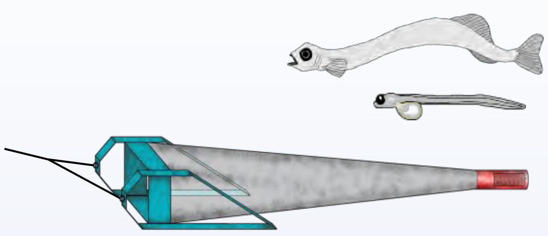
sublittoral sampling:
spring 2011
weekly

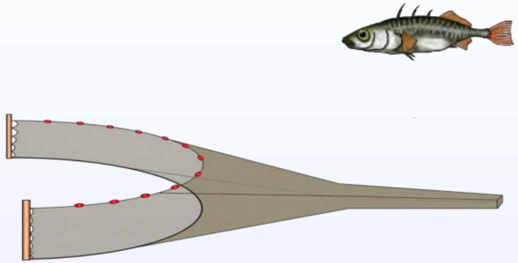


Herring larvae predation

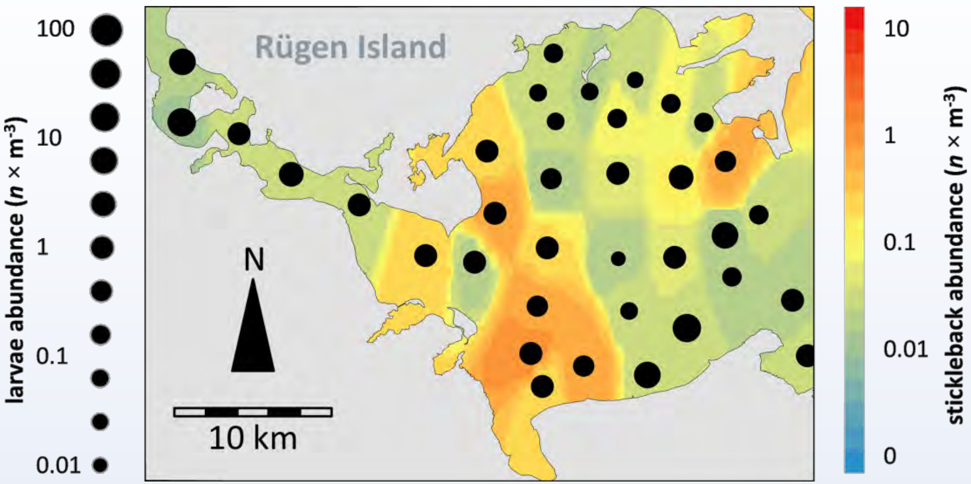


littoral sampling: spring 2011, fortnightly



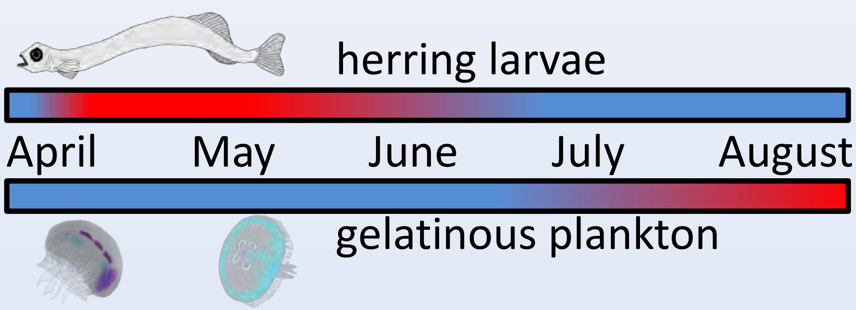


Herring larvae predation



High spatial overlap of larvae and potential predators (e.g. sticklebacks)

