Areas of the Eastern Baltic cod stock efficient reproduction – measures to increase fish protection during their spawning period

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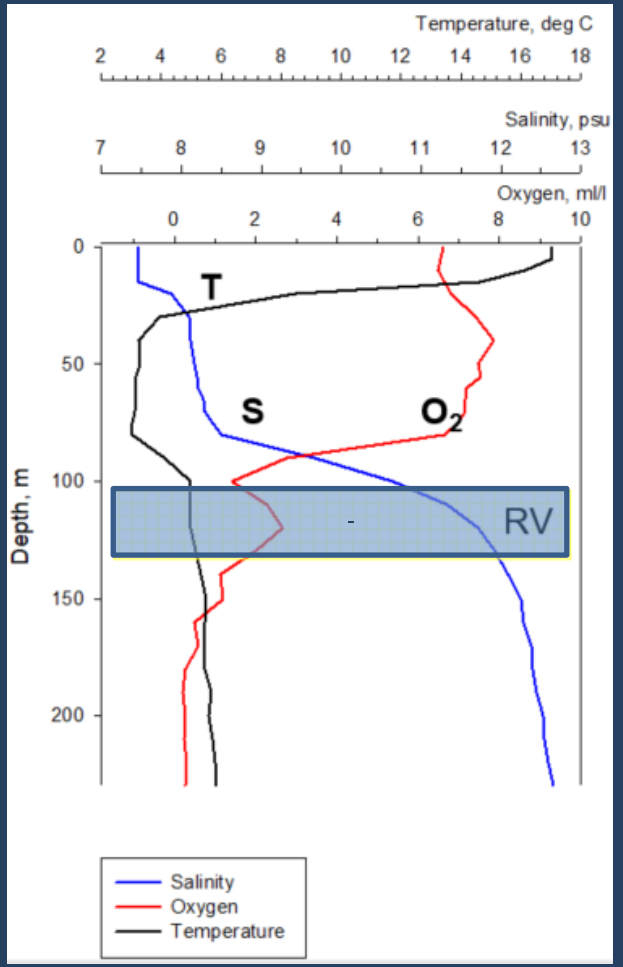
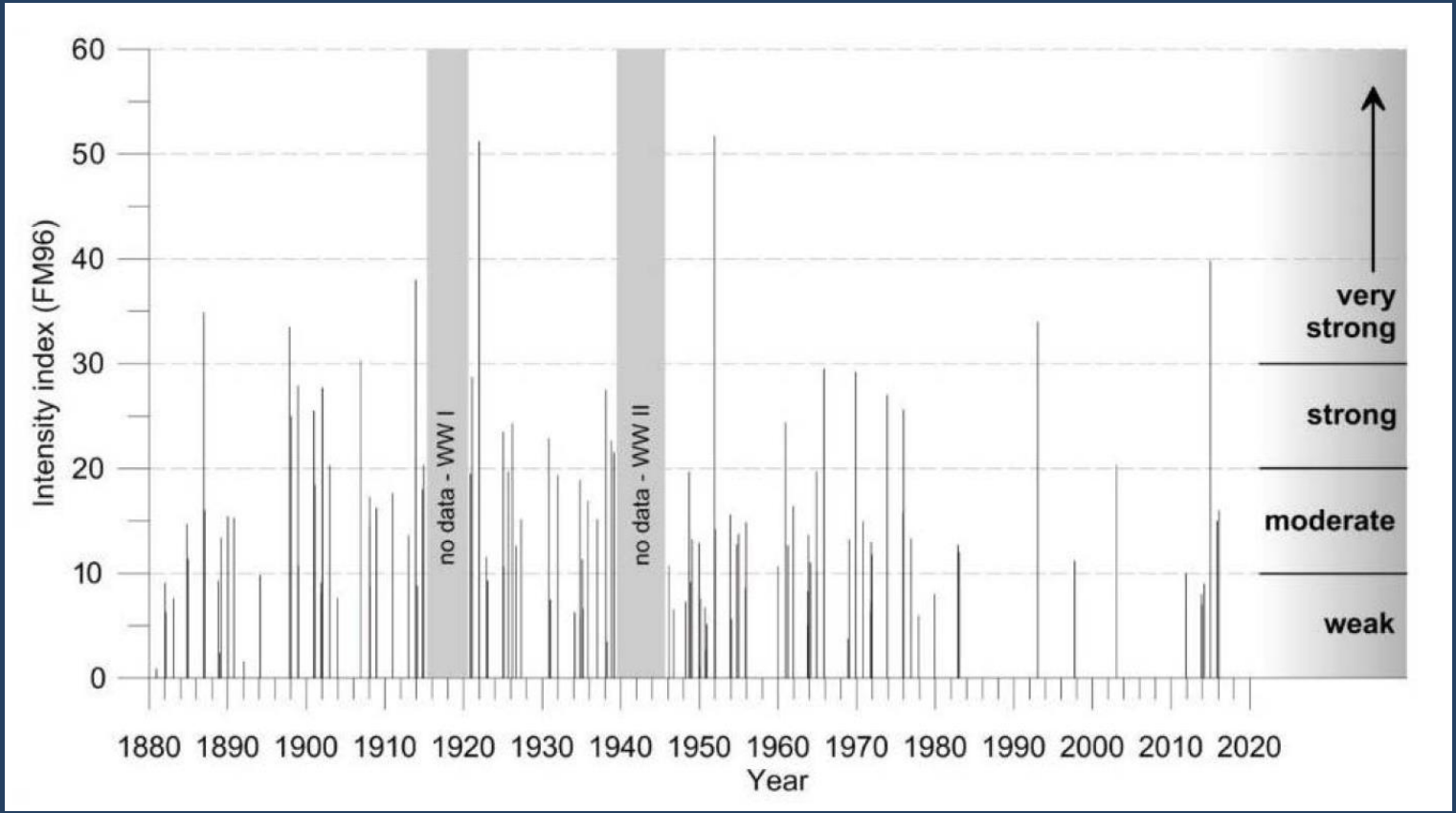
Cod reproduction volume concept

in the current form it was proposed by Plikshsa et al. (1993)

Salinity: >11psu (*Nissling, 1994*)
Oxygen: > 2 ml/l (*Wieland et al. 1994*)
Temperature: >2 °C (*Wieland et al., 1994*)

