

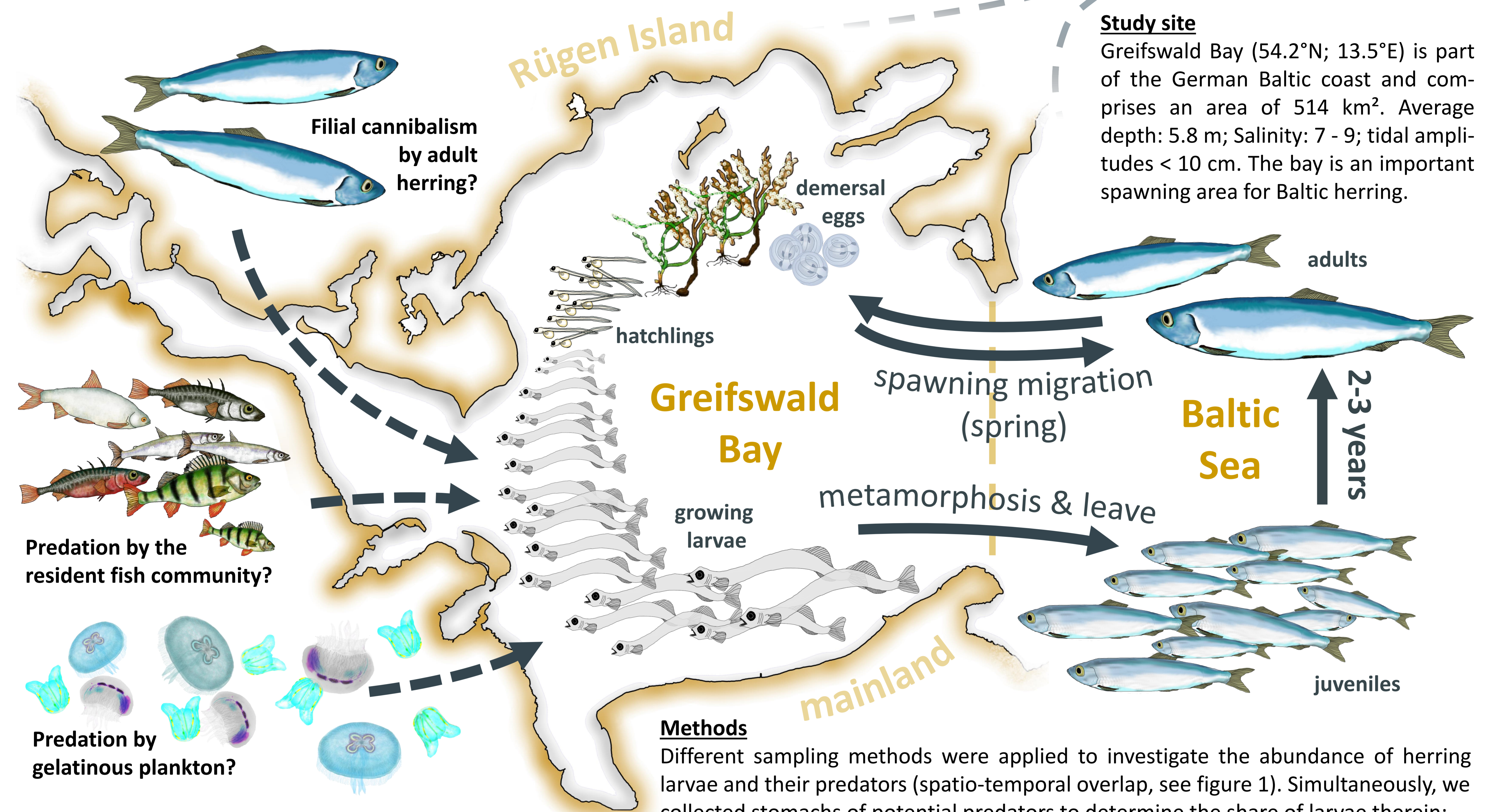
Predator impacts on inshore Baltic herring (*Clupea harengus*) larvae: Lions, tigers and bears – but where?

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Background

Predation on marine fish larvae is considered to be a major cause of their mortality. For example, in offshore retention areas of Pacific and Atlantic herring (*Clupea* spp.) larvae, a broad variety of different predators such as pelagic fish species and gelatinous plankton (Scyphozoa and Ctenophora) is assumed to significantly affect the survival of herring larvae. Furthermore, herring itself has been documented to conduct filial cannibalism. Alike other herring subpopulations, Baltic herring usually spawns in transitional waters and lagoons that are characterized by a different set of environmental factors and potential larvae predators. Are top-down mechanisms observed in offshore areas then transferable to inshore systems at all?



