

# 2.2. Resource depletion

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1. Possible effects of prey depletion; harbour porpoises in the Baltic
2. Prey depletion in the ASCOBANS area
3. National reports (summary, presentations by Parties)
4. Discussion and recommendations

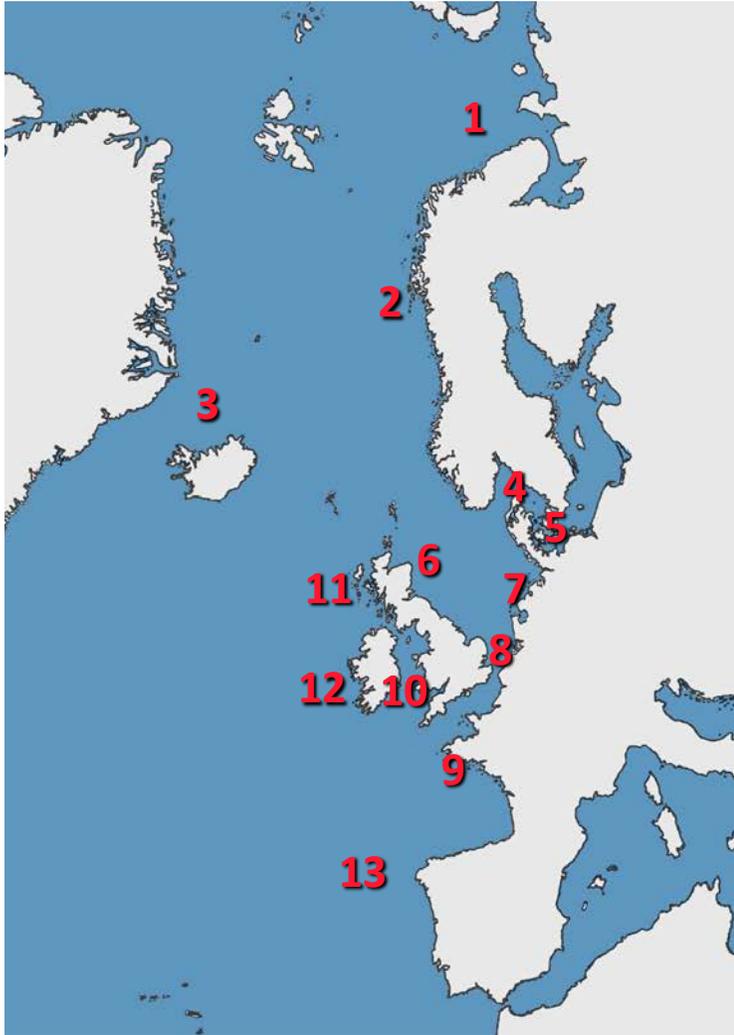
2.2.1. Analysis of national reporting data