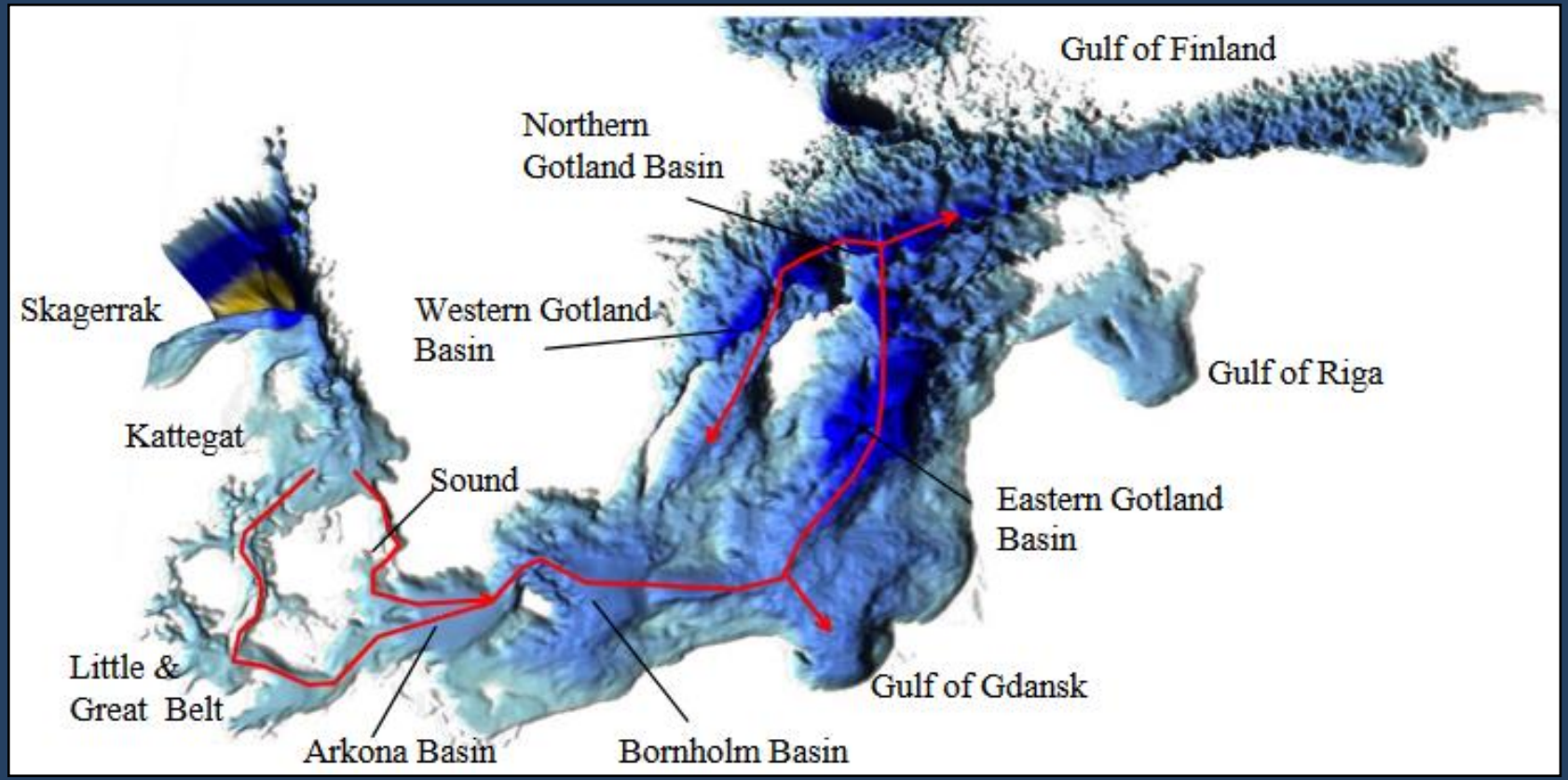


Inflow intensity



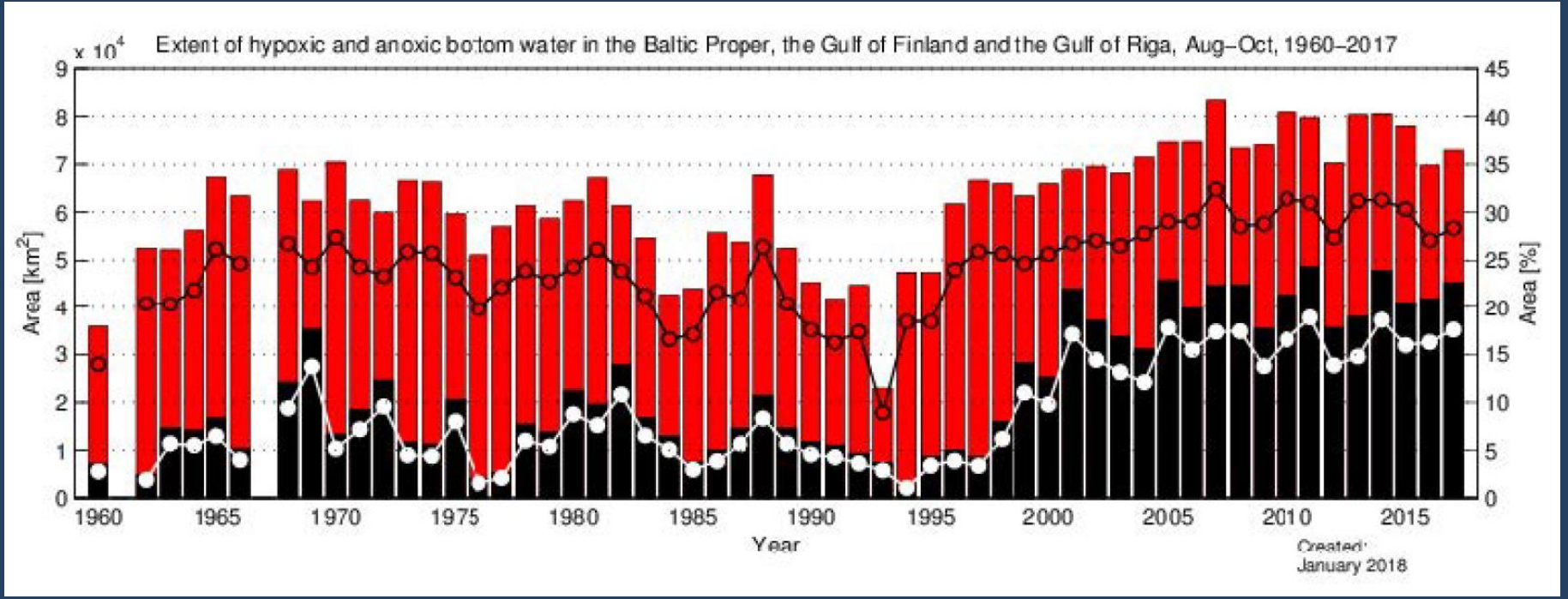
Feistel et al. (2016), Mohrholz et al. (2015)

Inflow pathways



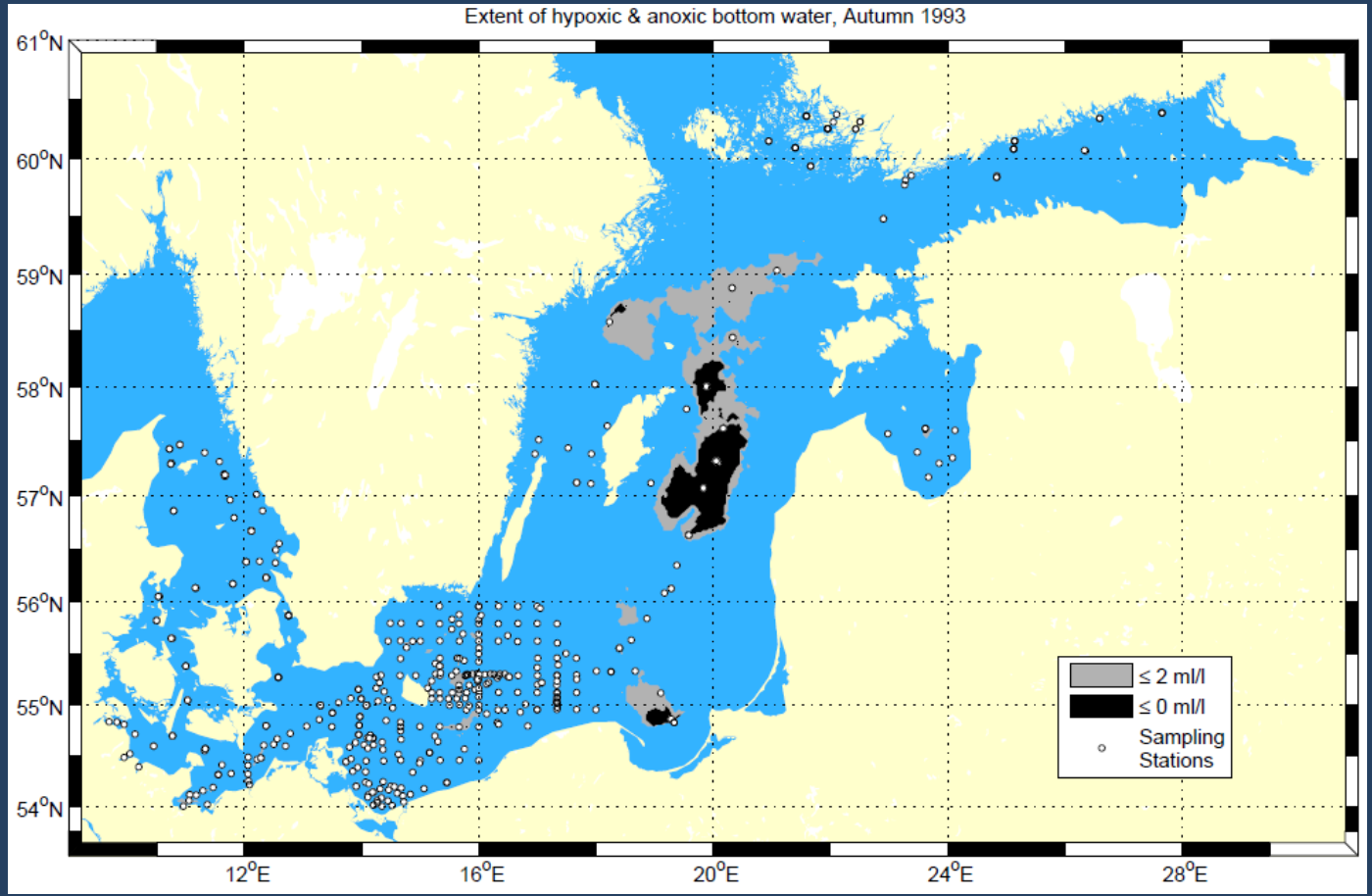
http://www.smhi.se/polopoly_fs/1.114927!/RO_58.pdf