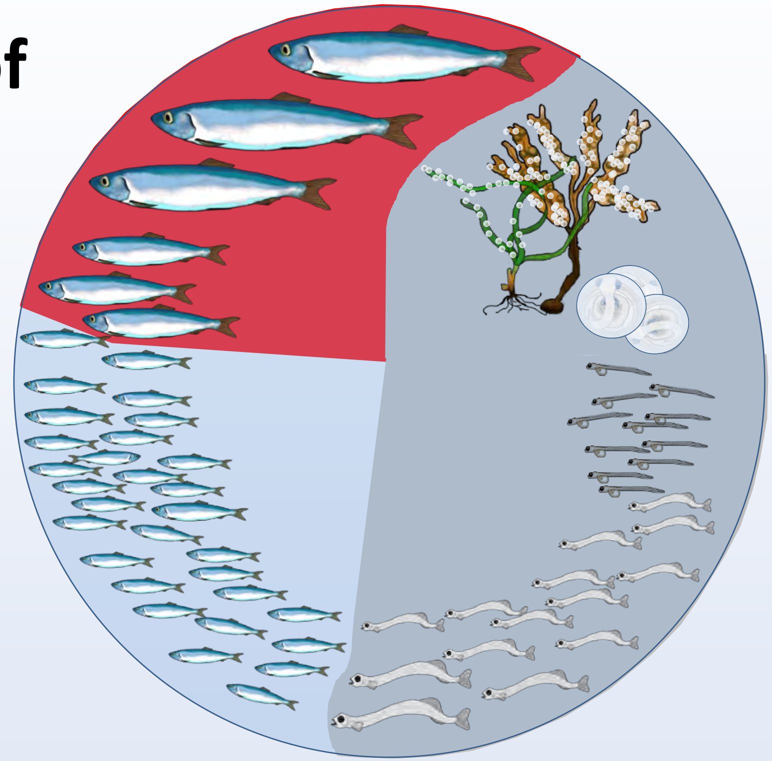
predator stomachs contents: almost no larvae



temporal mismatch with gelatinous plankton

Herring in inshore waters

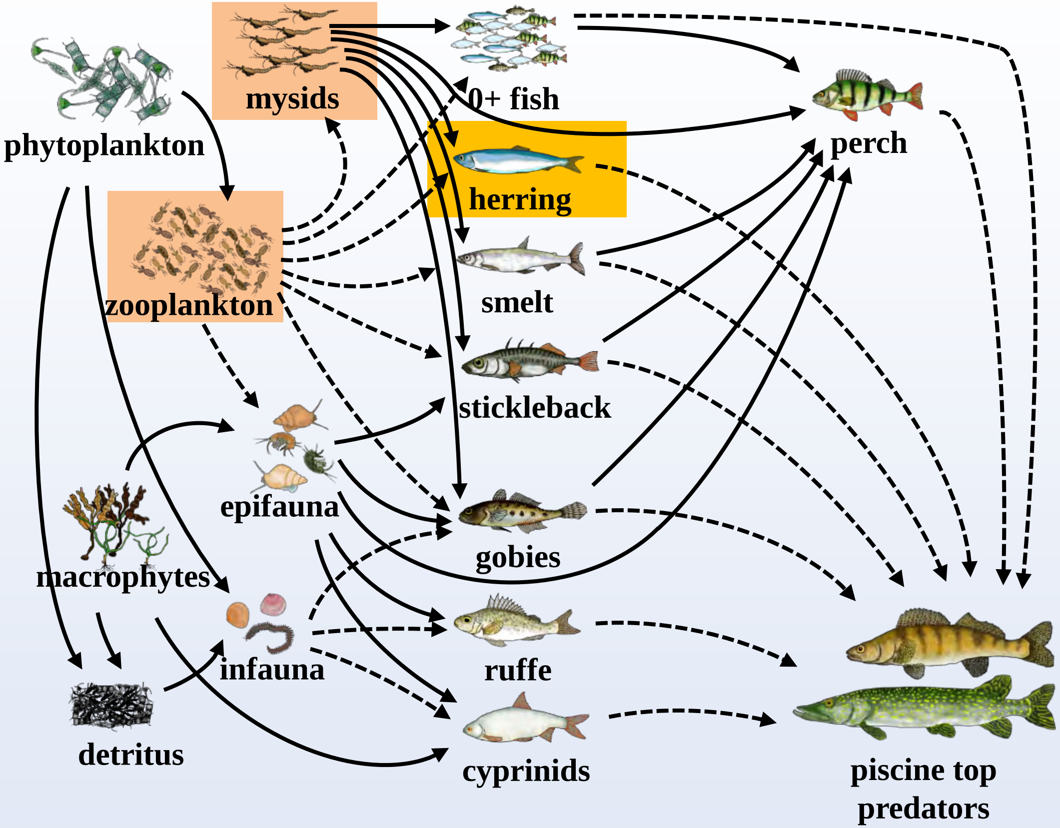
feeding ecology of adult herring in inshore waters



