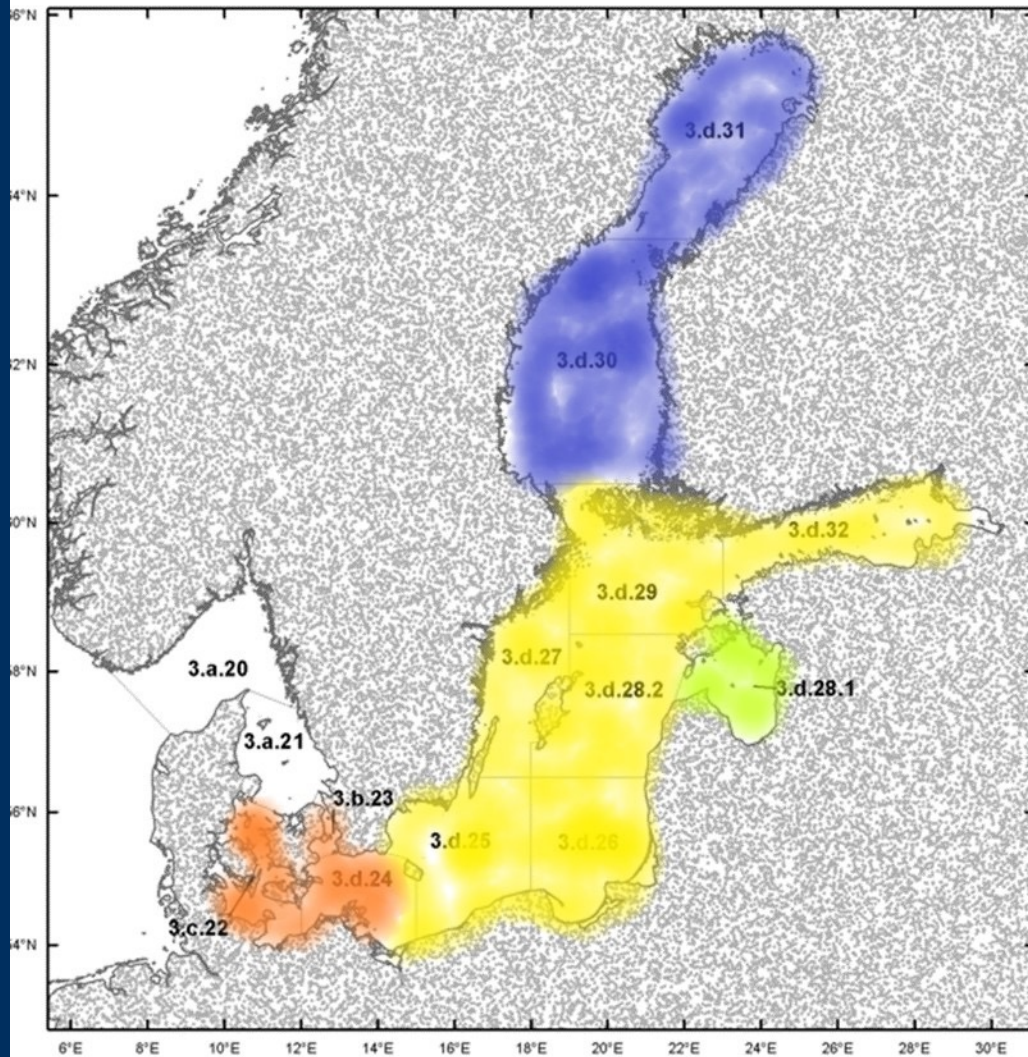


# Concrete actions towards a more sustainable fisheries management in the Baltic Sea

Charles Berkow

Policy Analyst,  
Baltic Sea Centre, Stockholm University





## Herring is managed as four stocks

- Western
- Central
- Gulf of Riga
- Gulf of Bothnia

# Why? Fish stocks in worse shape 2023 than 2017

	Western cod	Eastern cod	Western herring	Central Baltic herring	Gulf of Bothnia herring	Gulf of Riga herring	Sprat
2017 ICES	Danger zone	Warning zone	Warning zone	Productive	Productive	Productive	Productive
TAC (tonnes)	≤3 541	≤26 071	≤34 618	267 745	≤95 566	24 919	291 715
2023 ICES	Danger zone	Danger zone	Danger zone	Danger zone	Warning zone	Productive	Productive
TAC (tonnes)	≤24	0	0	52 459	63 049	35 902	241 604



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# GULF OF RIGA HERRING: STOCK STATUS AND FISHERIES MANAGEMENT

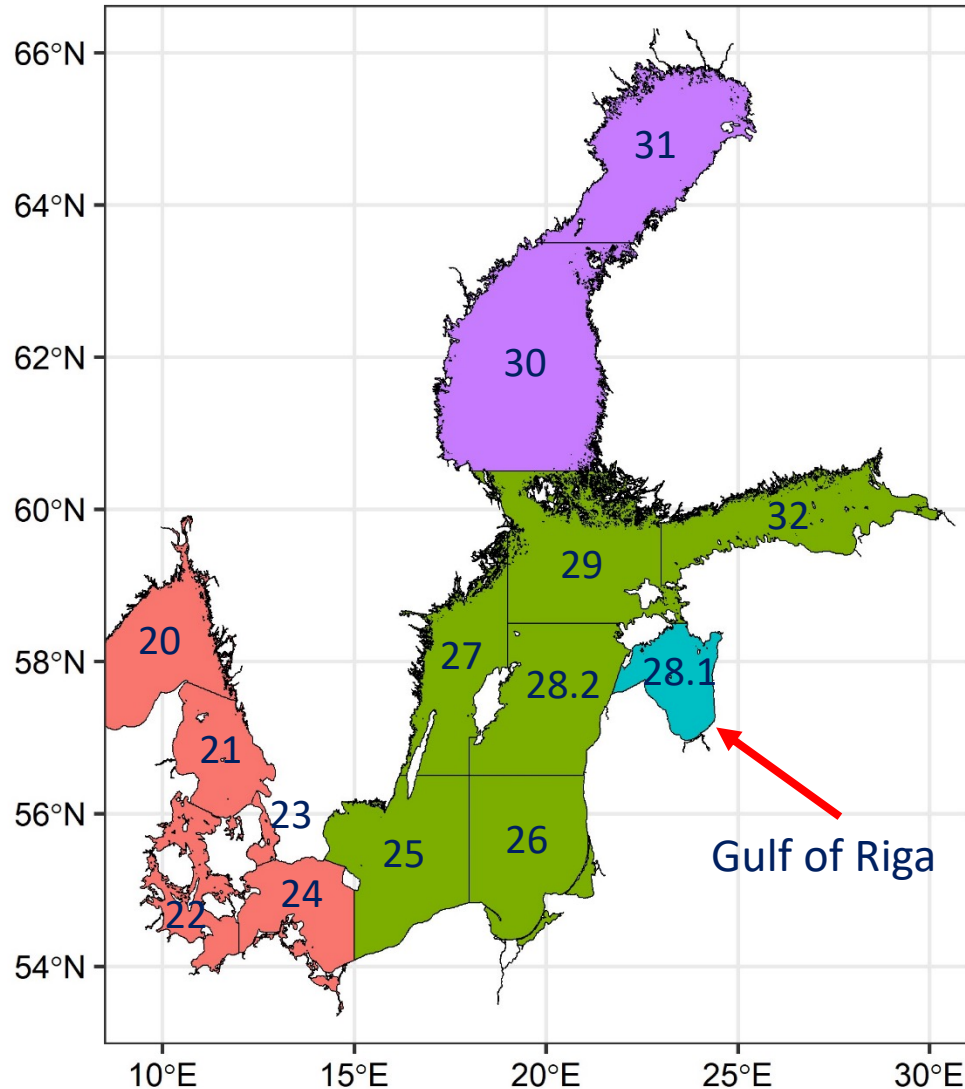
IVARS PUTNIS

[ivars.putnis@bior.lv](mailto:ivars.putnis@bior.lv)




25.04.2024.



# GULF OF RIGA HERRING

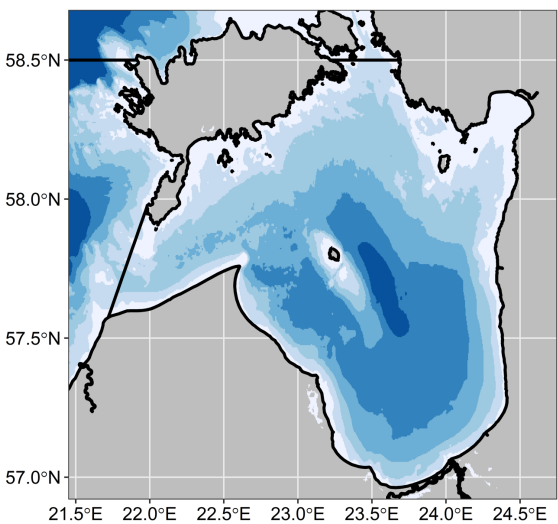


## Herring stocks

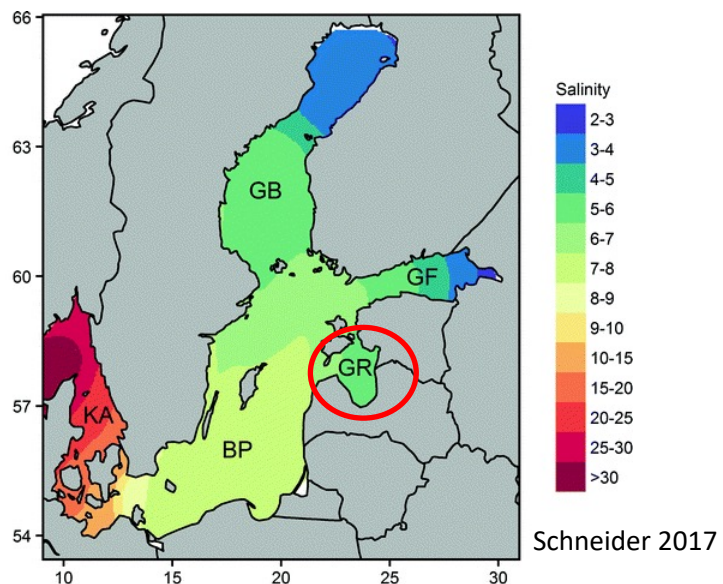
-  SD 20–24 (Skagerrak, Kattegat, and western Baltic)
-  SD 25–29 and 32, excluding the Gulf of Riga (central Baltic Sea)
-  SD 28.1 (Gulf of Riga)
-  SD 30 and 31 (Gulf of Bothnia)