Extent of anoxic and hypoxic conditions



Hansson et al. (2017)

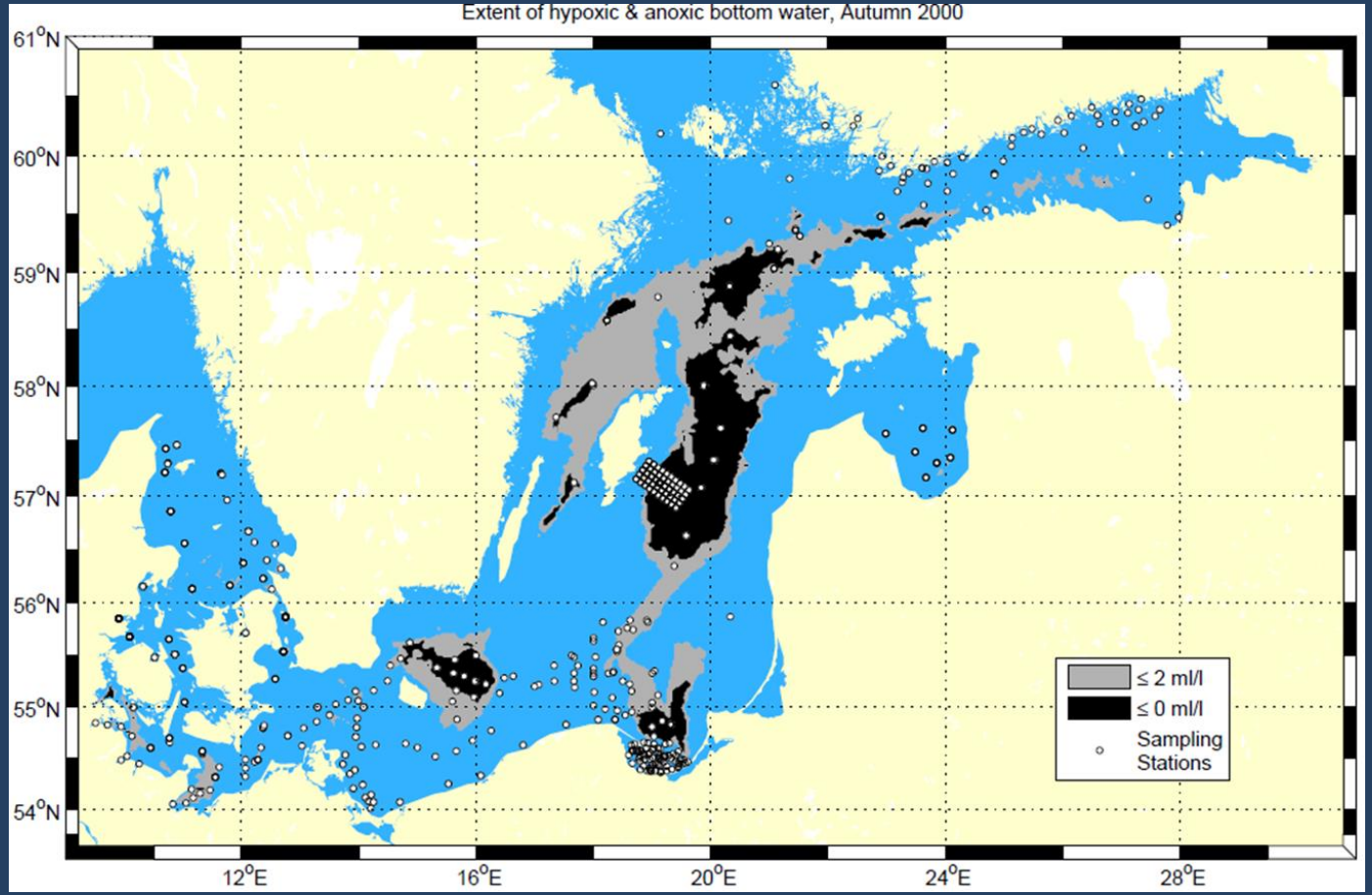
Distribution of areas with anoxic and hypoxic conditions



1993

SMHI reports

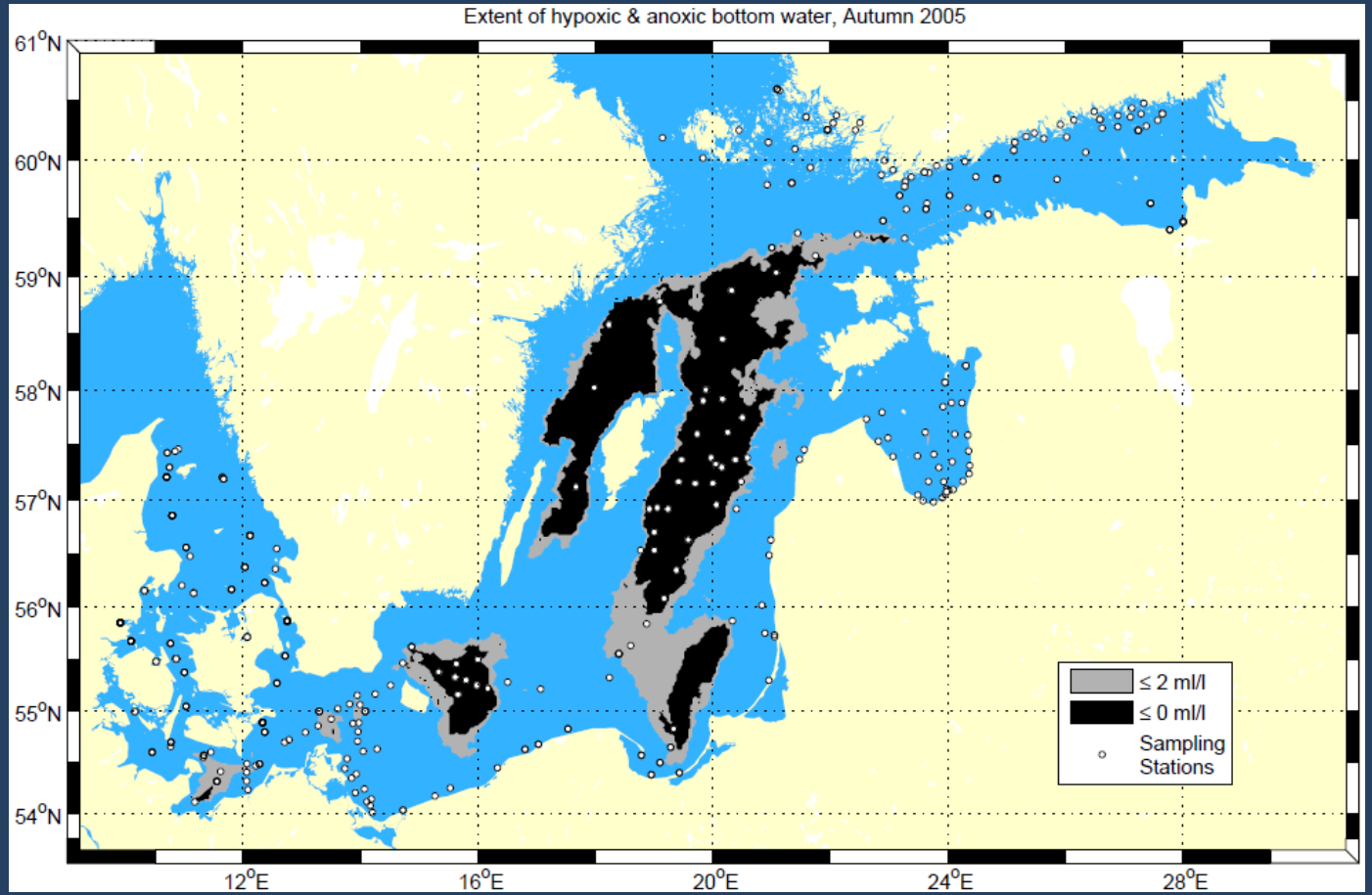
Distribution of areas with anoxic and hypoxic conditions