egg predation

no larvae predation

Adult herring in inshore waters



general assumption:

inshore feeding ecology

=

offshore feeding ecology

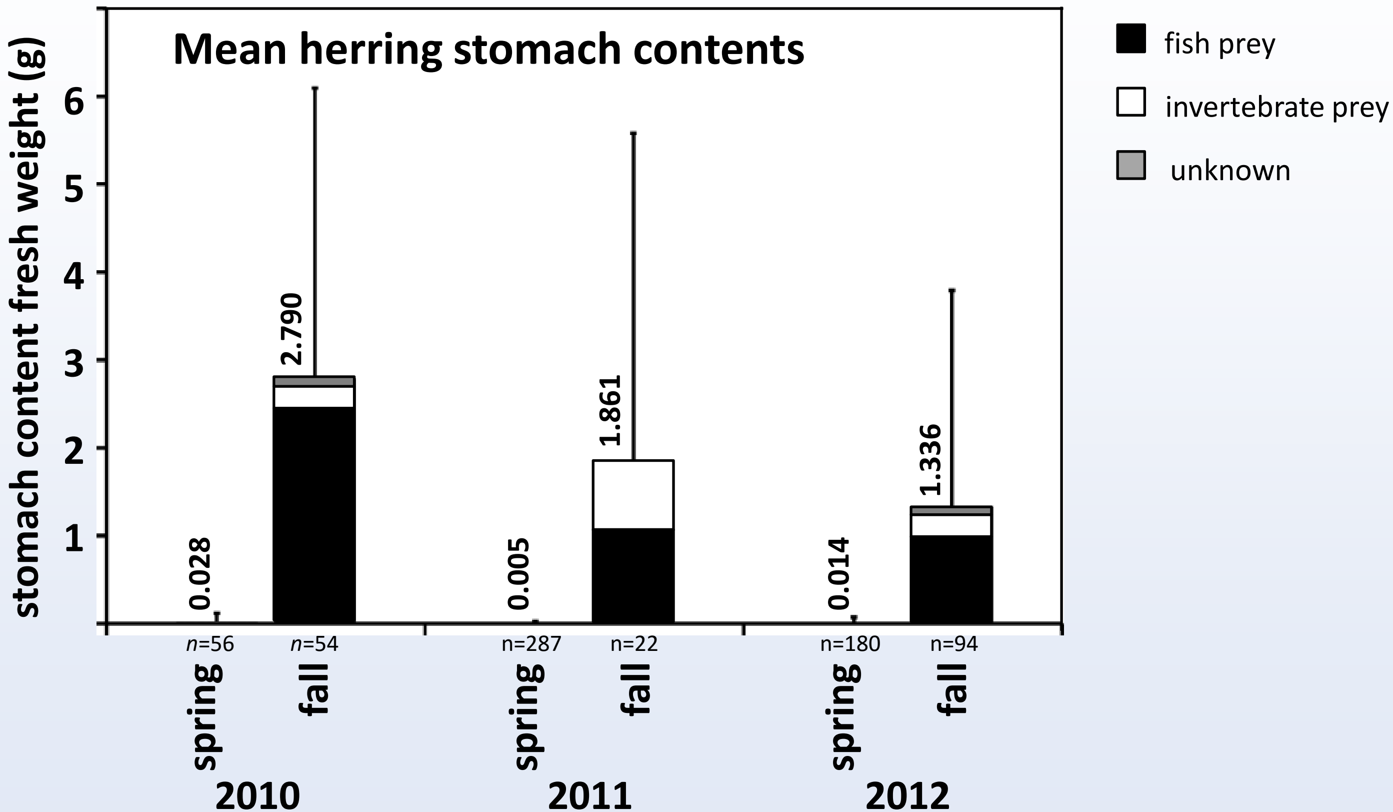
modified after Elliott and Hemingway (eds.), 2002: *Fishes in Estuaries*