# GULF OF RIGA ECOSYSTEM

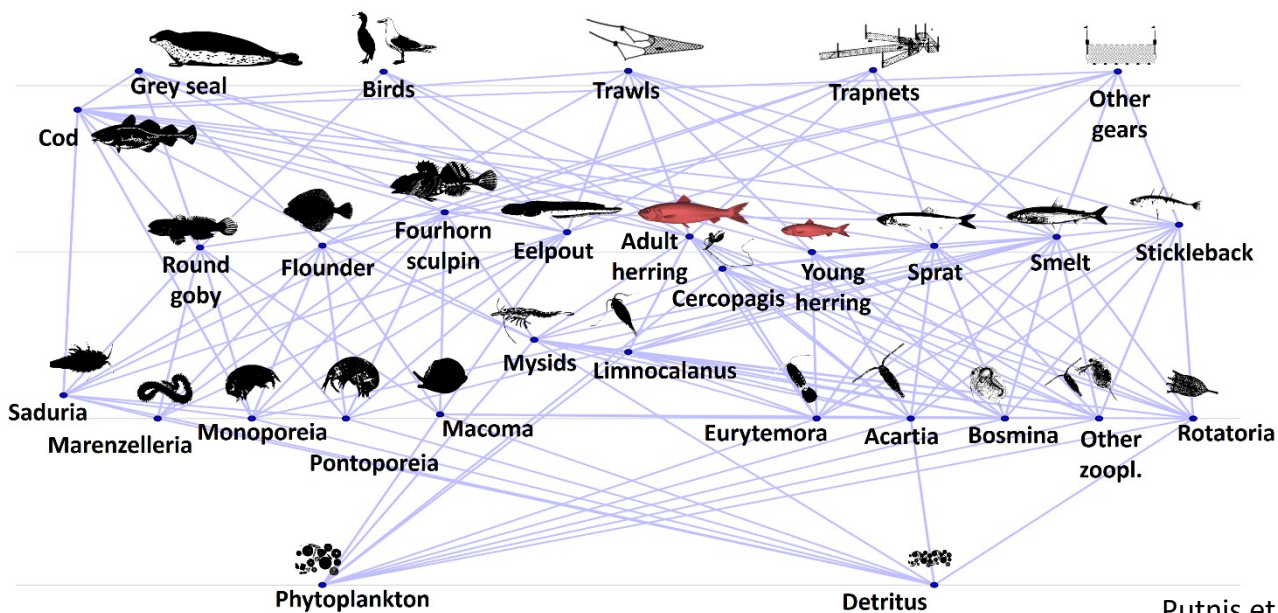
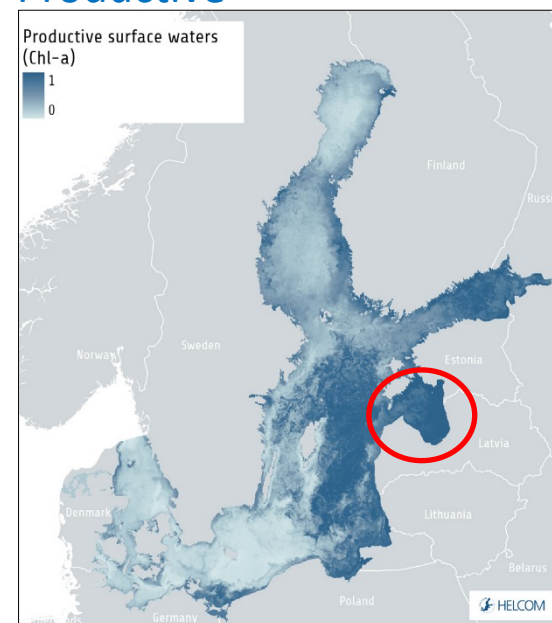
## Shallow



## Brackish



## Productive



Putnis et al. in prep.

**DATA COLLECTION**



COMMERCIAL FISHERY



SCIENTIFIC SURVEYS

**DATA ANALYSIS**



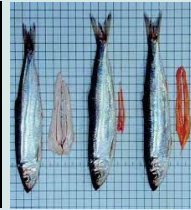
CATCH STATISTICS  
AND COMPOSITION



LENGTH AND WEIGHT



AGE



MATURITY



MORTALITY

**SCIENTIFIC ADVICE**



ICES WORKING GROUPS

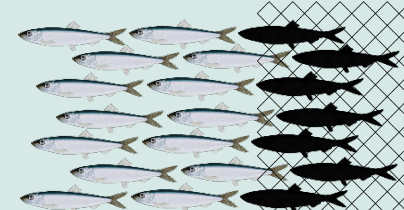


STOCK ASSESSMENT & ADVICE

**FISHERIES MANAGEMENT**



DECISION PROCESS



FISHERIES REGULATIONS – TAC  
AND OTHER MEASURES

**FISH POPULATION DYNAMICS**

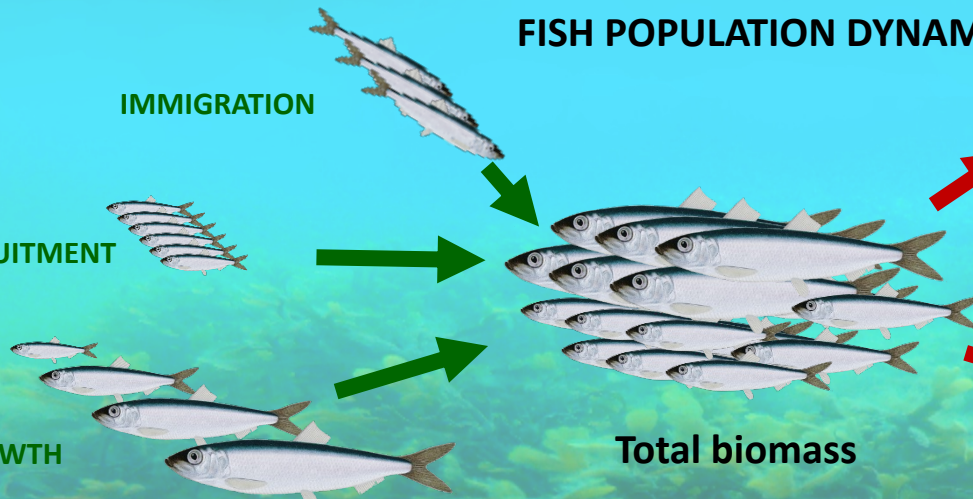


**Biomass increase**

IMMIGRATION

RECRUITMENT

GROWTH



EMIGRATION

NATURAL MORTALITY

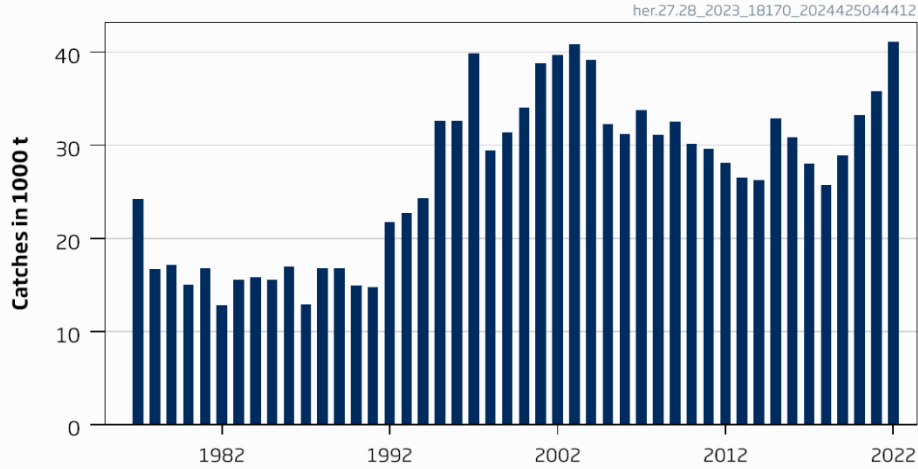
FISHING MORTALITY

4

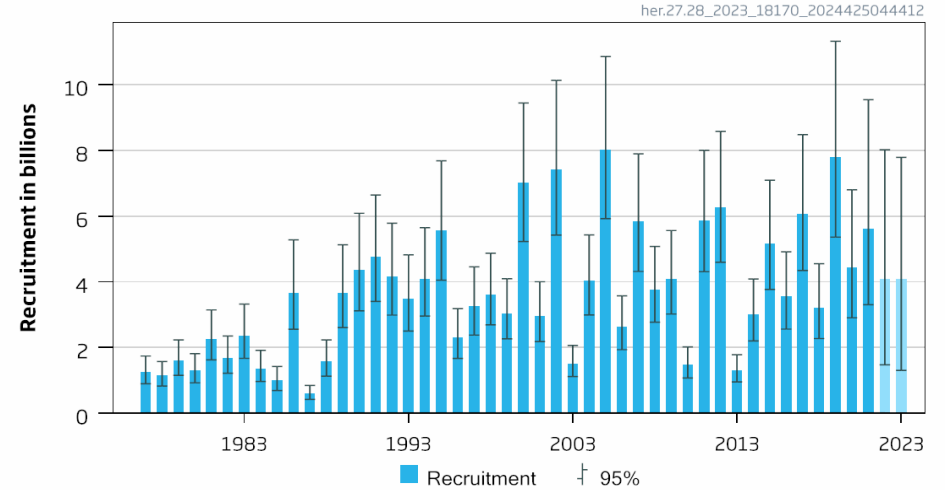
**Biomass decrease**

# SUMMARY OF THE GULF OF RIGA HERRING STOCK ASSESSMENT (2023)

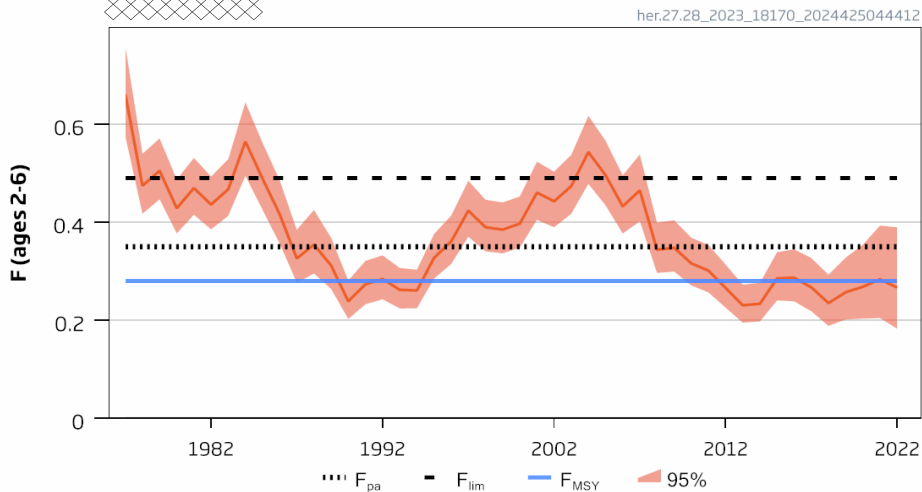
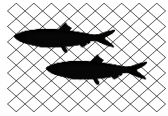
## Catches