2000

SMHI reports

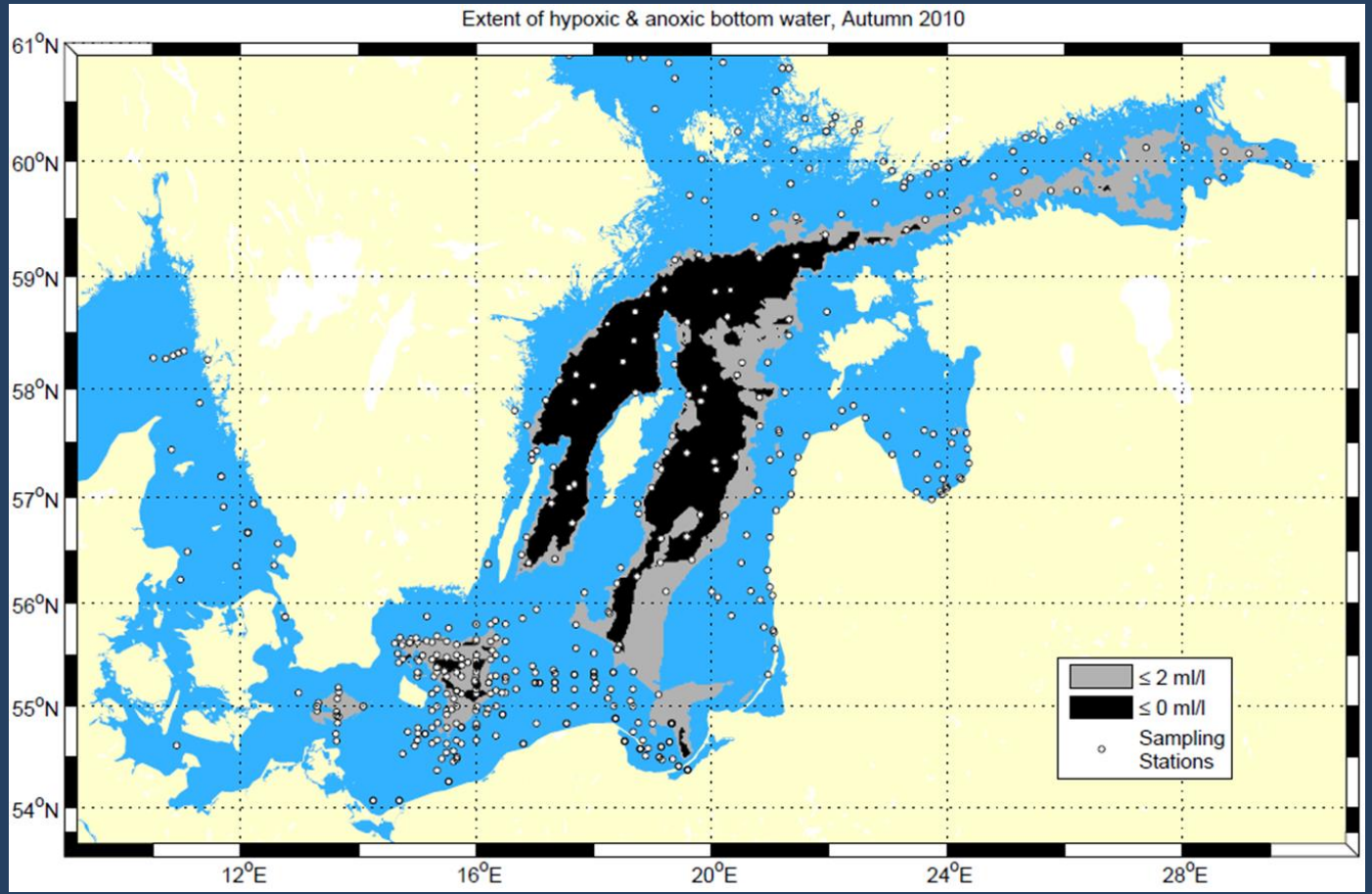
Distribution of areas with anoxic and hypoxic conditions



2005

SMHI reports

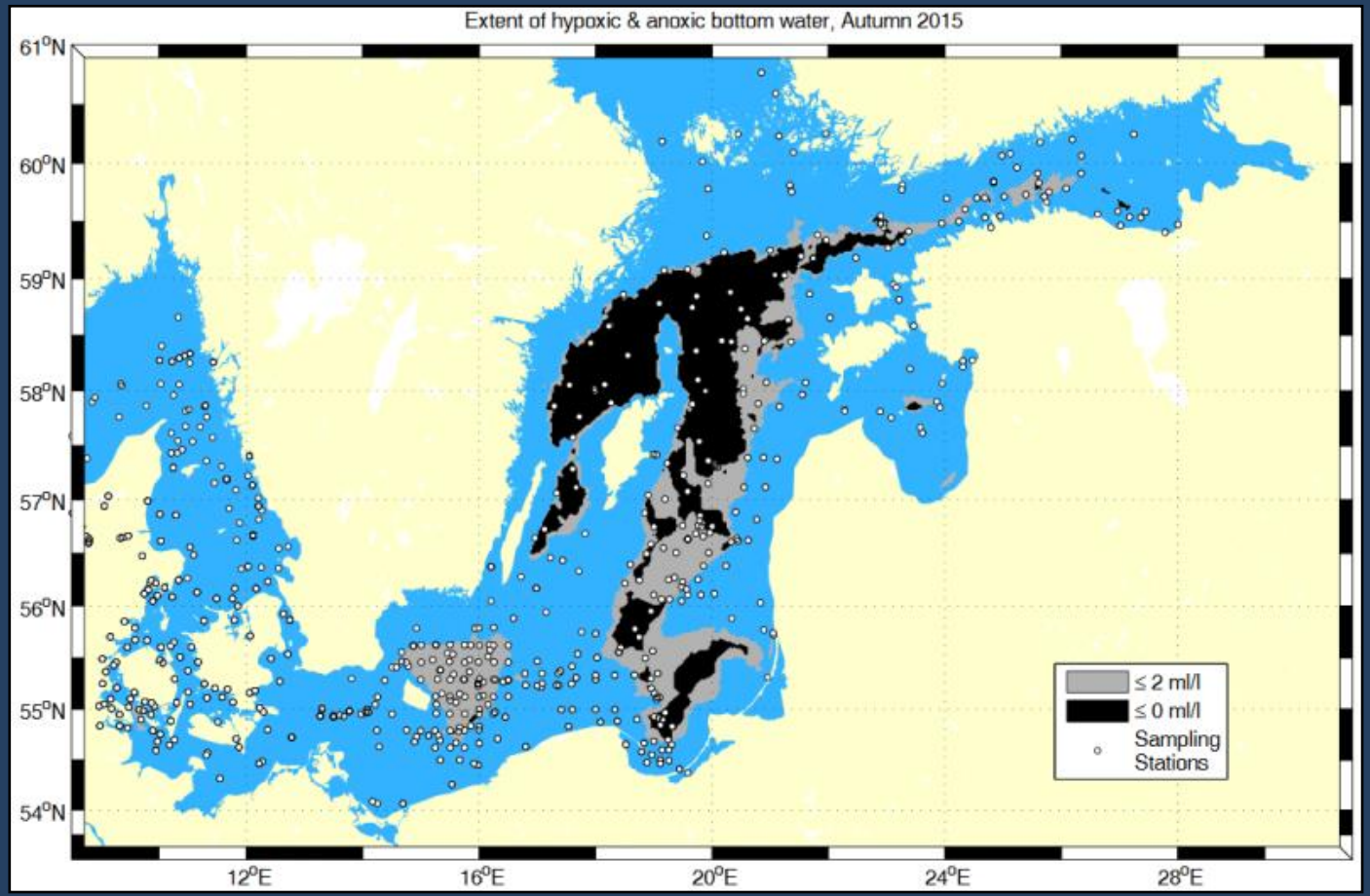
Distribution of areas with anoxic and hypoxic conditions