Adult herring in inshore waters

2010-2012: gill net sampling of adult herring (spring & fall)

stomach content analyses

Adult herring in inshore waters



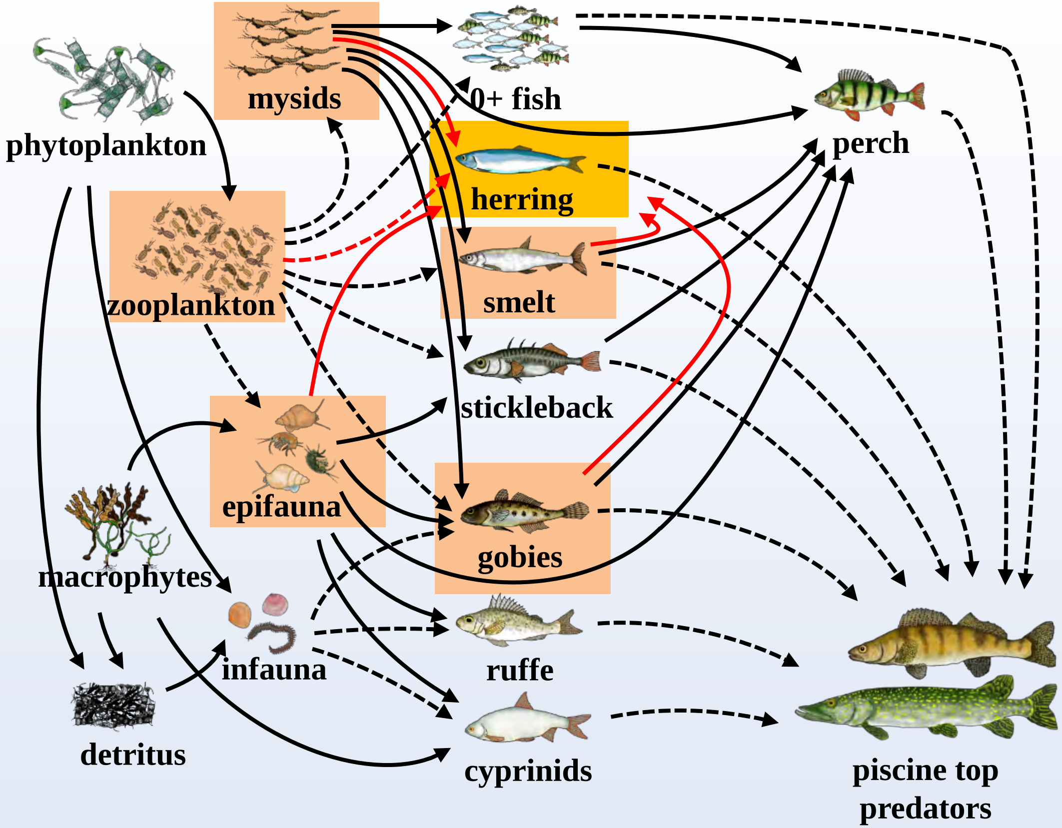
Adult herring in inshore waters