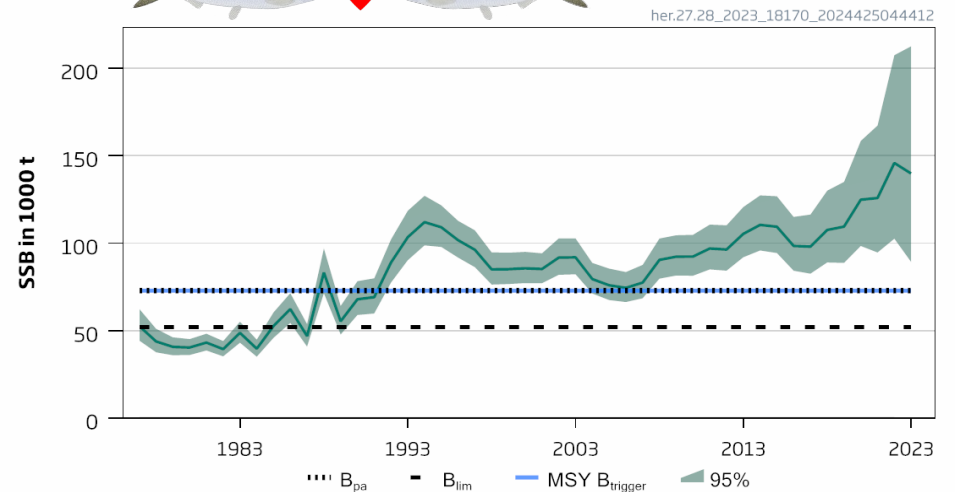
## Recruitment (age 0)



## F

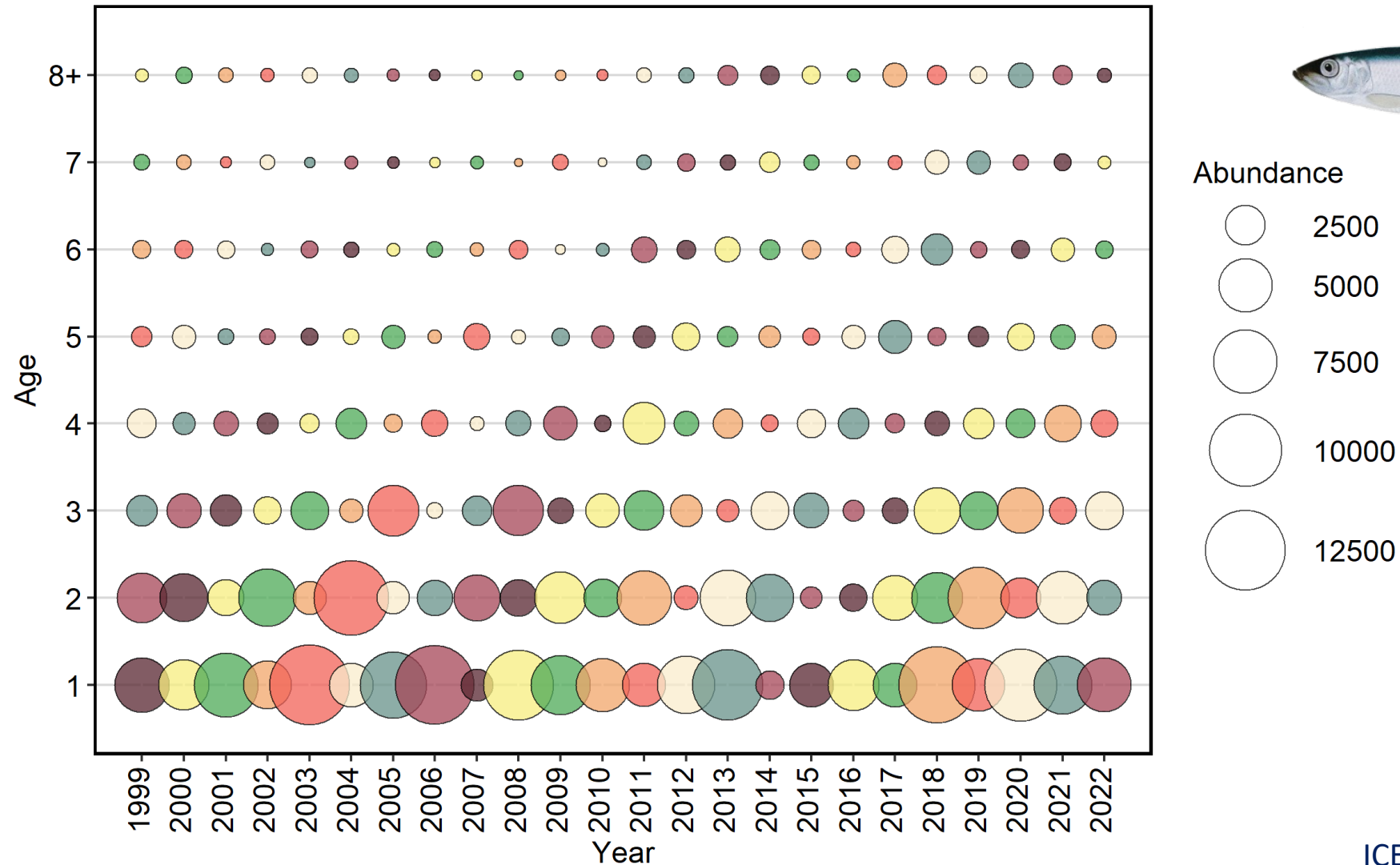


## SSB





# GULF OF RIGA HERRING. PROPORTION OF AGES IN HYDRO-ACOUSTICS SURVEY



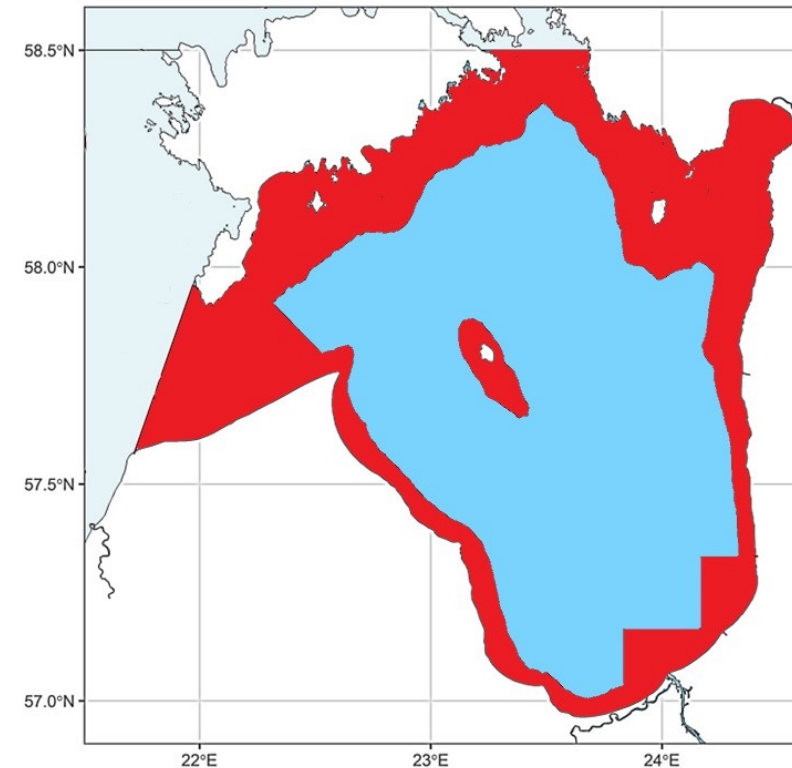
# FISHERIES MANAGEMENT IN THE GULF OF RIGA: SPECIFIC MEASURES

Vessels shall hold a fishing authorisation issued in accordance with Article 7 of Regulation (EC) No 1224/2009.

The engine power of a vessel must not exceed 221 kW at any time.

Trawling restrictions:

- restrictions for fishing gear (vertical opening of trawl < 12 m, no demersal trawling);
- closed areas (< 20 m depth; Irbe Strait etc.);
- closed season (30 days in spring for both countries; in Estonia, there is an additional trawling ban from mid-June to mid-September).



# CONCLUSIONS AND TAKE-HOME MESSAGES

1. The Gulf of Riga herring stock is sensitive to environmental changes. It has benefited from recent environmental changes (higher survival rate → higher recruitment → higher stock biomass).
2. Specific fisheries management measures are in force mainly to protect pre-spawning shoals and to limit vessel power.
3. Only two countries are involved in the fishery and stock management. There are few target species, and herring is mainly used for human consumption.
4. Intensive sampling of commercial landings. Increased effort in acoustic surveys. The joint Estonian-Latvian acoustic-trawl survey sampling intensity is several times higher than for other herring stocks.
5. Scientific staff with long-term experience.
6. The main future challenges – climate change & implementation of EBFM.

Thank you for your  
attention!