2.2.2. Prey depletion & changes in prey quality

2.2.3. Discussion & recommendations



# 1a. Geographic Variation in Harbour Porpoise Diet



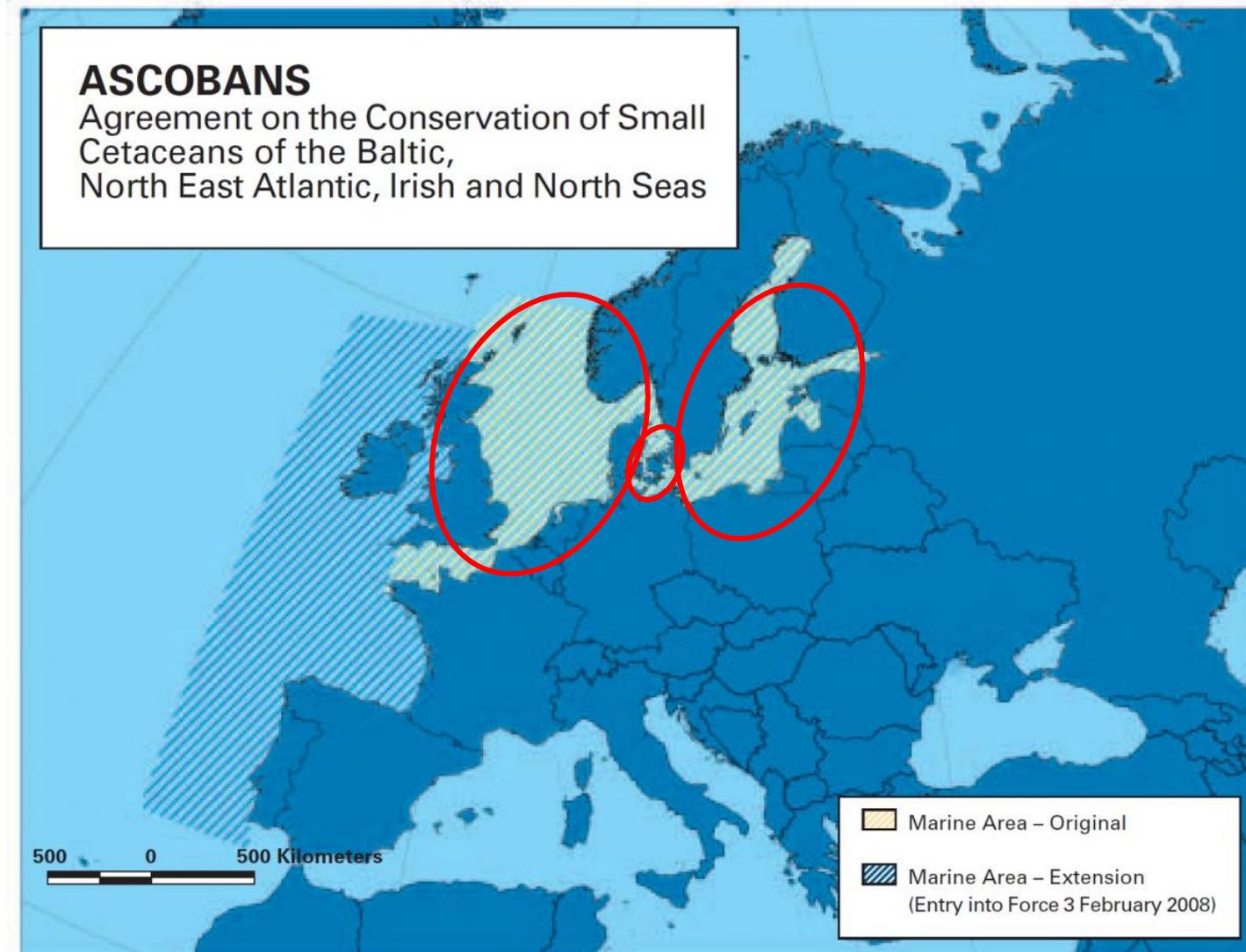
## Principal Prey Species

- 1 Capelin, herring
- 2 Herring, gadoids
- 3 Capelin, Atlantic cod, sandeels
- 4 Herring, cod, whiting
- 5 Cod, herring, whiting, gobies, hagfish, *Trisopterus*, saithe
- 6 Sandeels, whiting, *Trisopterus*
- 7 Sole, cod, sandeels
- 8 Whiting, sandeels, sprat, herring, gobies, smelts
- 9 Blue whiting, scad, hake, sardine
- 10 Sprat, whiting
- 11 Sprat, whiting
- 12 Whiting, herring, *Trisopterus*
- 13 *Trisopterus*, Blue whiting, scad, silvery pout, gobies, sandeels

(Desportes, 1985; Lick, 1991; Aarefjord et al., 1995; Benke & Siebert, 1996; Rogan & Berrow, 1996; Martin, 1996; Berggren, 1996; Santos, 1998; Borjesson et al. 2003; Santos & Pierce, 2003; Santos et al. 2004, Spitz et al. 2006; Read et al. 2012; Sveegard et al. 2012; Koponen, 2013; Schelling et al., 2014; Leopold et al., 2015; Ross et al., 2016; Andreasen et al., 2017; Mafouz et al. 2017)