2010

SMHI reports

Distribution of areas with anoxic and hypoxic conditions

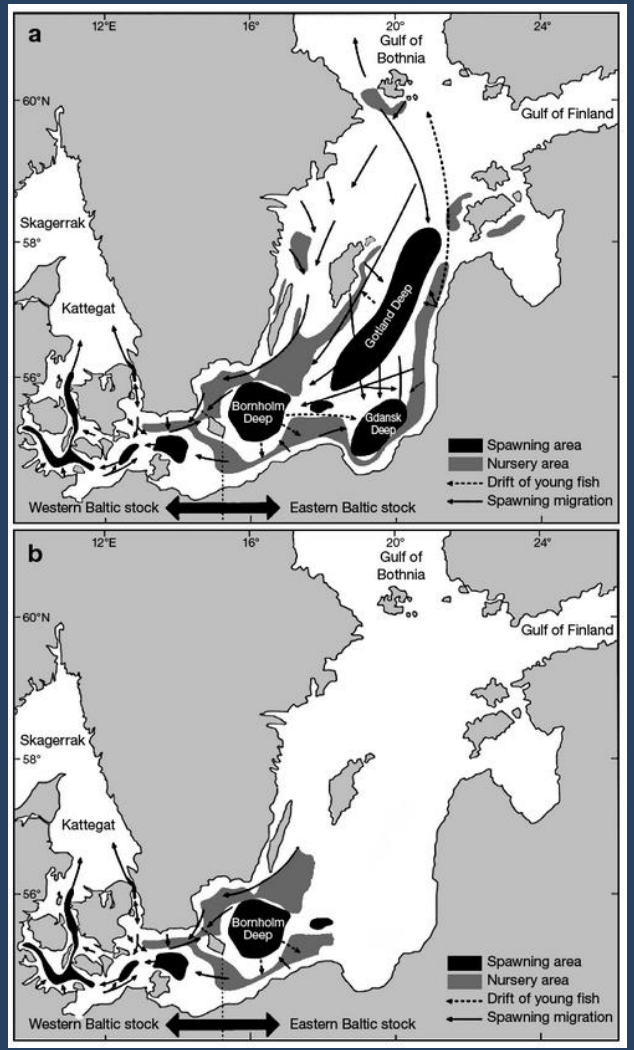


2015

SMHI reports

Areas of the Eastern cod stock reproduction

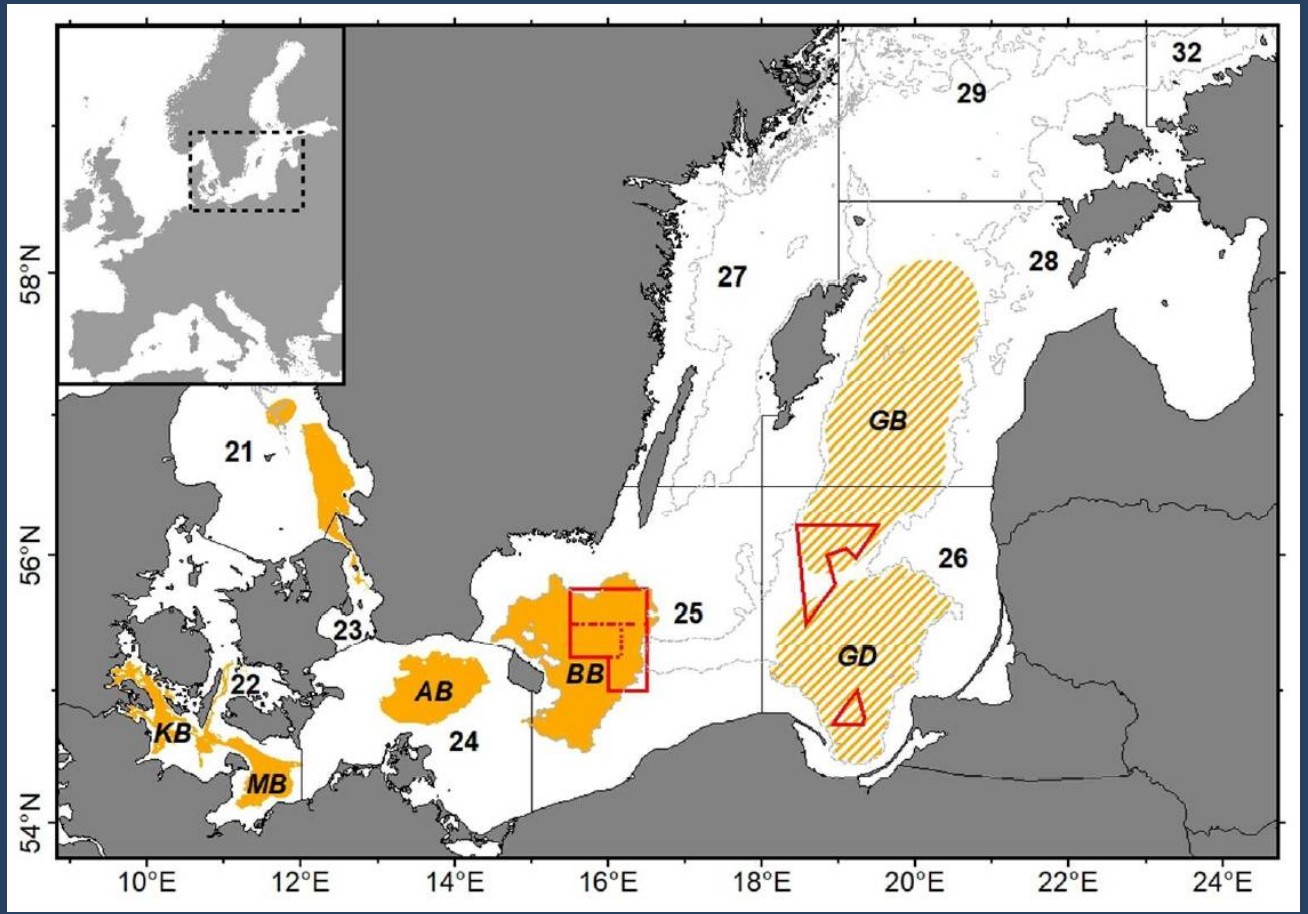
Historical (1980s) and current areas of efficient cod reproduction



Cardinale & Svedang 2011

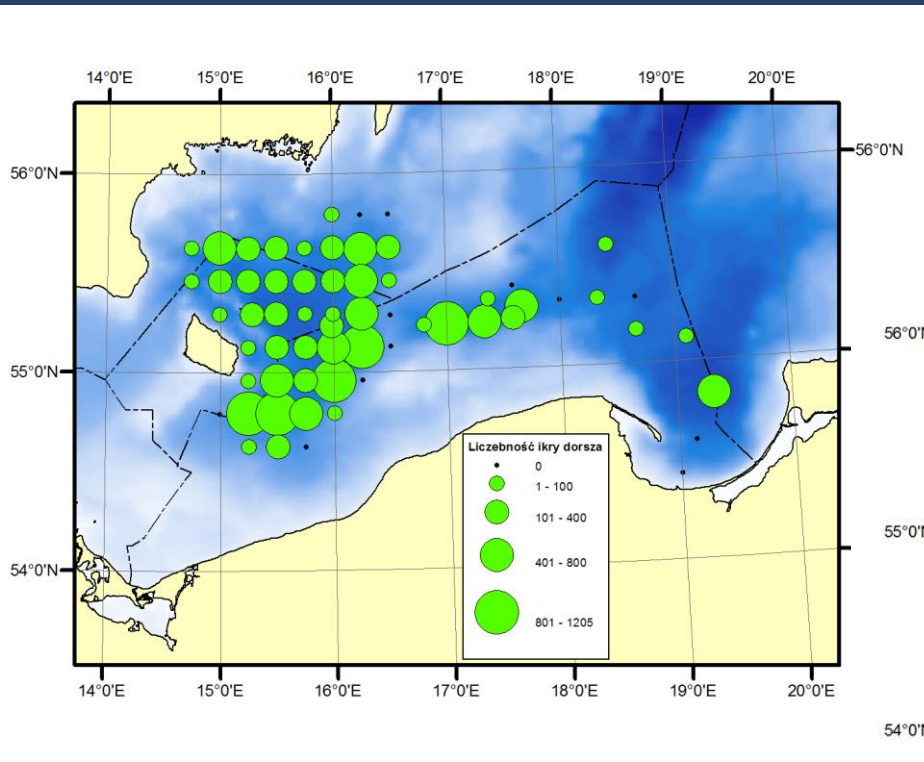
Spawning closures

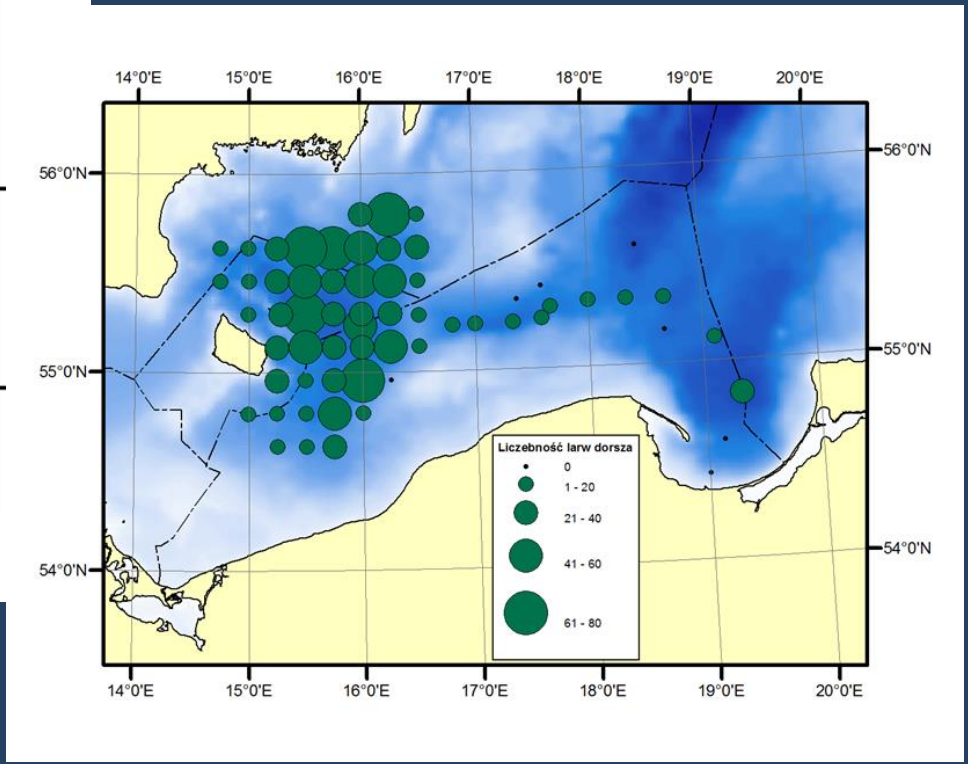
Regulation (EU) 2016/1139 of the European Parliament and of the Council of 6 July 2016 establishing a multiannual plan for the stocks of cod, herring and sprat in the Baltic Sea and the fisheries exploiting those stocks.