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[www.bior.lv](http://www.bior.lv)

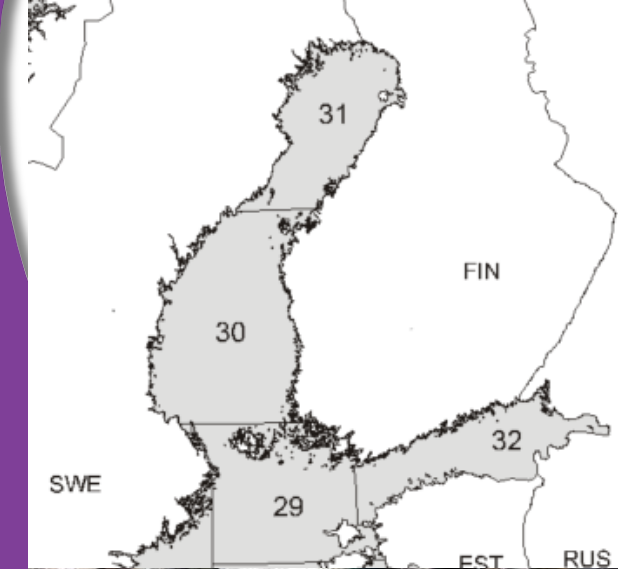


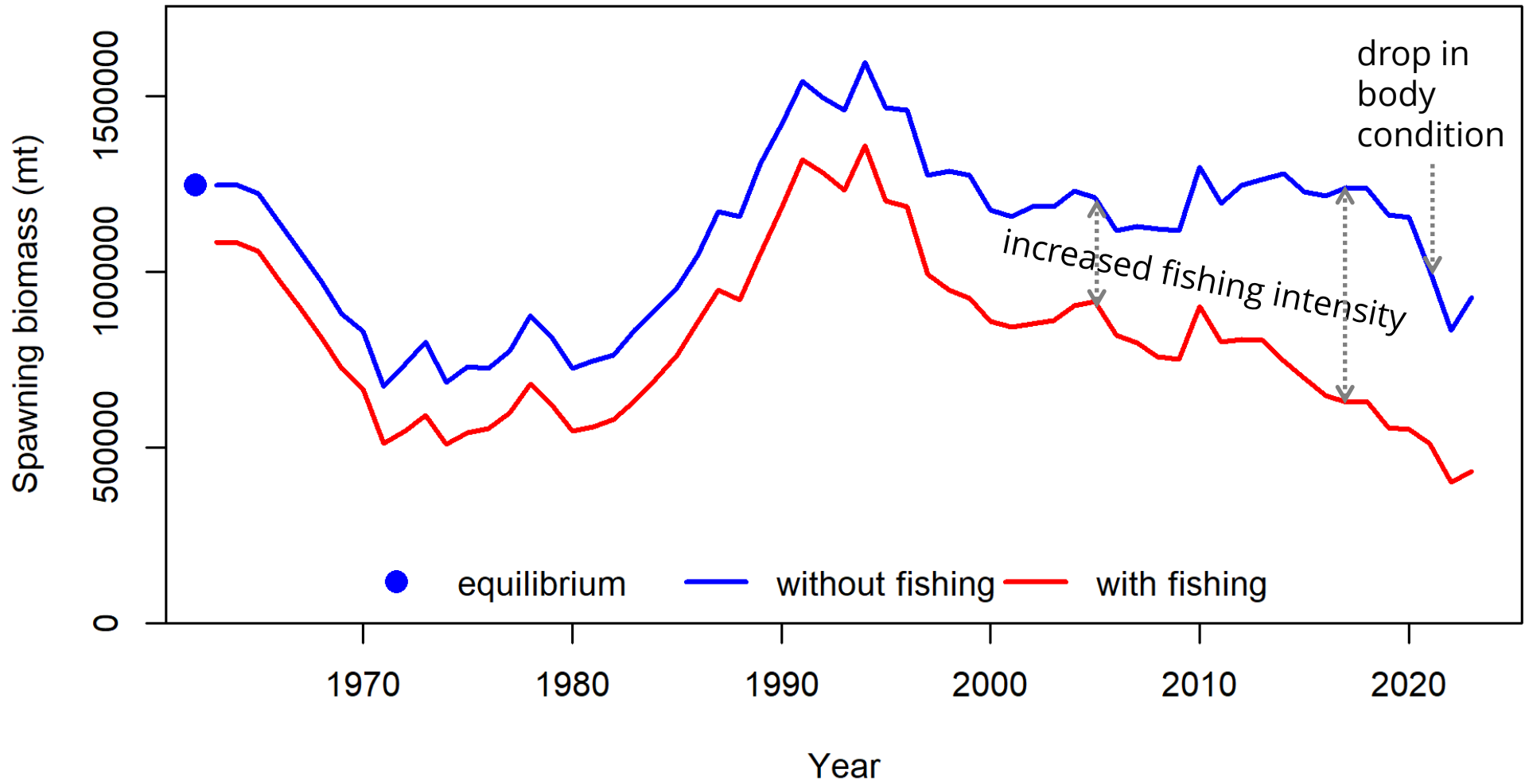
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AND ENVIRONMENT

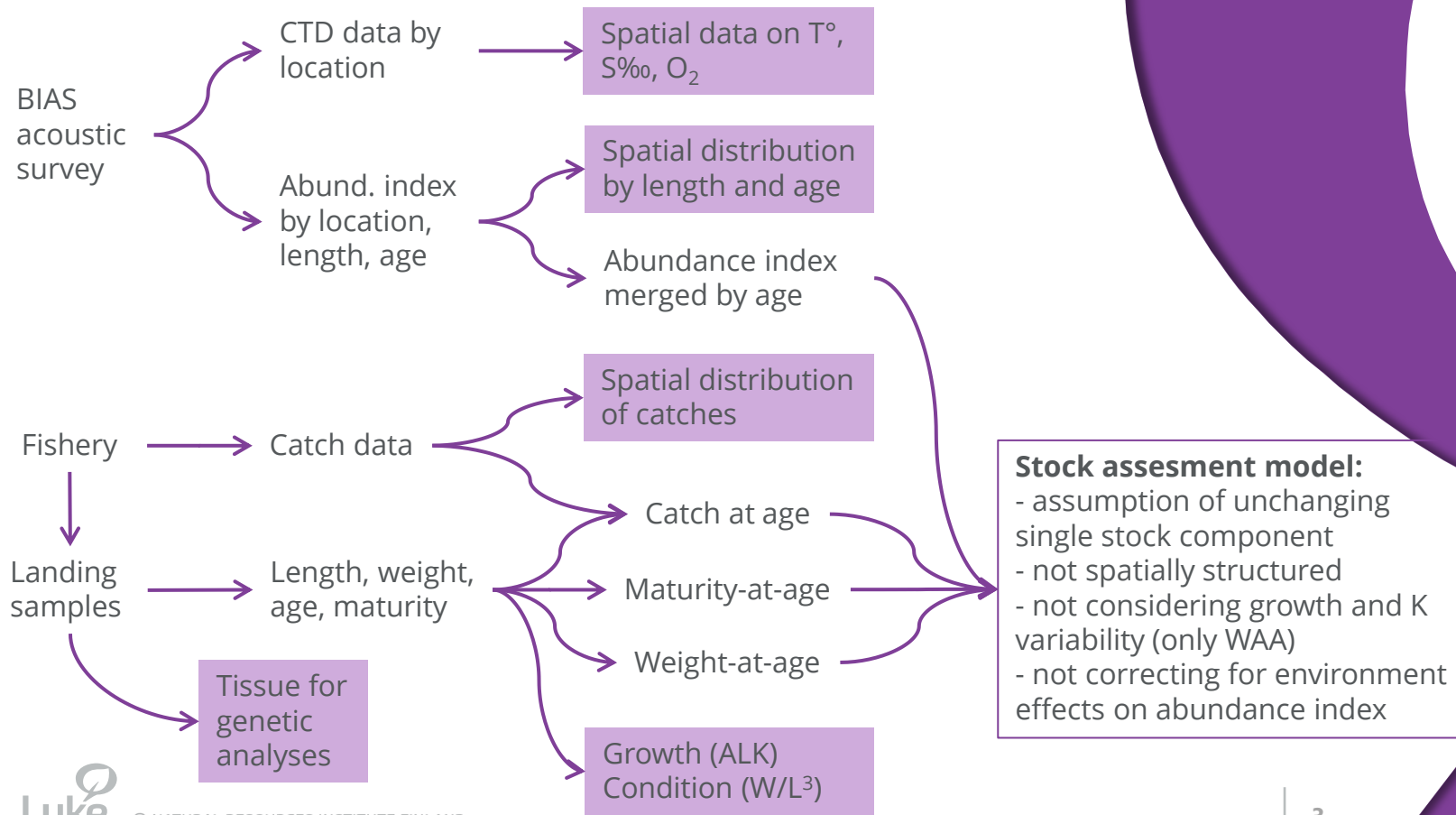
# Improving the science basis of the fisheries management of the Gulf of Bothnia herring (IMPROFISH)

- Bothnian herring is an important pelagic stock in the Baltic Sea, managed as a single unit in SD 30 and 31
- In the last few years the spawning biomass has been decreasing to the point of getting close to  $B_{lim}$  (threshold spawning biomass for unimpaired recruitments)
- How to better foresee and mitigate the biomass variations of Bothnian herring?
- What knowledge gaps do we need to fill for a better management of the stock?