# 1b. Harbour porpoise in the Baltic: introduction

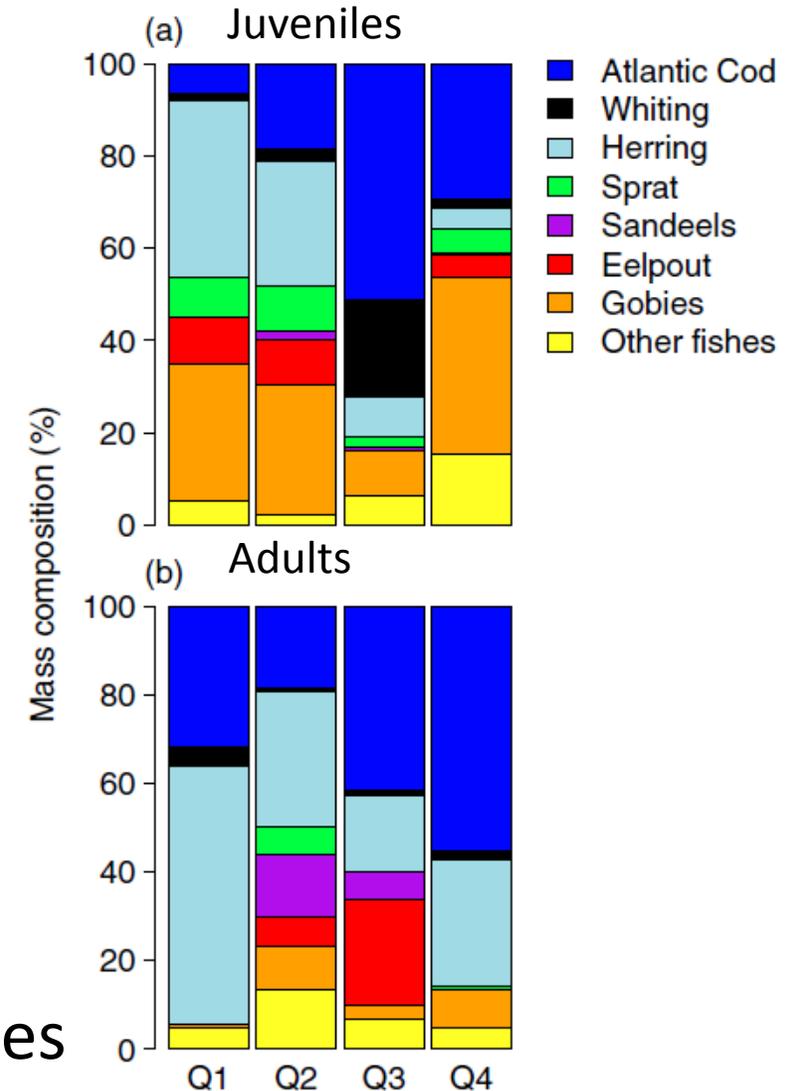
- 3 populations: North Sea, Belt Sea, Baltic Sea
- Morphometric adaptations to different habitats => differences in prey preferences
- Biology of porpoises: small size in cold water => high energy demands => daily consumption approx. 3-4 kg.



# Harbour porpoise prey preferences

- A known opportunistic forager, however....
- Andreassen et al 2017: N=339, 1980–2011, Western Baltic Sea. Quarterly prey mass composition (%) in the diet of harbor porpoises  
➔ Adults: cod & herring, Juveniles: cod fish & gobies
- Börgesson & Berggren 2003: N=112, 1989-96, Kattegat/Skagerrak: Herring, cod-fish, hagfish
- Andreassen 2009: North Sea: cod, whiting, sandeel, goby
- Wisniewska et al 2016: tagging suggested shift to smaller species in the Belt Sea