spring: empty stomachs

fall: intense feeding on demersal macro-invertebrates and gobies

No filial cannibalism

Adult herring in inshore waters



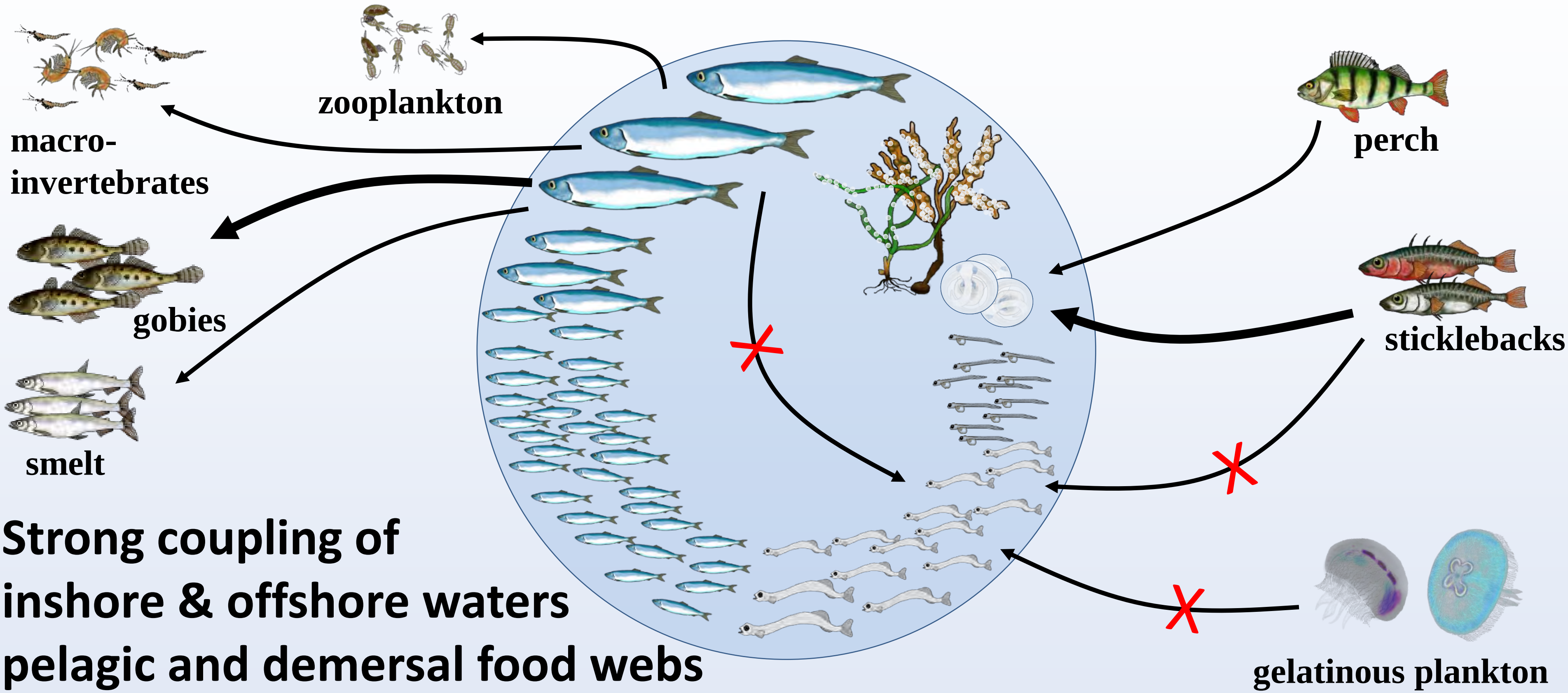
Atlantic herring is not strictly zooplanktivorous!