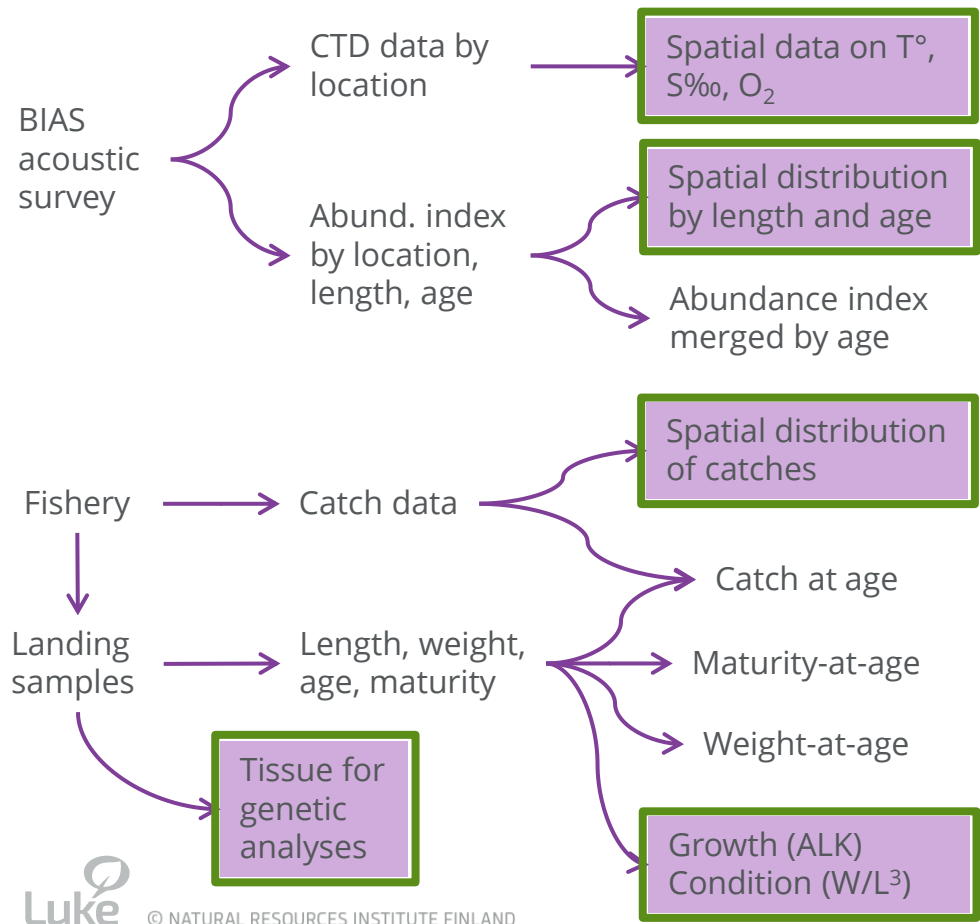




# What data do we have and do we use them?



# What data do we have and do we use them?



How does the environment affect the detectability of juvenile herring?

How does herring distribute spatially, has it changed and how does it affect our perception of the stock dynamics?

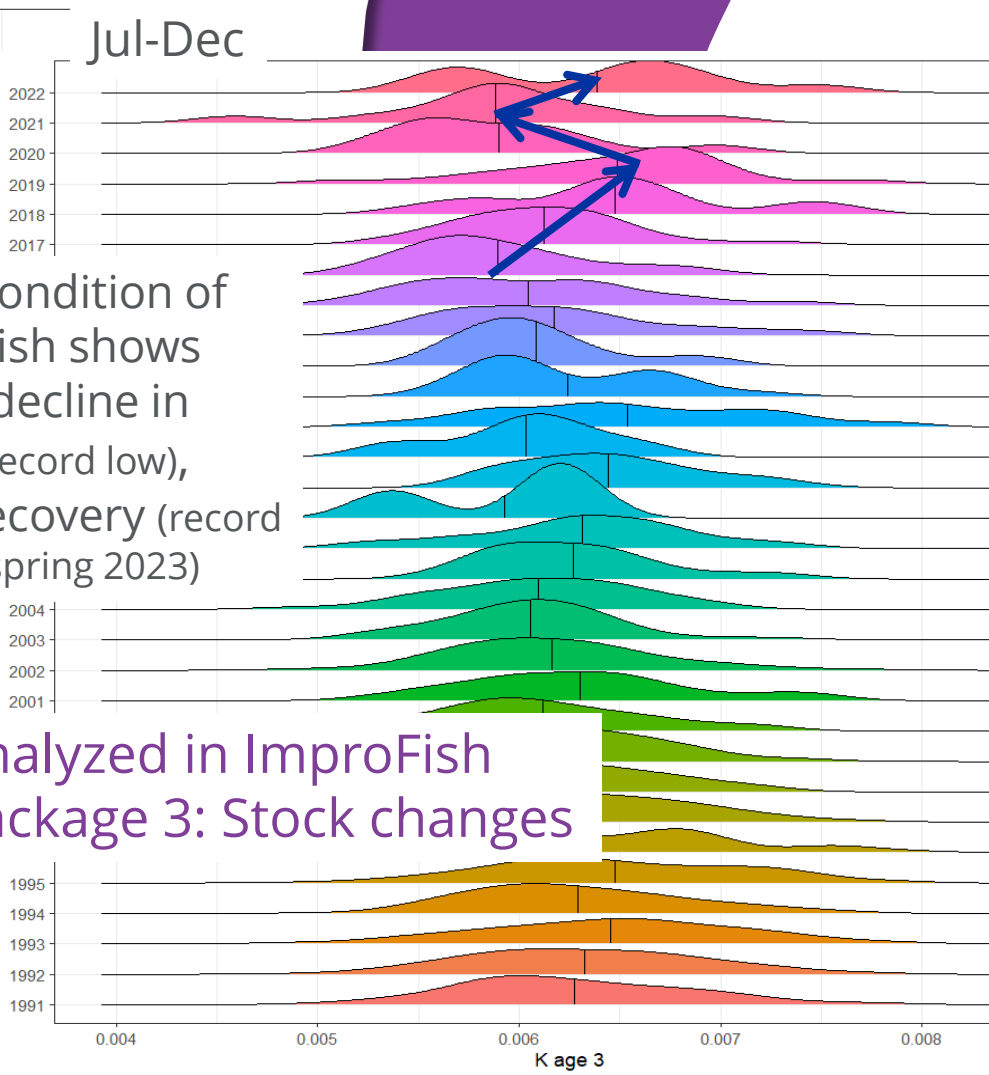
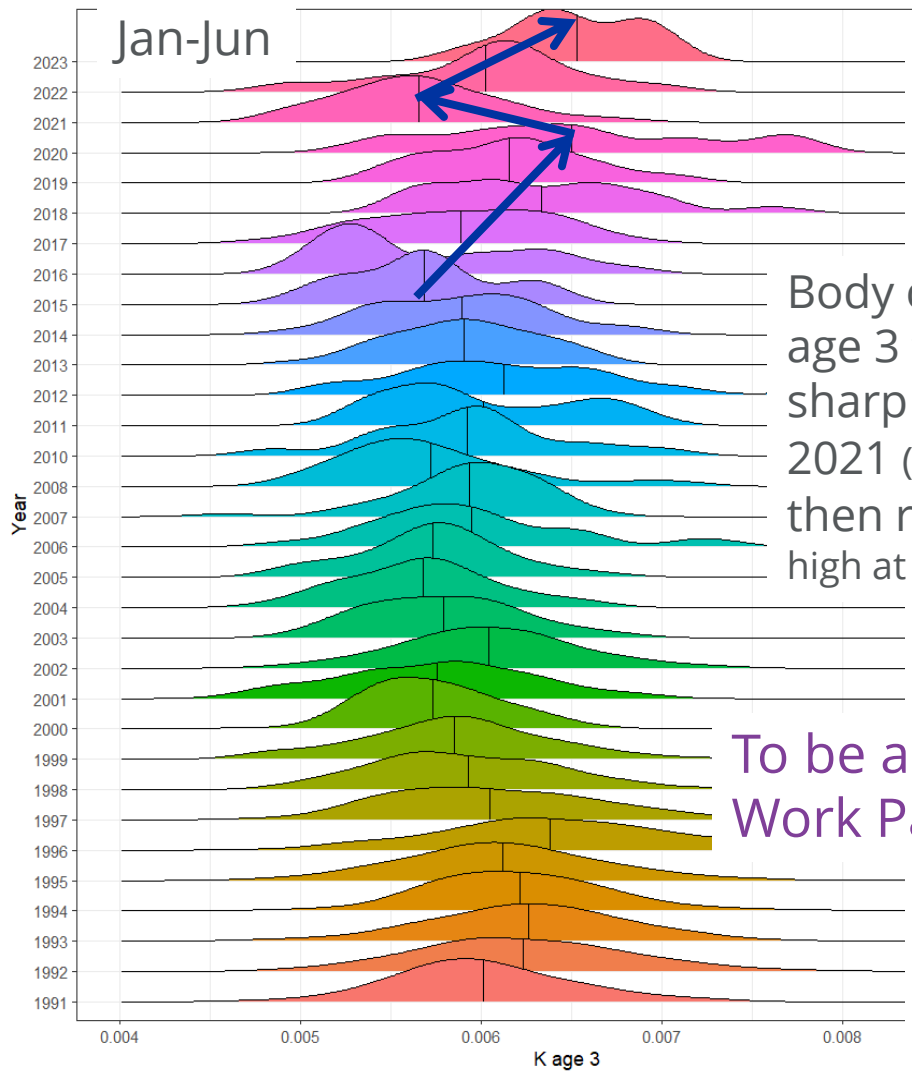
Is there more than one single stock component?

How did the variations in growth and condition affect the stock dynamics and our perception of it?



Jan-Jun

Jul-Dec

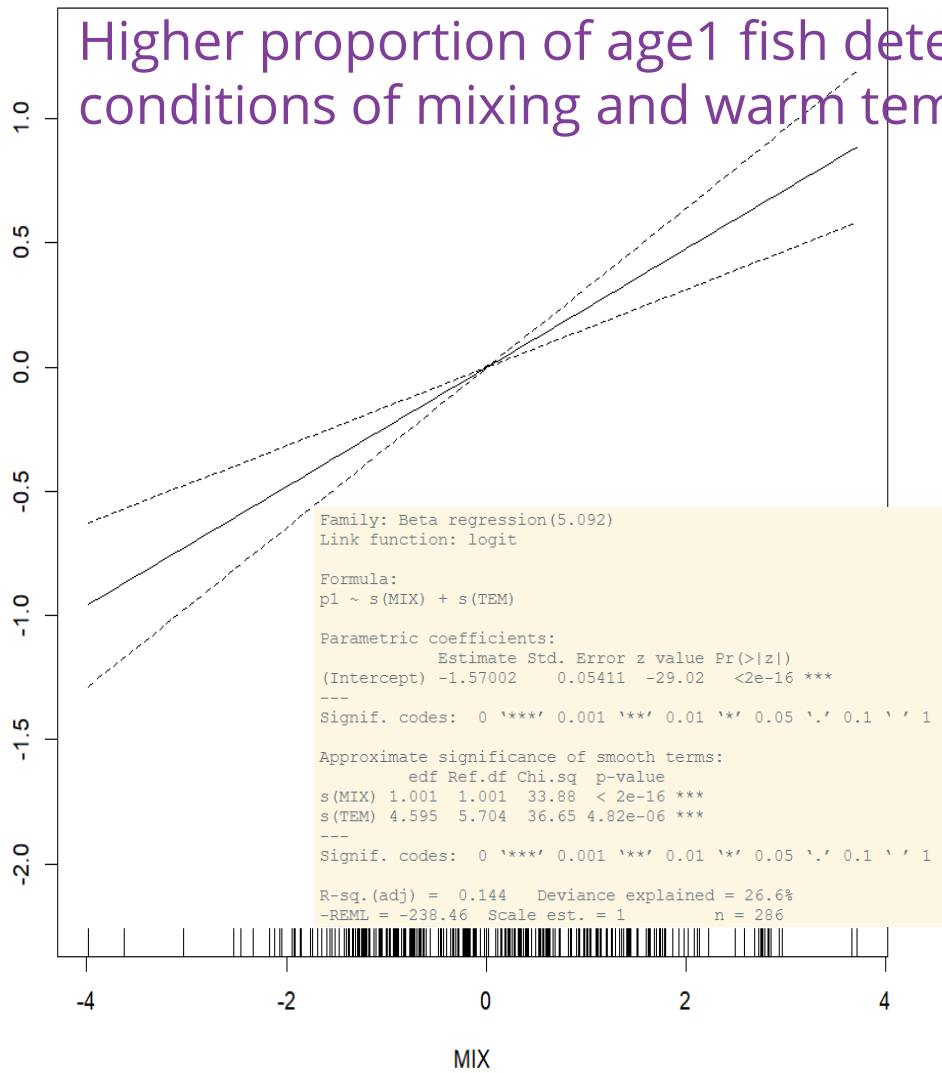


Body condition of age 3 fish shows sharp decline in 2021 (record low), then recovery (record high at spring 2023)