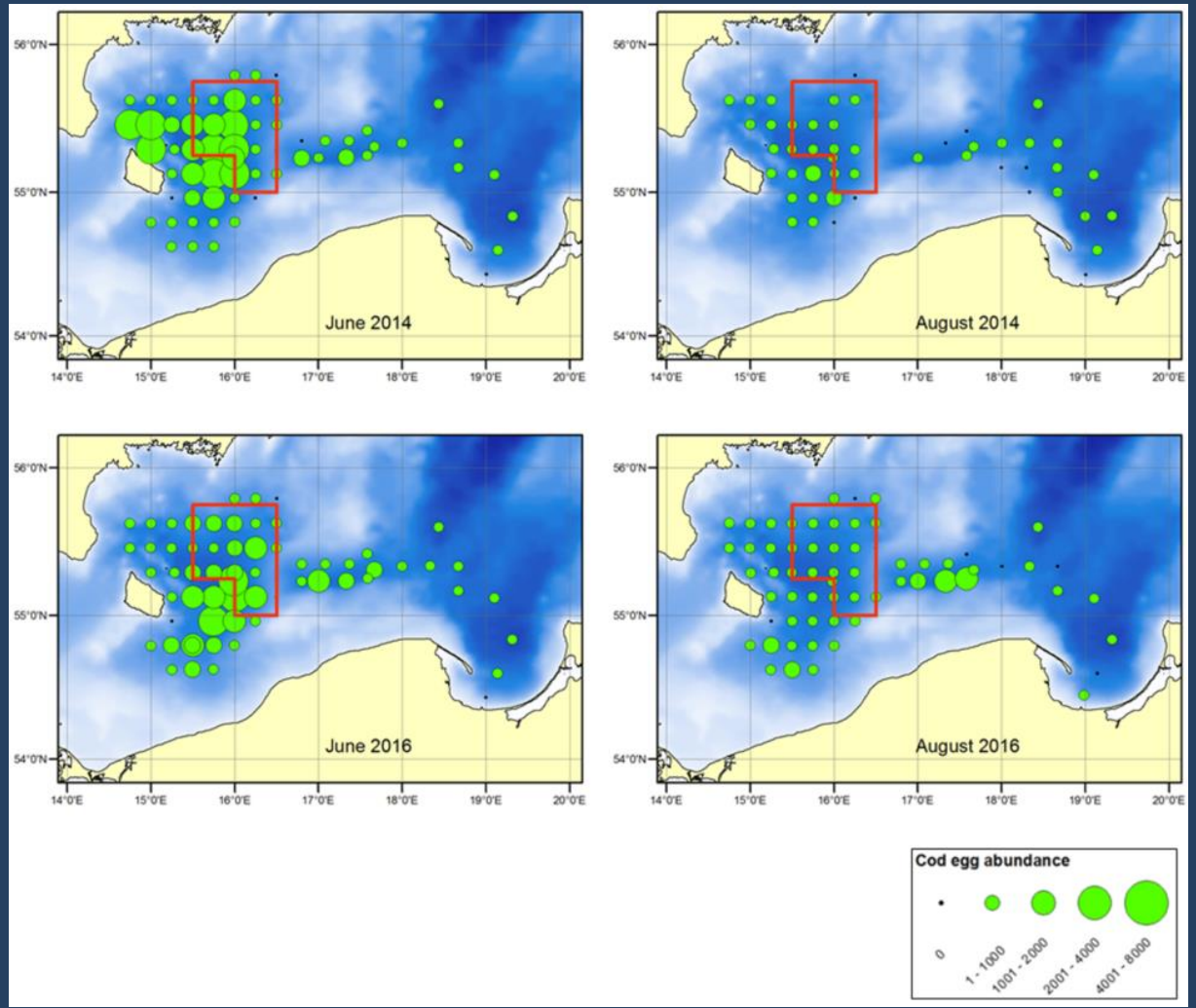
Eero et al. (in prep)

Current distribution of cod eggs and larvae (August 2017 example)



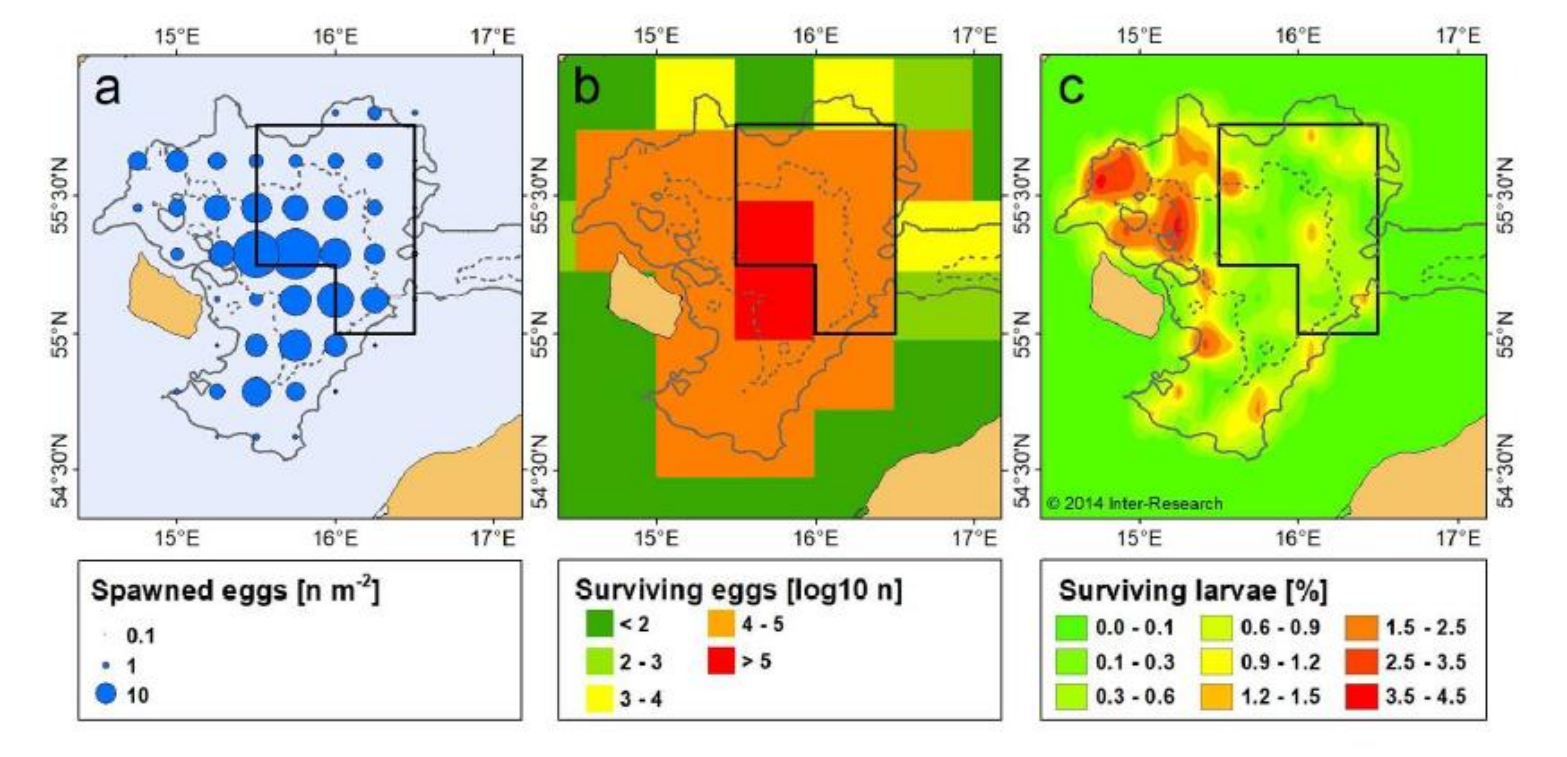


Seasonal and inter-annual variability in distribution of cod eggs (n * 1000 m^3) in selected years and months