Summary: Cod, whiting, herring, sprat, sandeel, gobies



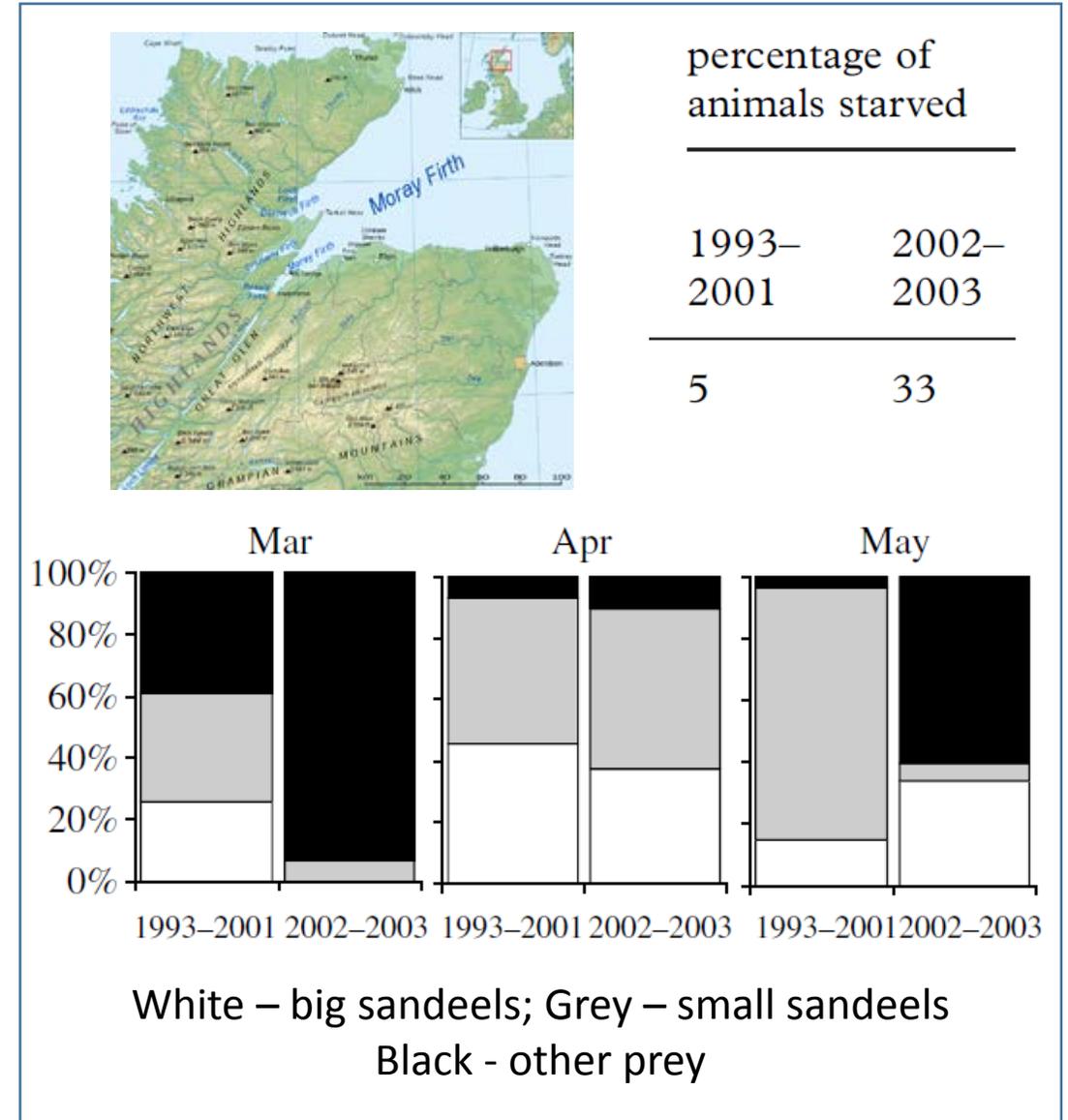
# Effects of prey depletion

## Cause of prey depletion and change in prey quality:

- Over-fishing
- Climate change
- Pollution

## Possible effects:

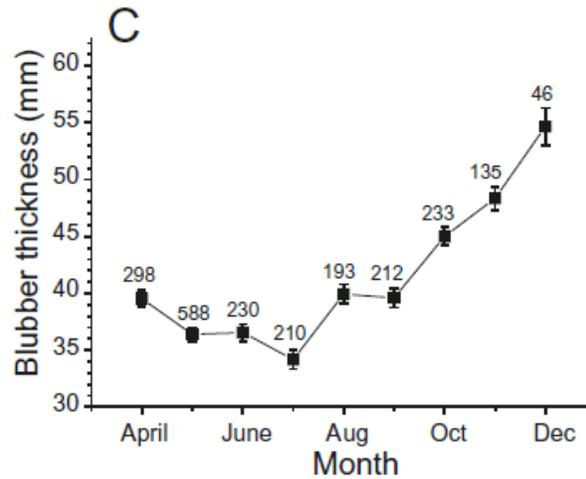
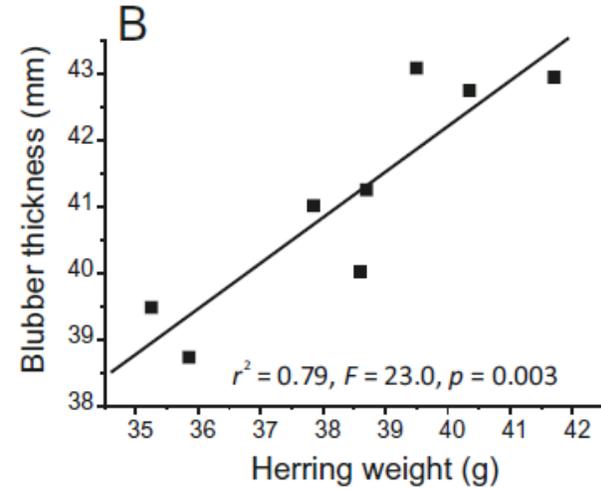
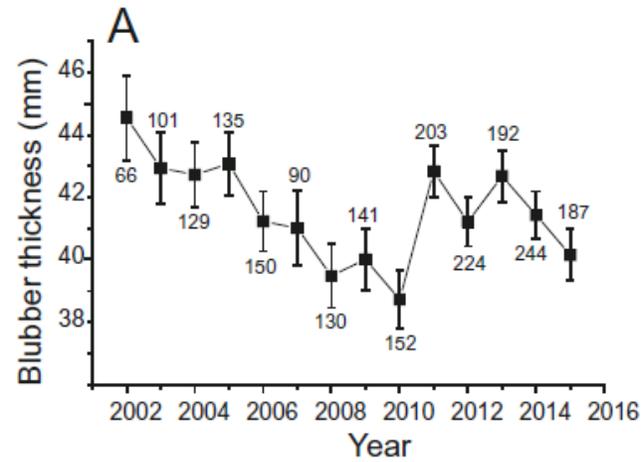
- Starvation (e.g. MacLeod et al 2007)
- Thinner blubber layer (insulation / energy storage)
  - => lower fitness
  - => lower reproduction
- Blood parameters (Thompson et al. 1997, seals)