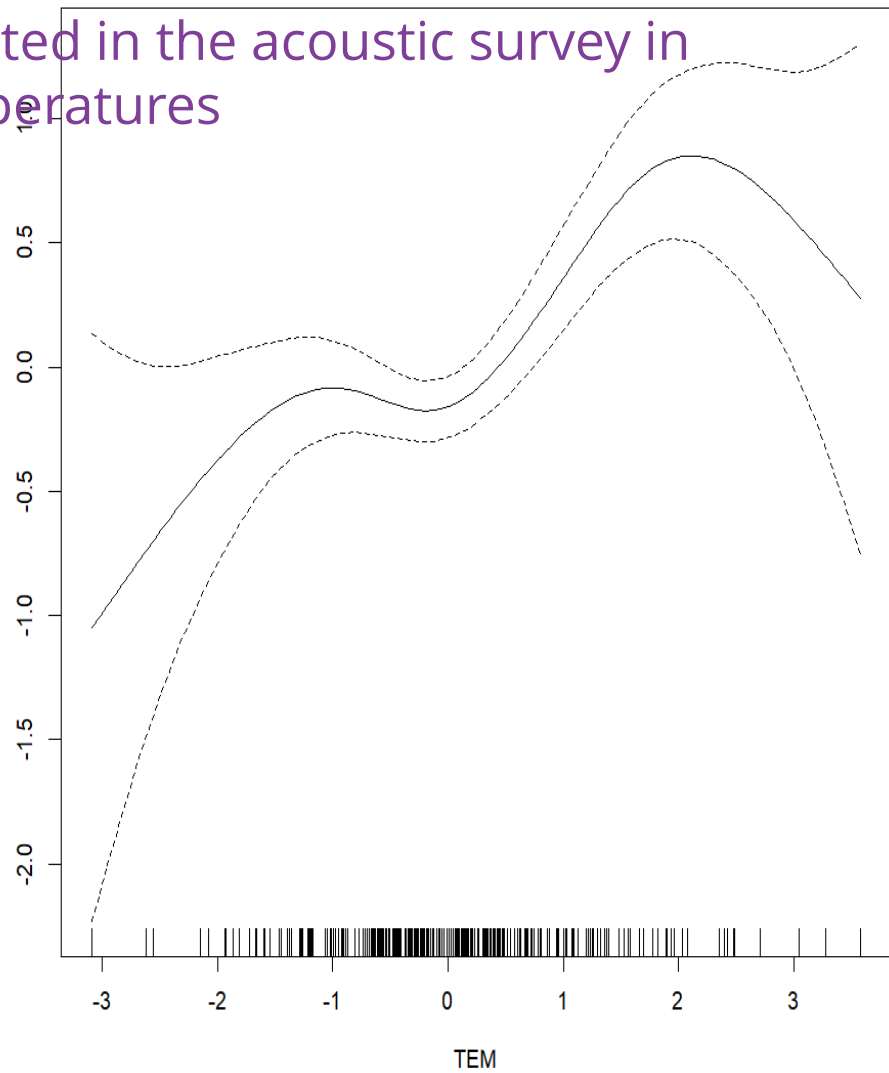
To be analyzed in ImproFish Work Package 3: Stock changes

# Higher proportion of age1 fish detected in the acoustic survey in conditions of mixing and warm temperatures

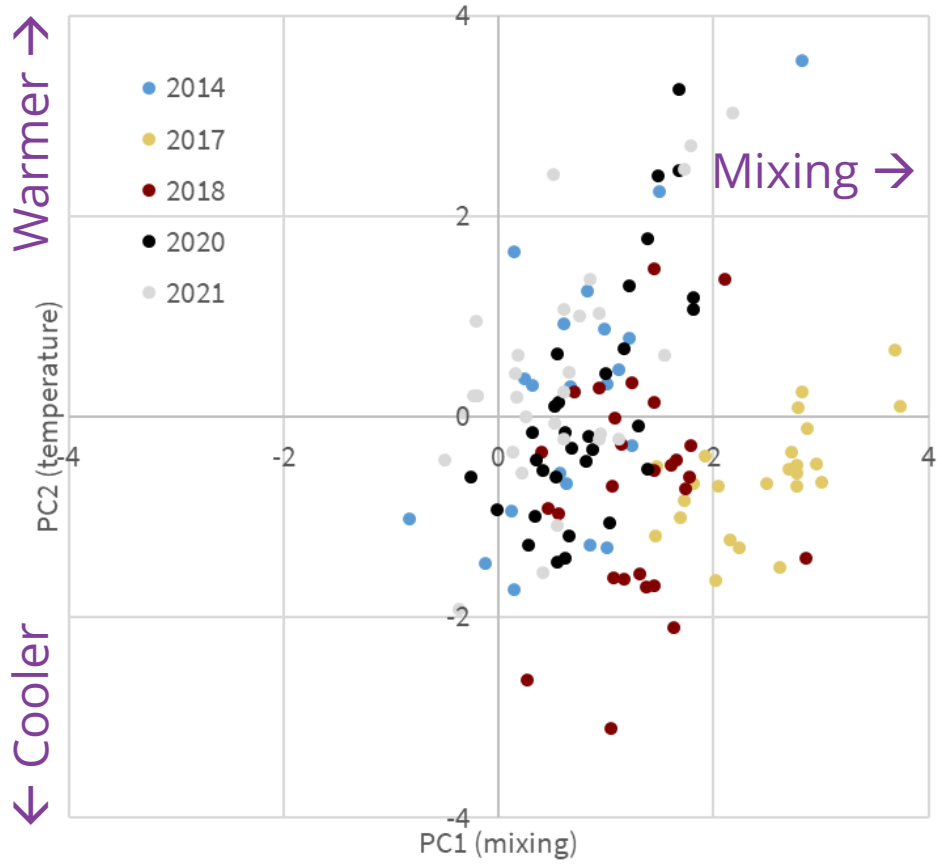
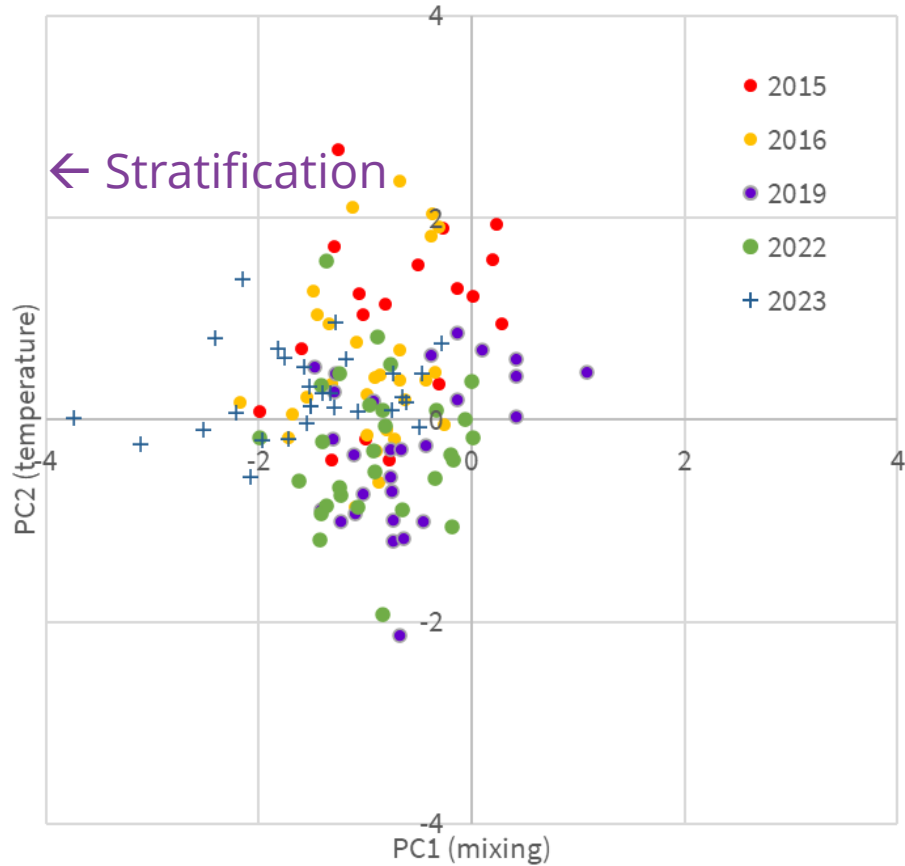
effect on proportion of age1 individuals