Inshore waters foster coupling of pelagic & benthic communities

Plasticity of feeding ecology should be considered in future multi-species models

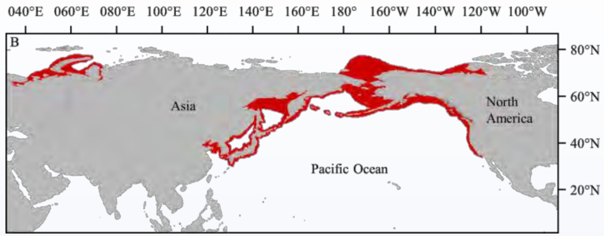
modified after Elliott and Hemingway (eds.), 2002: *Fishes in Estuaries*

Summary

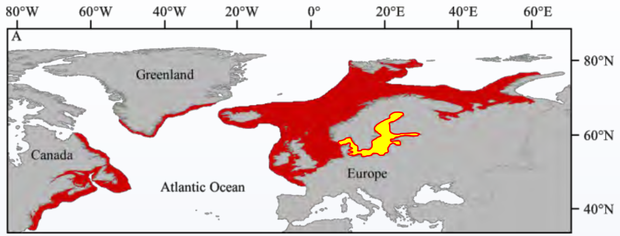


Strong coupling of inshore & offshore waters pelagic and demersal food webs

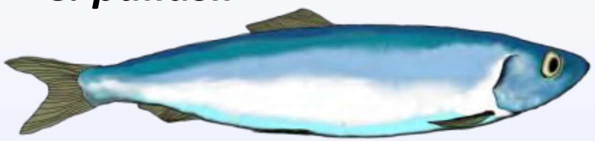
Outlook



Pacific and Baltic herring share ecological traits:

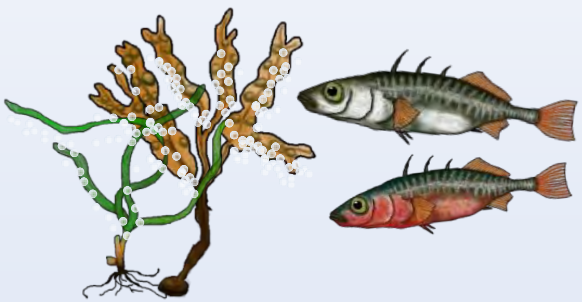


C. pallasii

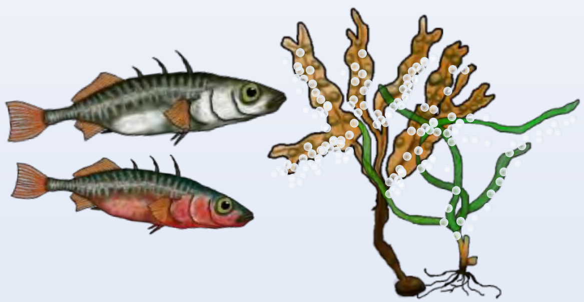


C. harengus

spawning of demersal, stationary eggs in coastal spawning grounds



certain predators are abundant in both systems



comparative studies (pacific collaborators needed)

Acknowledgements

Christopher Zimmermann, Christian von Dorrien, Daniel Stepputtis, Heike Peters, Dagmar Stephan, Titus Rohde, Tom Jankiewicz, Andrea Müller, Mario Koth, Uta Schröder, Bastian Rosin + numerous other students, Norbert Proetel, Annemarie Jetter, Joachim Dröse, Cornelia Albrecht, Sven Dressler, Marion Nickel, Crews of research vessels (particularly FFS Clupea), Helmut Winkler, Axel Temming, Jens-Peter Herrmann, Matthias Paulsen, Anja Schanz, Carsten Kühn, Stefan Herper, Gerhard Rieger, Sebastian Rieß, Claudia Winkler, Heiko, Alex, Stefan, Luise, Sarah, Marten, Liesbeth, Jan-Ole, Maxx, Marie, family, friends and Meike in particular.

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