# Effects of prey depletion

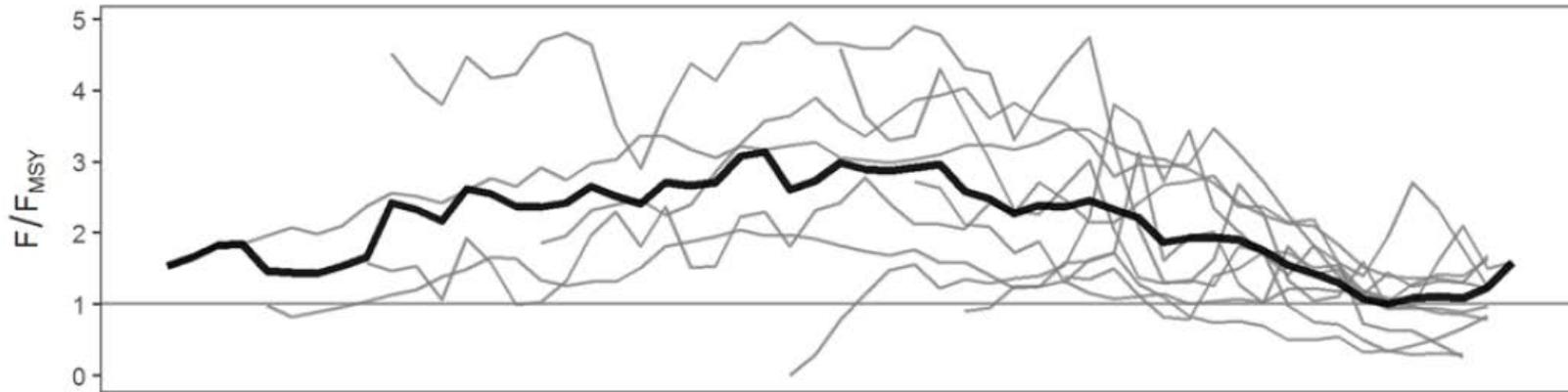
Kauhala et al. (2017): correlation between decreased blubber thickness of Baltic grey seals and increased herring catches (and reduced herring weight).

=> Impact of prey quality



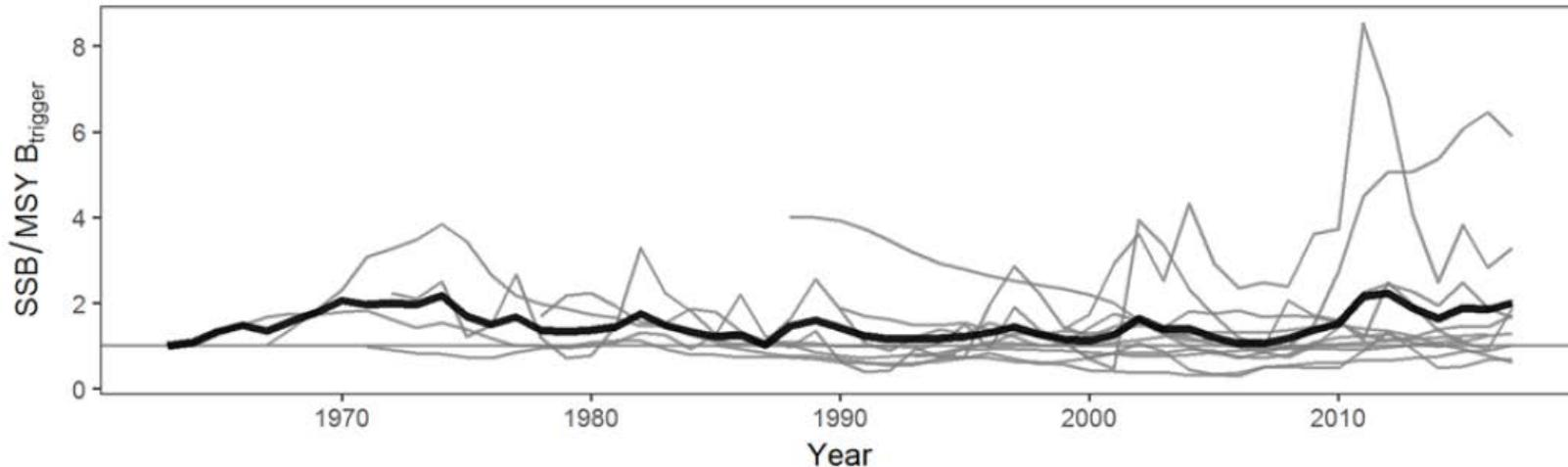
## 2. ICES: Status of demersal species in Greater North Sea (Dec 2017)

Fishing effort



Slightly high?