effect on proportion of age1 individuals

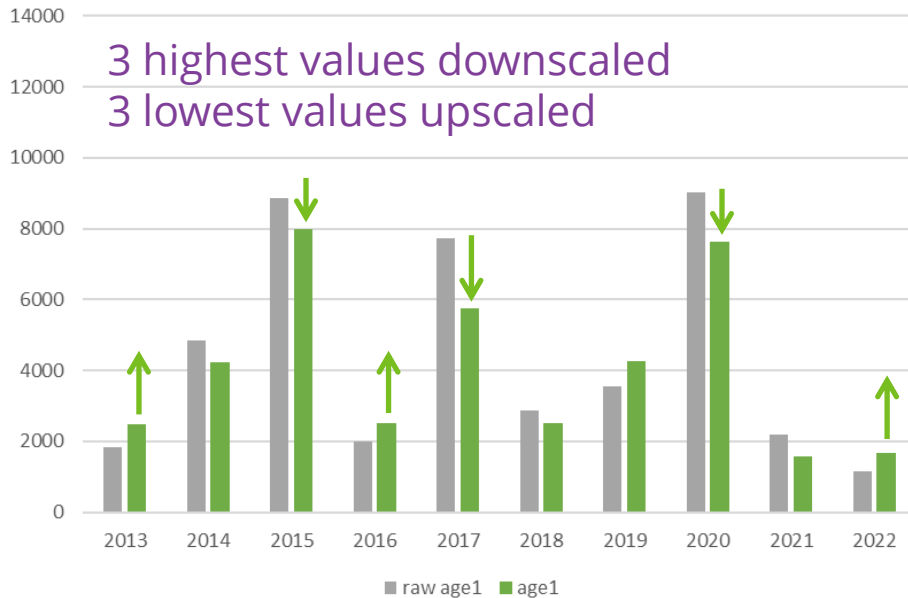


# More or less windy (and warm) years during the survey

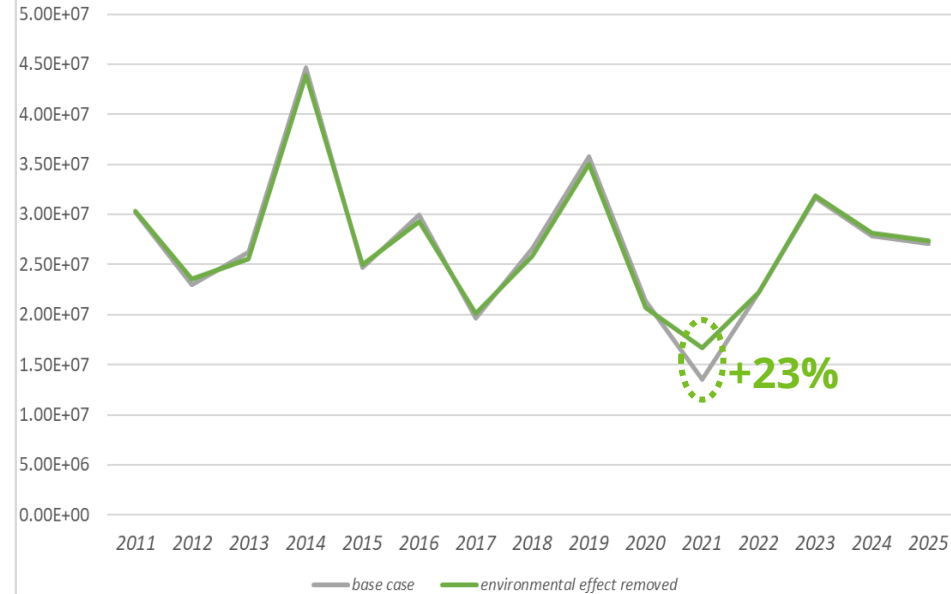


# Acoustic index for age 1 before/after removing the effect of mixing and temperature

age 1 abundance

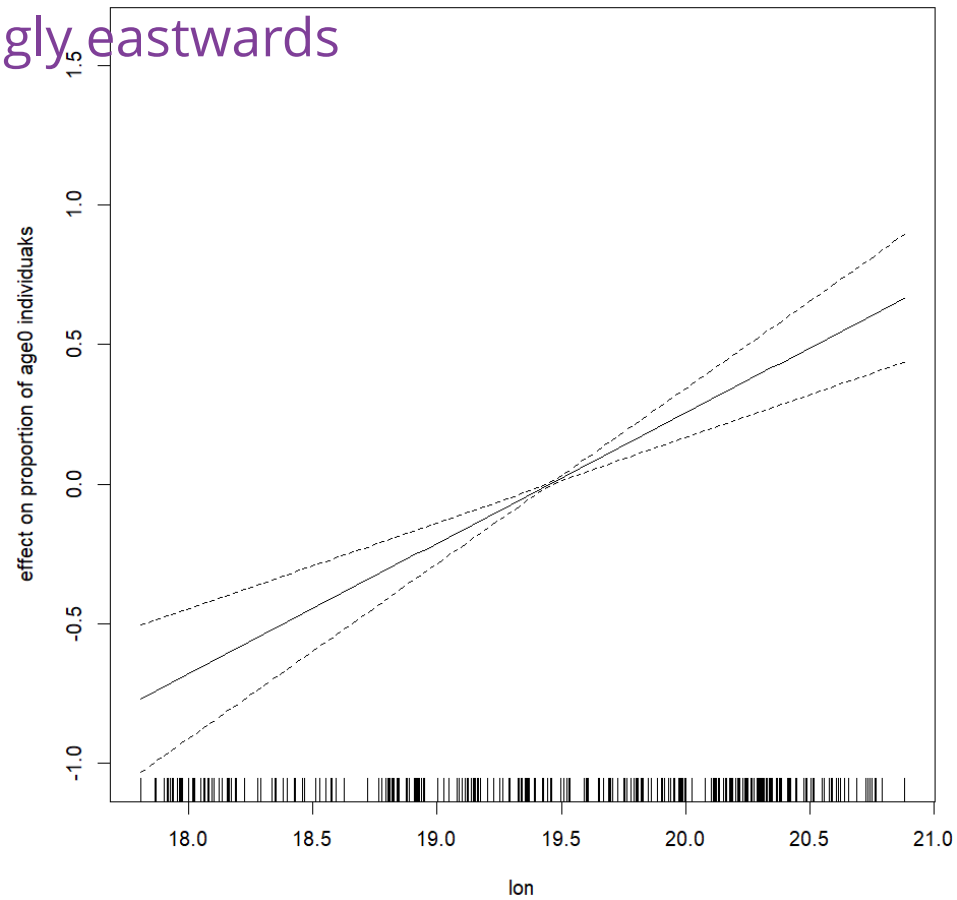
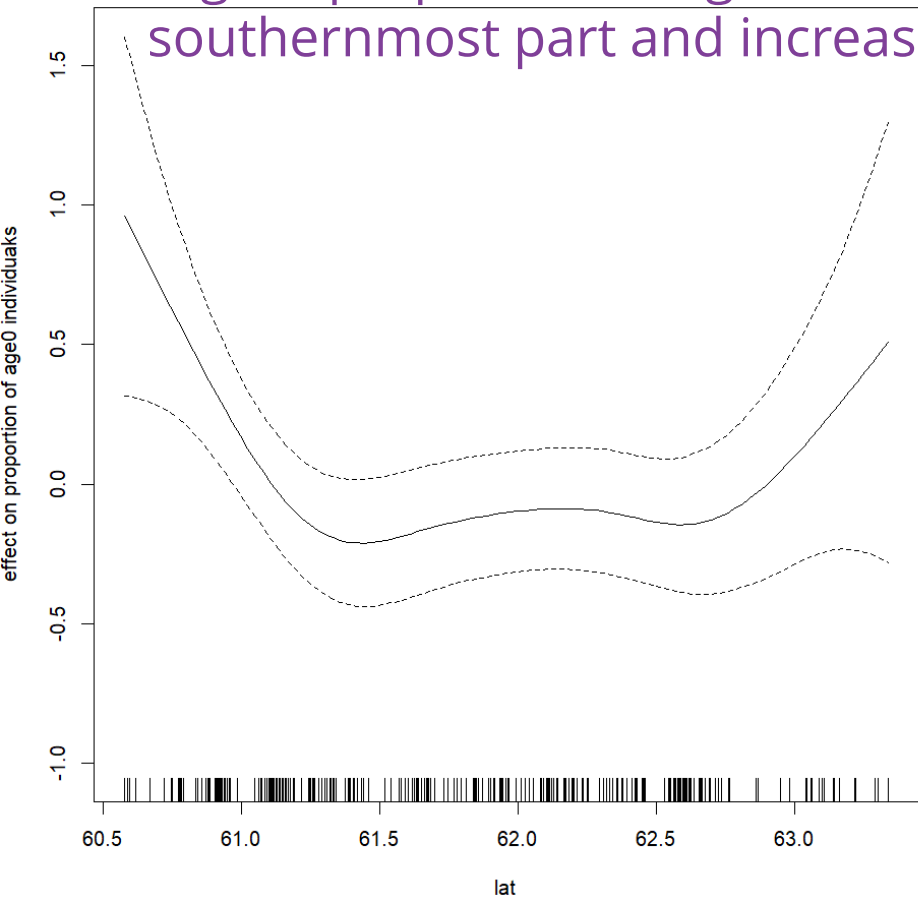