Herring larvae: Oblique Bongo net hauls at 36 distinct stations (25 years data series) & trawls with a modified epibenthic sledge in the littoral zone (2011)
Potential predators: Bongo net bycatches; frame trawl catches in the bay (2011); beach seine hauls in the littoral (2011-2015). Adult herring were sampled with a gill net (2010-2015). Stomach samples were immediately fixated onboard (frozen on dry ice or with 4% formalin) & later analyzed in the laboratory.

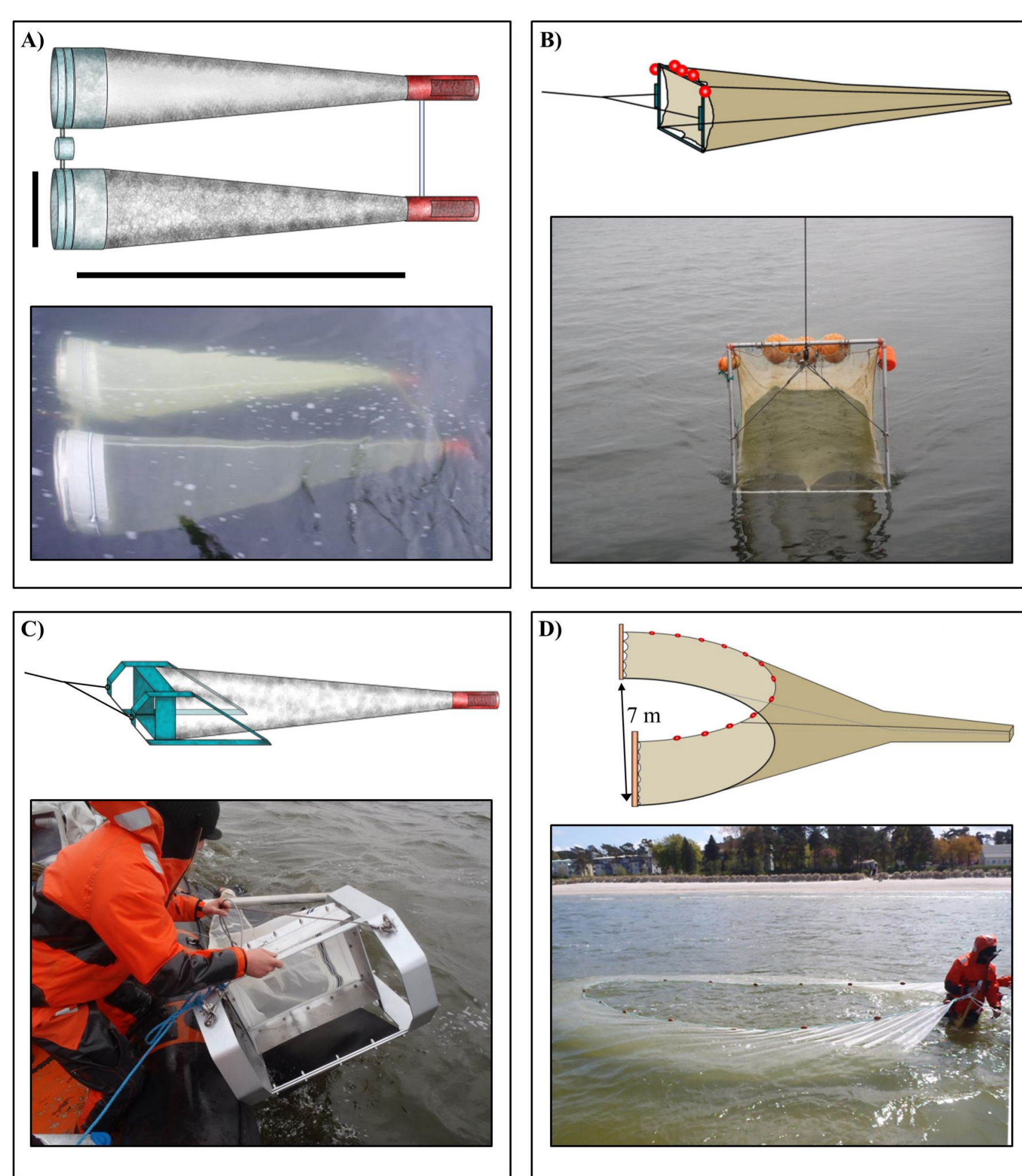


Figure 1. Sampling techniques. A) Bongo-net (oblique haul plankton net with meshes of 335 & 780 μm) B) Frame trawl with 2.1 m² opening and 5 mm meshes. C) Modified epibenthic sledge, equipped with a plankton net (500 μm) D) Beach seine with 7 m opening and 5 mm meshes.