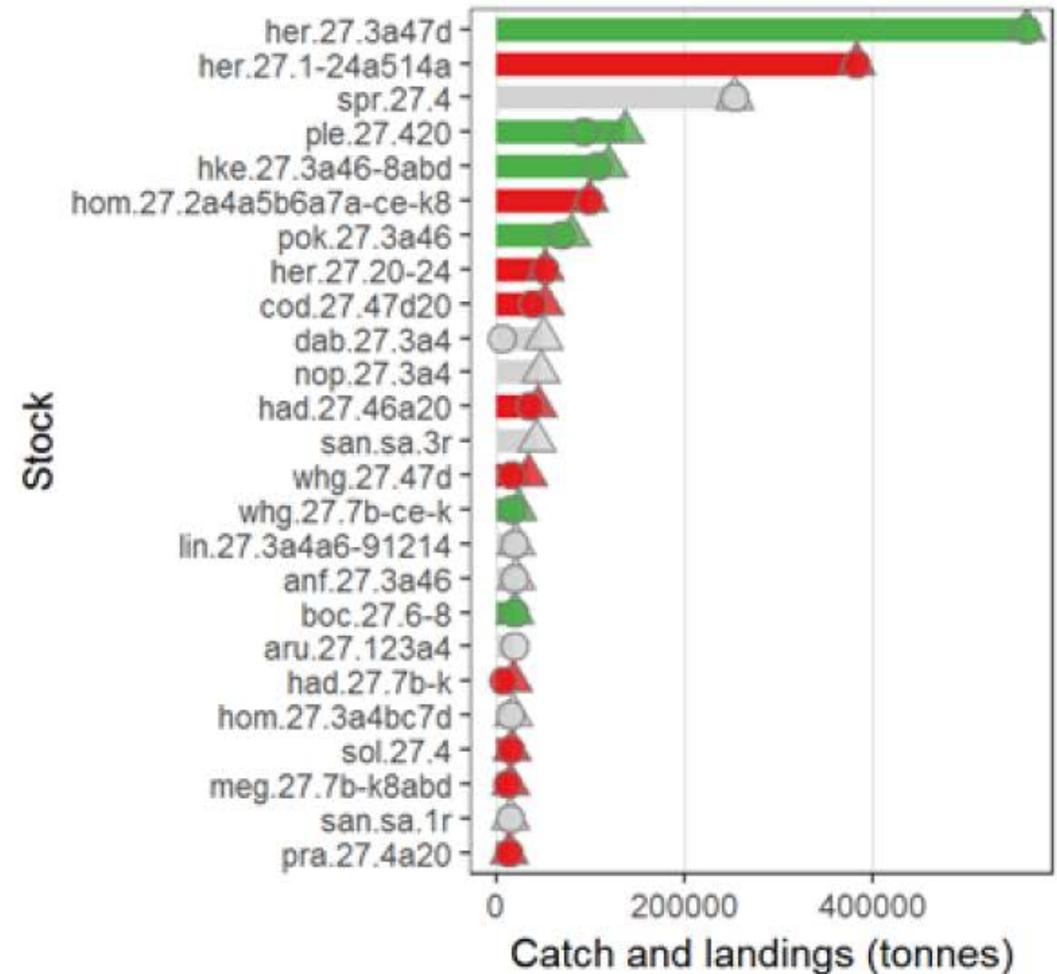
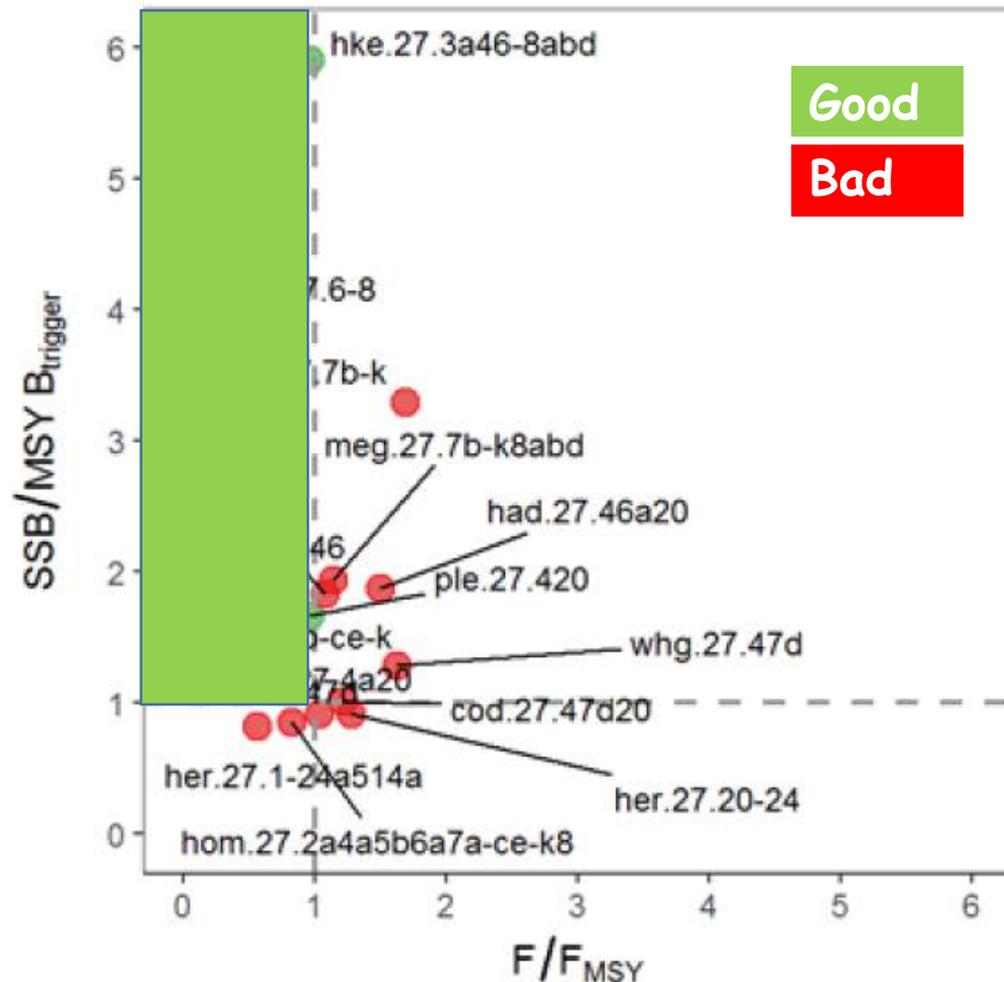
SSB