Recruitment

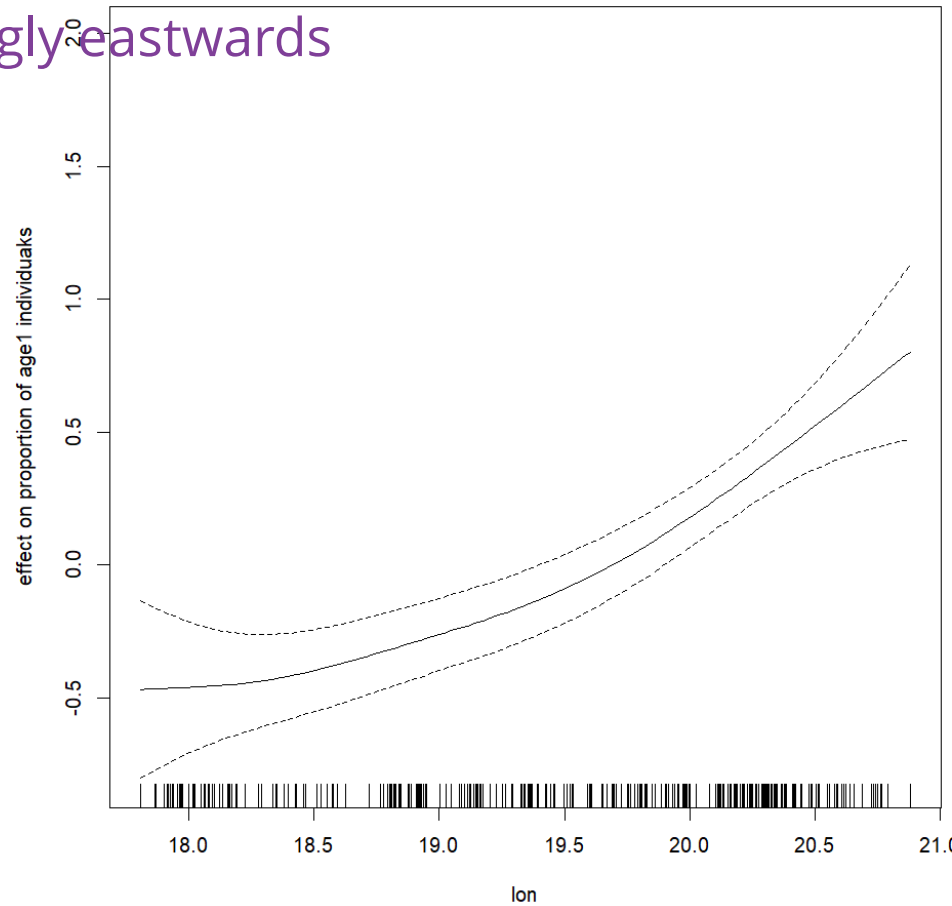
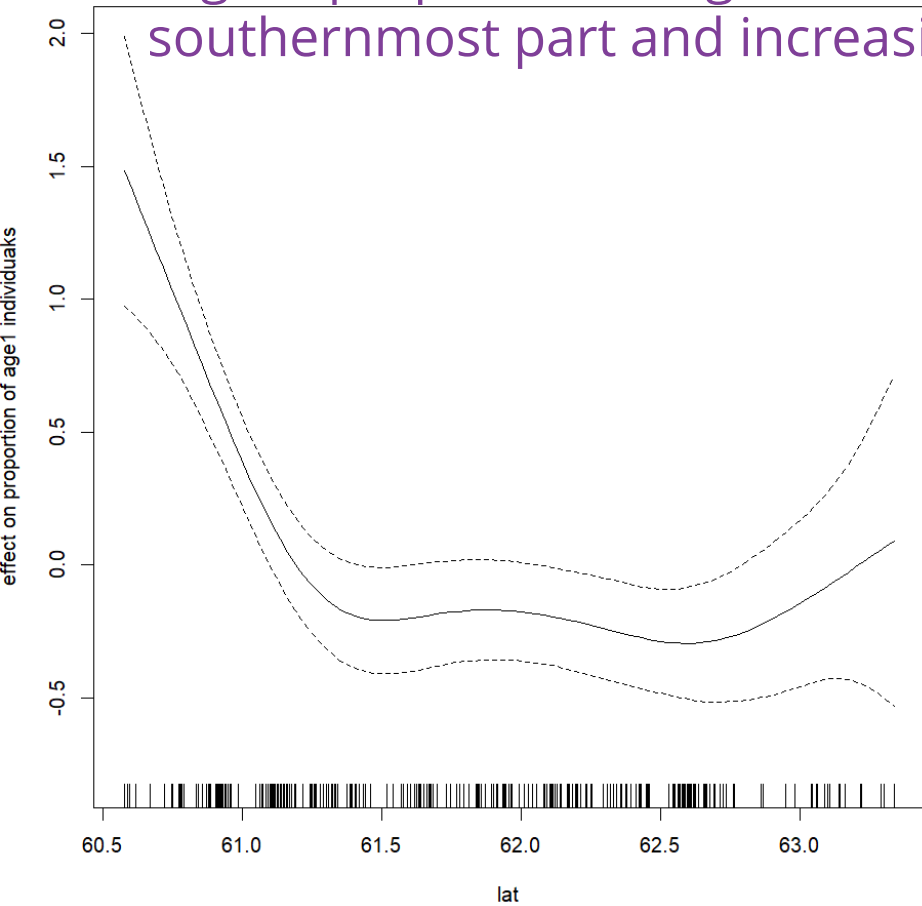


More to explore in ImproFish Work Package 2: Acoustics

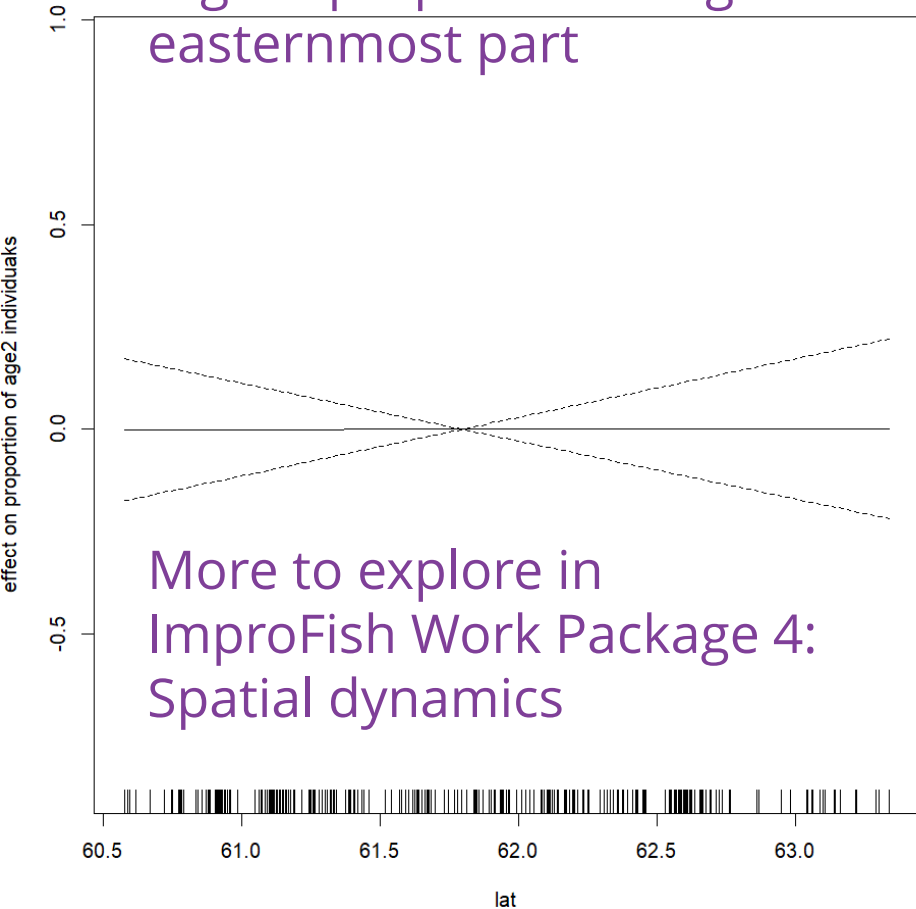
Higher proportion of age0 fish in the southernmost part and increasingly eastwards



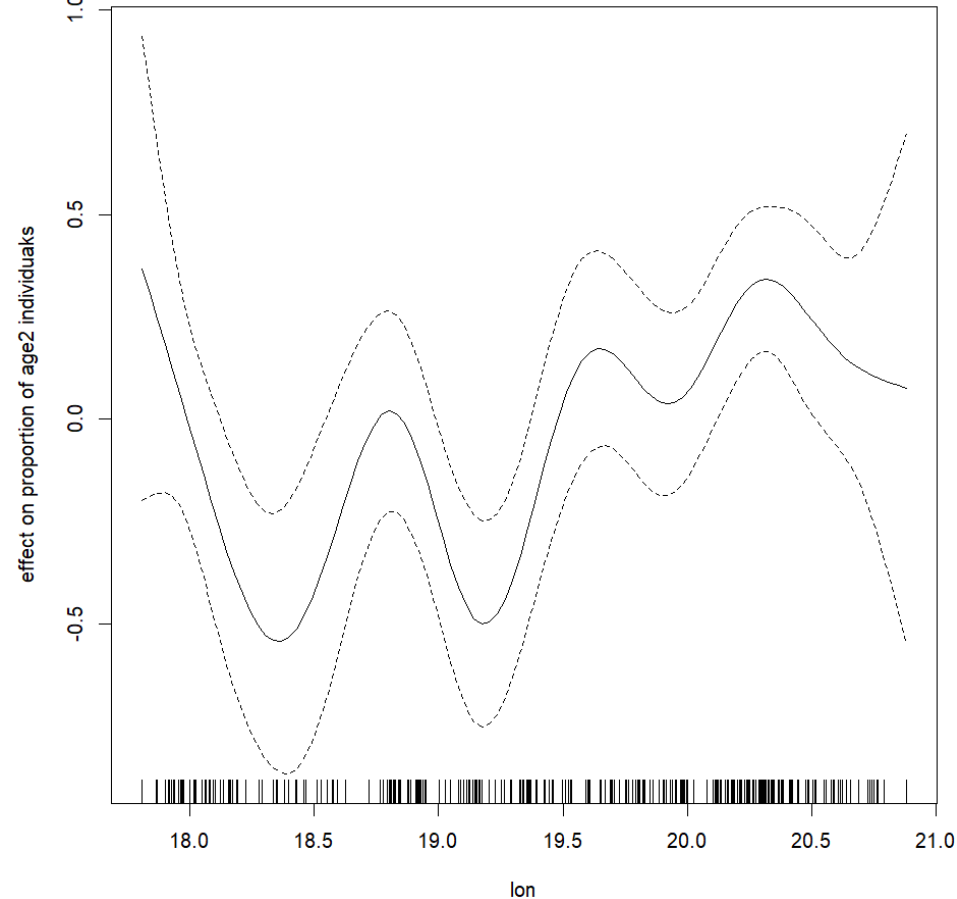
# Higher proportion of age1 fish in the southernmost part and increasingly eastwards



Higher proportion of age2 fish in the easternmost part



More to explore in ImproFish Work Package 4: Spatial dynamics



Current approach	What to aim at
assumption of unchanging single stock component	assessing the genetic diversity and relative importance of autumn spawners
not spatially structured	identifying the temporal changes in the spatial distribution of fish and effort, spawning locations
not considering for environment effects on abundance index	assessing and correcting for age-specific environment effects on detectability
WAA not reflecting variability of growth and body condition	understanding drivers of size-specific changes in growth and body condition

## Improving the science basis of the **fisheries** management of the Gulf of Bothnia herring (IMPROFISH): 2024-2026



AND