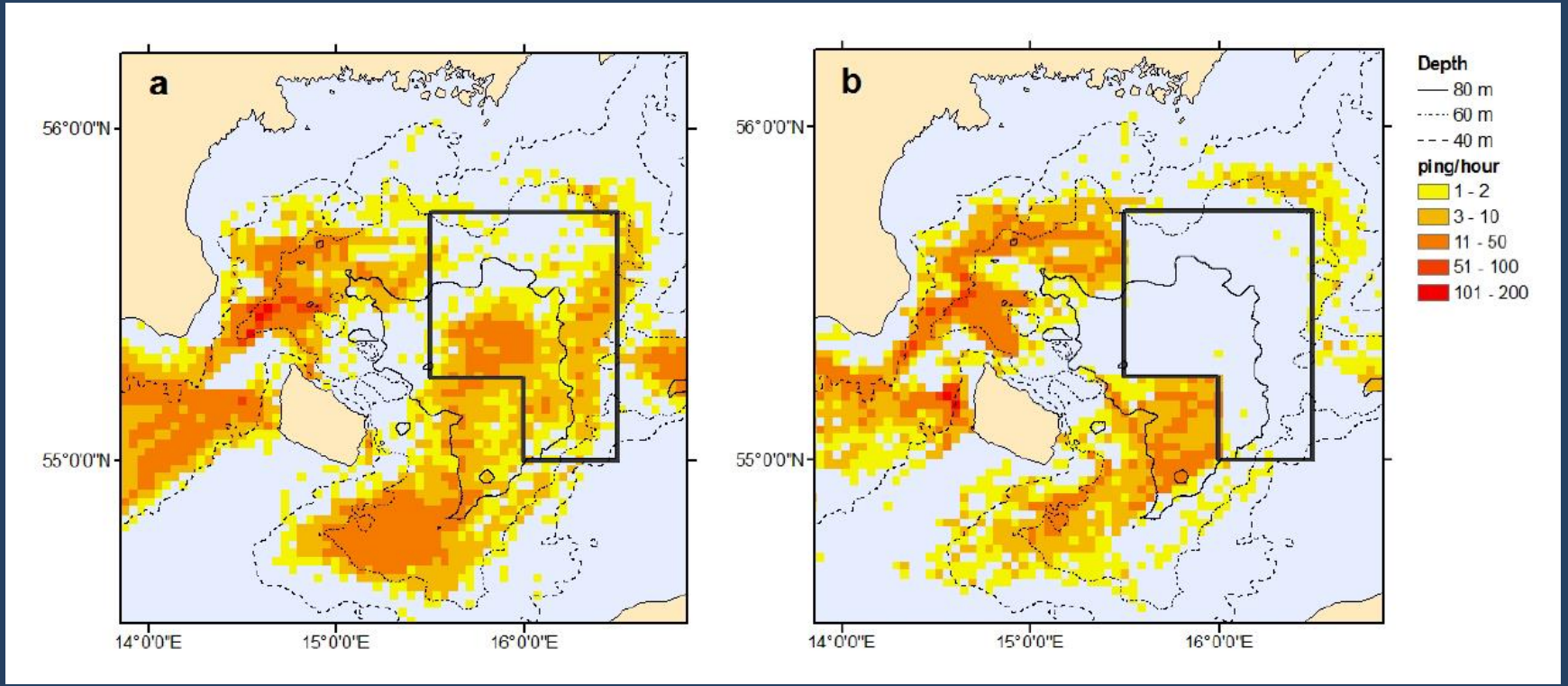
Eero et al. (in prep)

Horizontal distribution of newly spawned cod eggs, modelled spatial origin of first-feeding yolk-sac larvae, and origin of pelagic juveniles that have survived through the larval stage



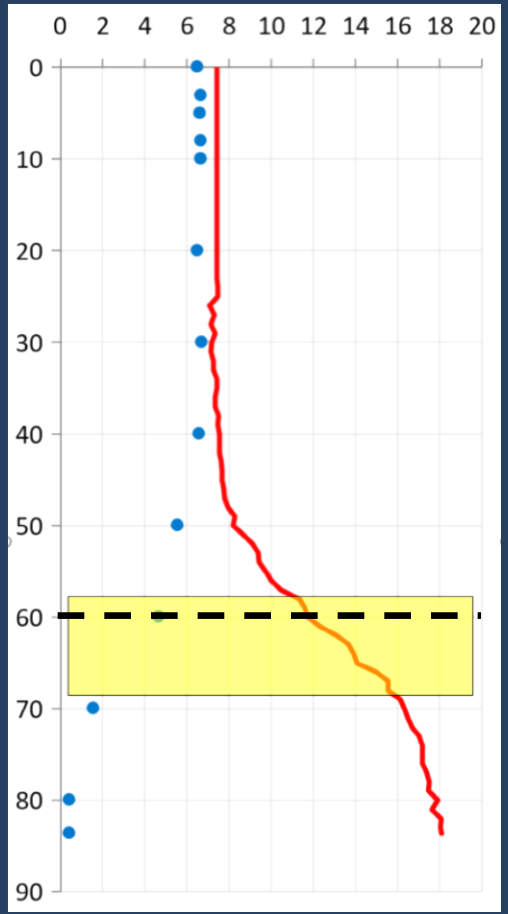
Eero et al. (in prep)

Spatial distribution of fishing effort in months without the area closure (Nov–April) and months with the area closure in force (May–Oct)

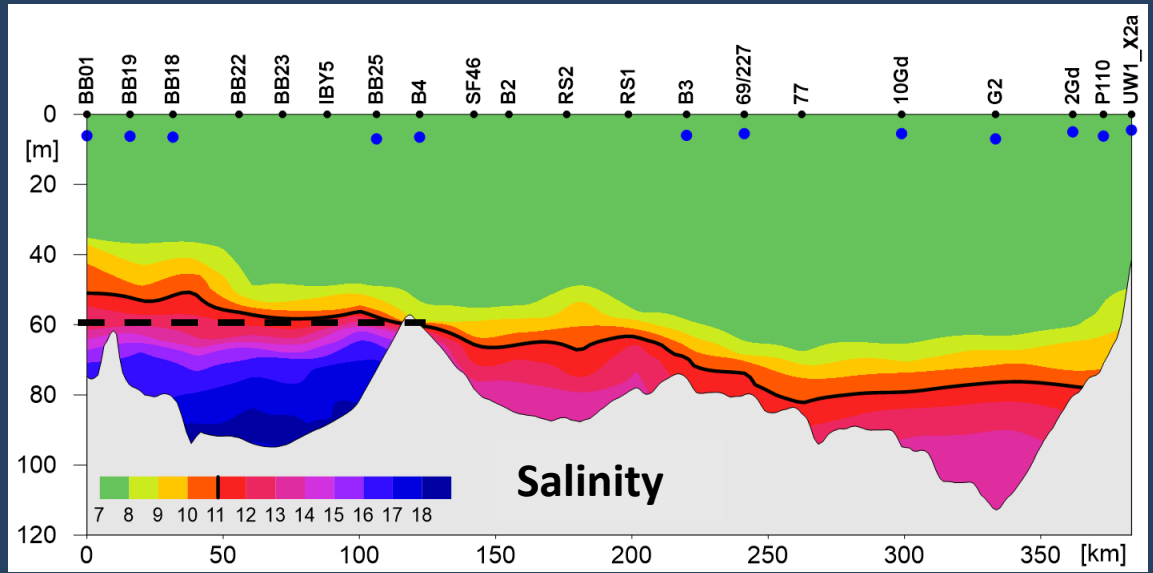


Eero et al. (in prep)