On average, OK

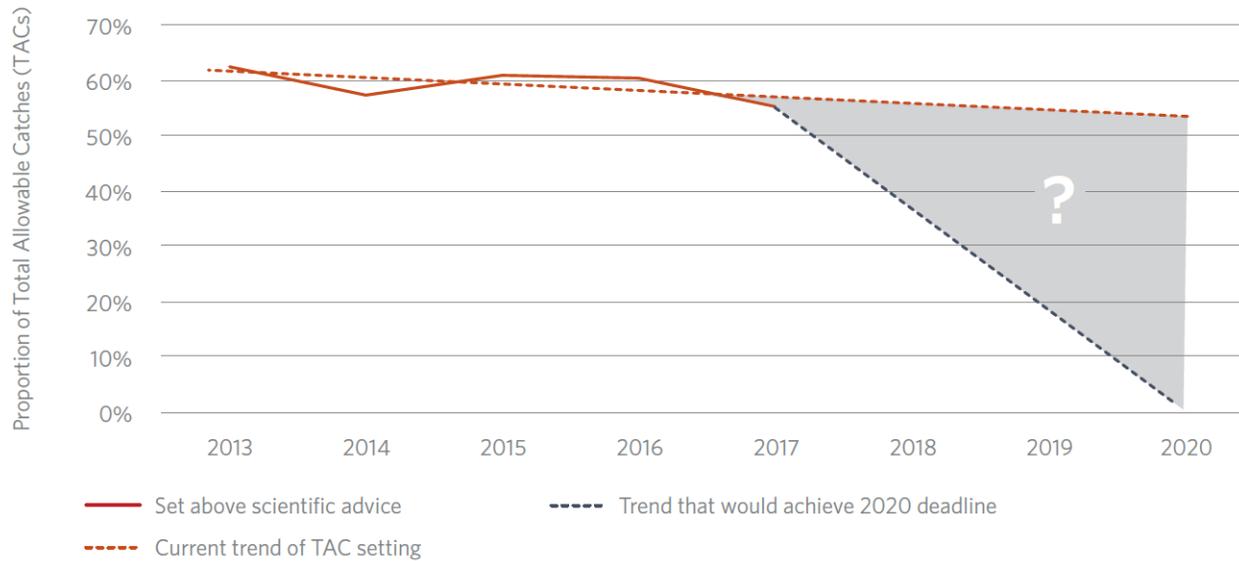
Biomass developed over time of **demersal stocks with defined reference points** (i.e., data rich stocks) and excludes plaice, sole, anglerfish, megrim and Nephrops. Each grey line corresponds to a stock and **the black line is the average of all stocks**. The  $MSY B_{trigger}$  is the reference value for the biomass according to the Maximum Sustainable Yield (MSY), meaning that a "sustainable stock" should have the SSB above that value [also the fishing mortality below / at the  $F_{MSY}$ ].