Results

| predator group: | adult herring | fish community | gelatin. plankton |
|--------------------------|------------------------------------|------------------------------------|---------------------|
| spatio-temporal overlap? | ⊕ strong overlap | ⊕ strong overlap (see figure 2) | ⊖ temporal mismatch |
| larvae predation? | ⊖ nearly no larvae in the stomachs | ⊖ nearly no larvae in the stomachs | ⊖ no predation |

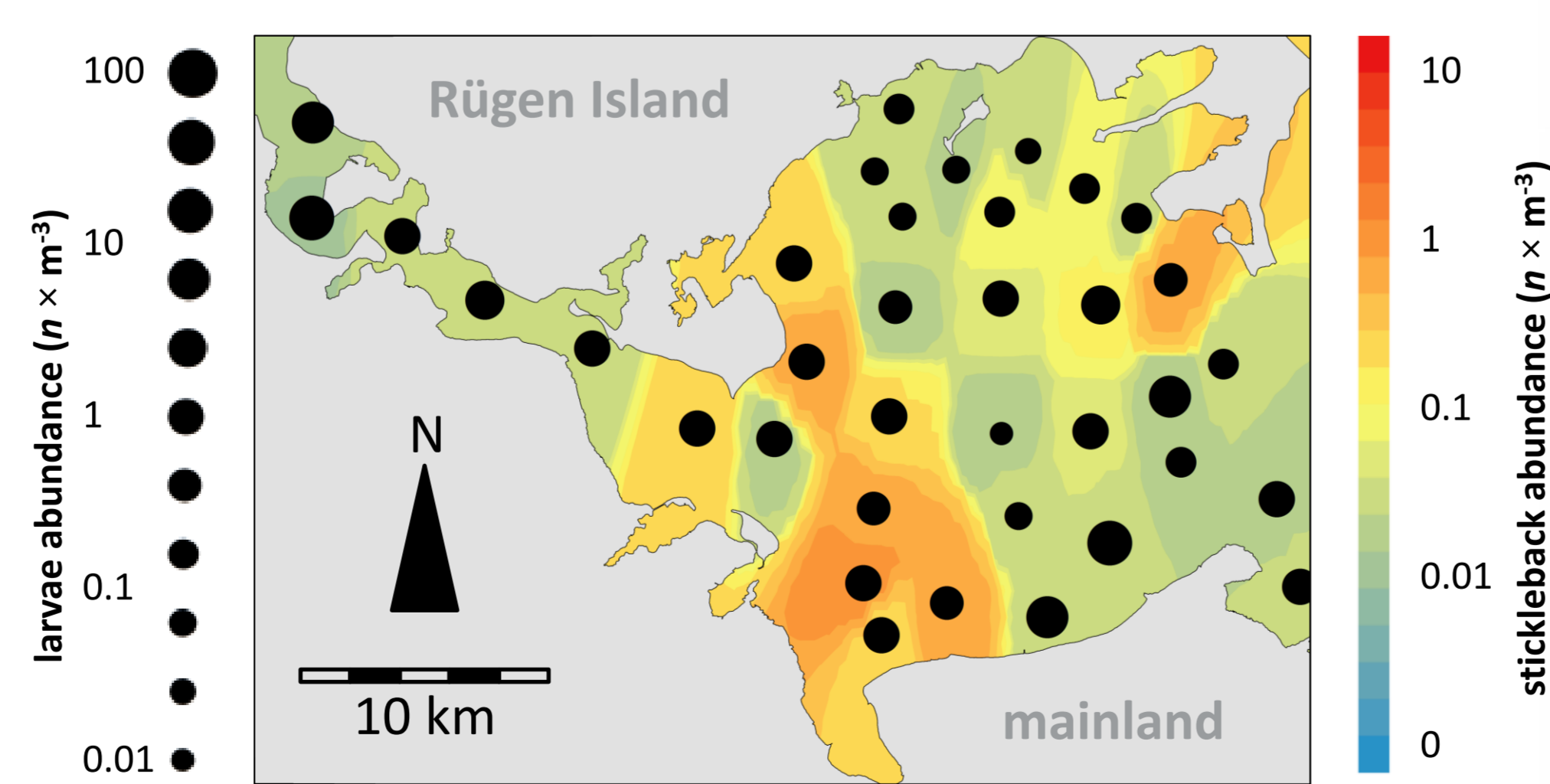


Figure 2. Spatial overlap of herring larvae and threespine stickleback (*Gasterosteus aculeatus*) in May 2011 (calendar week 19) based on the Bongo-net sampling at 36 stations within Greifswald Bay. Larvae abundances are given as black circles (area = proportional to abundance) while the stickleback abundance (color scale) was interpolated using a spatial kriging approach.

Conclusions

Unexpectedly, we found no significant predation on herring larvae within Greifswald Bay. We conclude that in these types of nursery grounds, larval mortality due to predation is negligible and that observations from offshore areas should not be transferred. Moreover, low predation rates might act synergistically with favorable temperatures and nutritional conditions for larval growth - making transitional waters even more valuable as spawning & nursery grounds for marine fishes.

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