Potential correction of the existing spawning closure in the Bornholm Basin



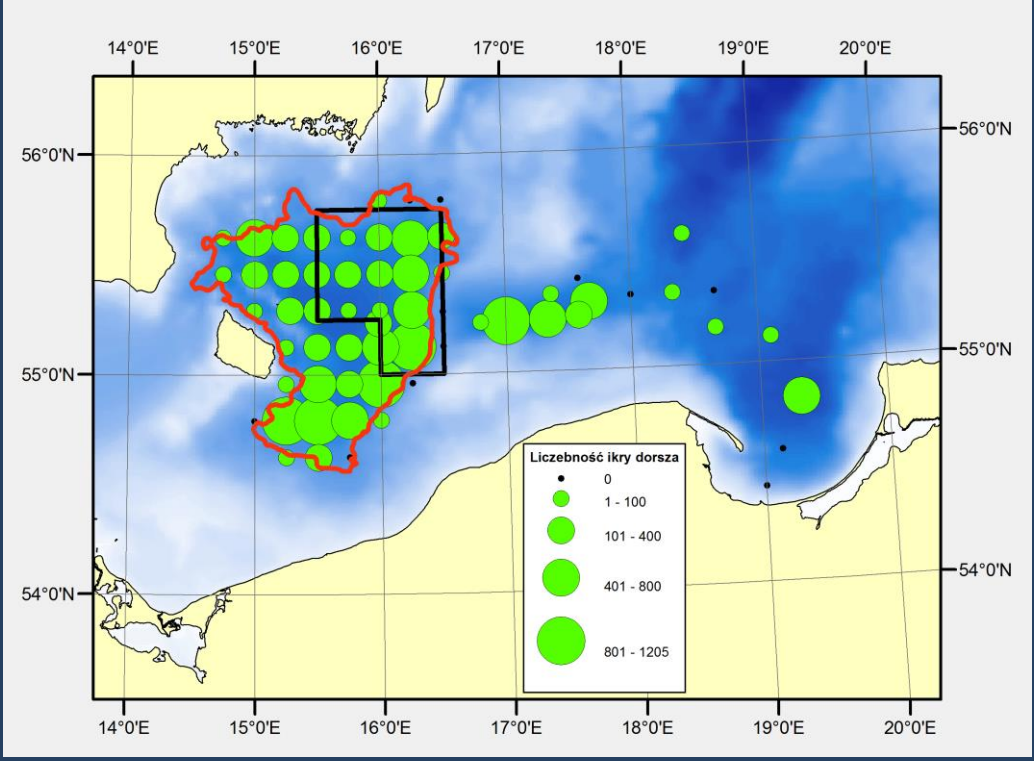
Hydrological data from the IBY-5 station located in the Bornholm Basin (August 2017 example)



Tycjan Wodzinowski (NMFRI)

P. Margoński: Areas of the Eastern Baltic cod stock efficient reproduction – measures to increase fish protection …

Potential correction of the existing spawning closure in the Bornholm Basin



A manuscript on cod spawning closures has been prepared:

„A review on knowledge and challenges associated with evaluating the effects of spawning closures on cod in the Baltic Sea”

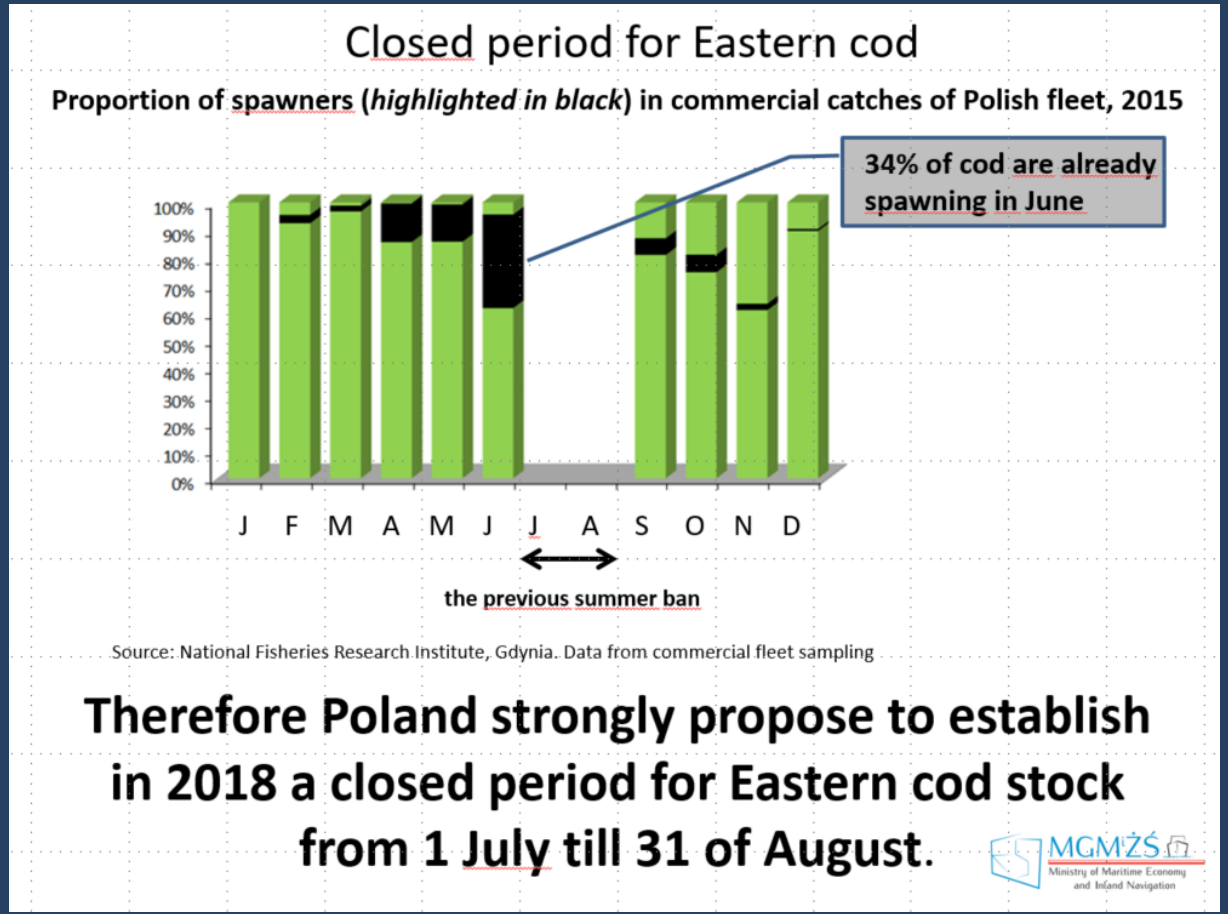
Margit Eero - Technical University of Denmark, DTU-Aqua
Hans-Harald Hinrichsen - GEOMAR Helmholtz Centre for Ocean Research Kiel,
Joakim Hjelm - Institute of Marine Research, Swedish University of Agricultural Sciences
Bastian Huwer - Technical University of Denmark, DTU-Aqua
Karin Hüssy - DTU Aqua, Population and Ecosystem Dynamics
Köster, Fritz - Technical University of Denmark, DTU-Aqua
Piotr Margoński - Morski Instytut Rybacki - Państwowy Instytut Badawczy,
Māris Plikšs - Institute of Food Safety, Animal Health and Environment,
Marie Storr-Paulsen - Technical University of Denmark, DTU-Aqua
Christopher Zimmermann - Thünen Institute of Baltic Sea Fisheries

(submitted to the Ocean and Coastal Management)

Sugestion to re-establish the closed period as proposed at the BALTFISH HLG 2017

Successful for 2018

Slide from the presentation Poland provided during the BALTFISH HLG in Luxembourg (8.10.2017)



Polish Ministry of Maritime Economy and Inland Navigation requested ICES for a review of the effectiveness of the conservation measures currently in place, in particular the conservation areas and periods, for the recovery of the cod stock in the Baltic Sea

1. A draft document describing the information available and knowledge gaps (30 June)
2. WebEx in early July 2018 to agree on the main issues to be covered at the workshop.
3. 2-day workshop to review and compile the available material and shape the draft advice (14-15 August).
4. Review Group (30-31 August)
5. Advice Drafting group by correspondence (13-14 September)
6. WCWIDE (21 September)
7. Release of advice on the 28 September

Summary:

1. Environmental conditions controlling the EB cod successful spawning are deteriorating (low frequency of saline-water inflows is supporting the increasing extension of anoxic and hypoxic conditions)
2. Currently the efficient EB cod stock spawning is observed in the Bornholm Basin only (a limited spawning in more eastern parts is unable to influence the cod recruitment)
3. Thus, protection of fish during spawning appears to be one of very few realistic and potentially efficient measures
   - It has to be considered that the existing spawning closure in the Bornholm Basin, in certain circumstances, might be even counterproductive.
   - Its extension to 60m isobath would remove most of its current limitations.
   - Until it is implemented, our priority to release the fishing pressure on spawning fish should focus on re-establishing of the closed period from July, 1st to August, 31st)