# ICES: current status of all stocks in Greater North Sea (Dec 2017) (includes pelagic, benthic (flatfish) and crustaceans too)



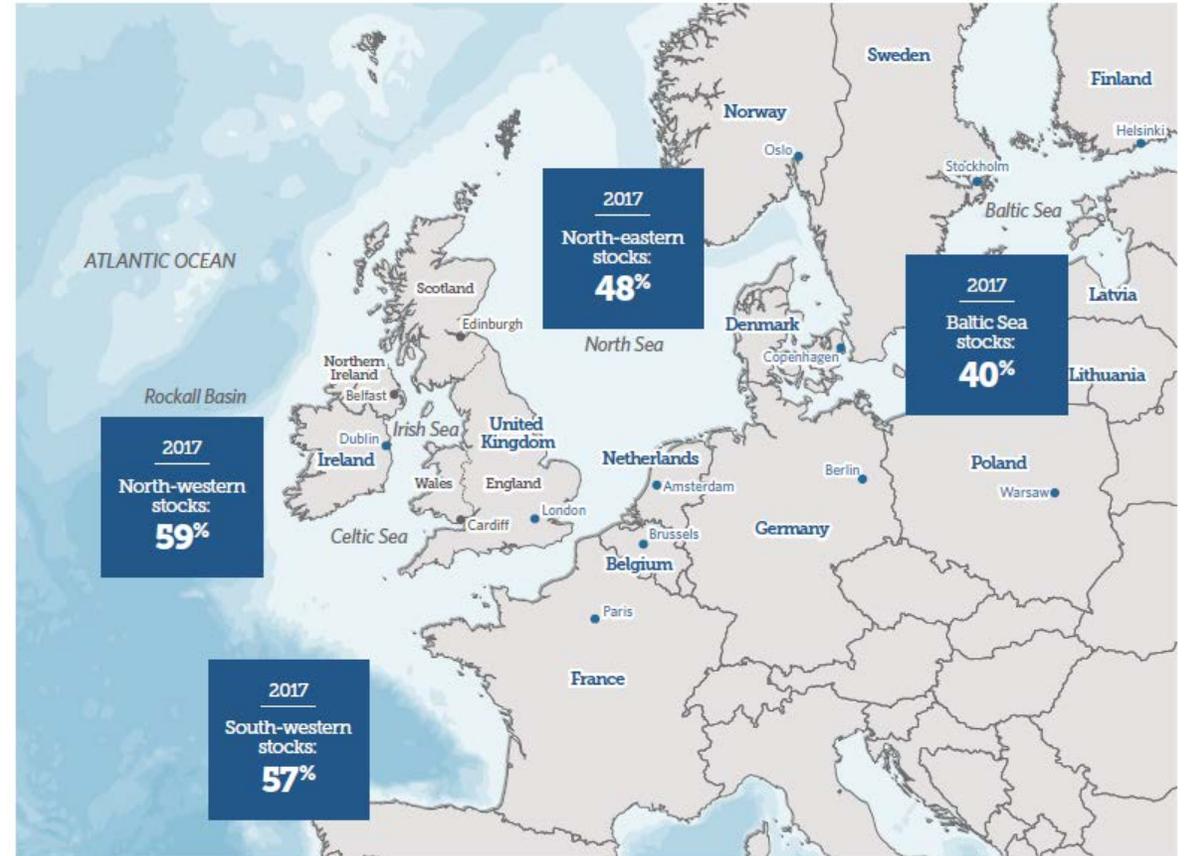
ICES Stock Assessment Database, 2017/December. ICES, Copenhagen

Figure 1  
 Majority of EU Catch Limits Set Above Scientific Advice, 2013–17  
 Faster progress needed to meet 2020 deadline



**Pew Trusts Report, 2018:**  
 Catch limits set above advice

Figure 2  
 Large Percentages of European Fishing Limits Set Above Sustainable Levels  
 More than half of limits for north-western and south-western stocks exceed scientific advice



Source: *Taking Stock* report  
 © 2018 The Pew Charitable Trusts

# MSFD monitoring of GES (2017)

Figure 1. Status of fish and shellfish stocks in regional seas around Europe

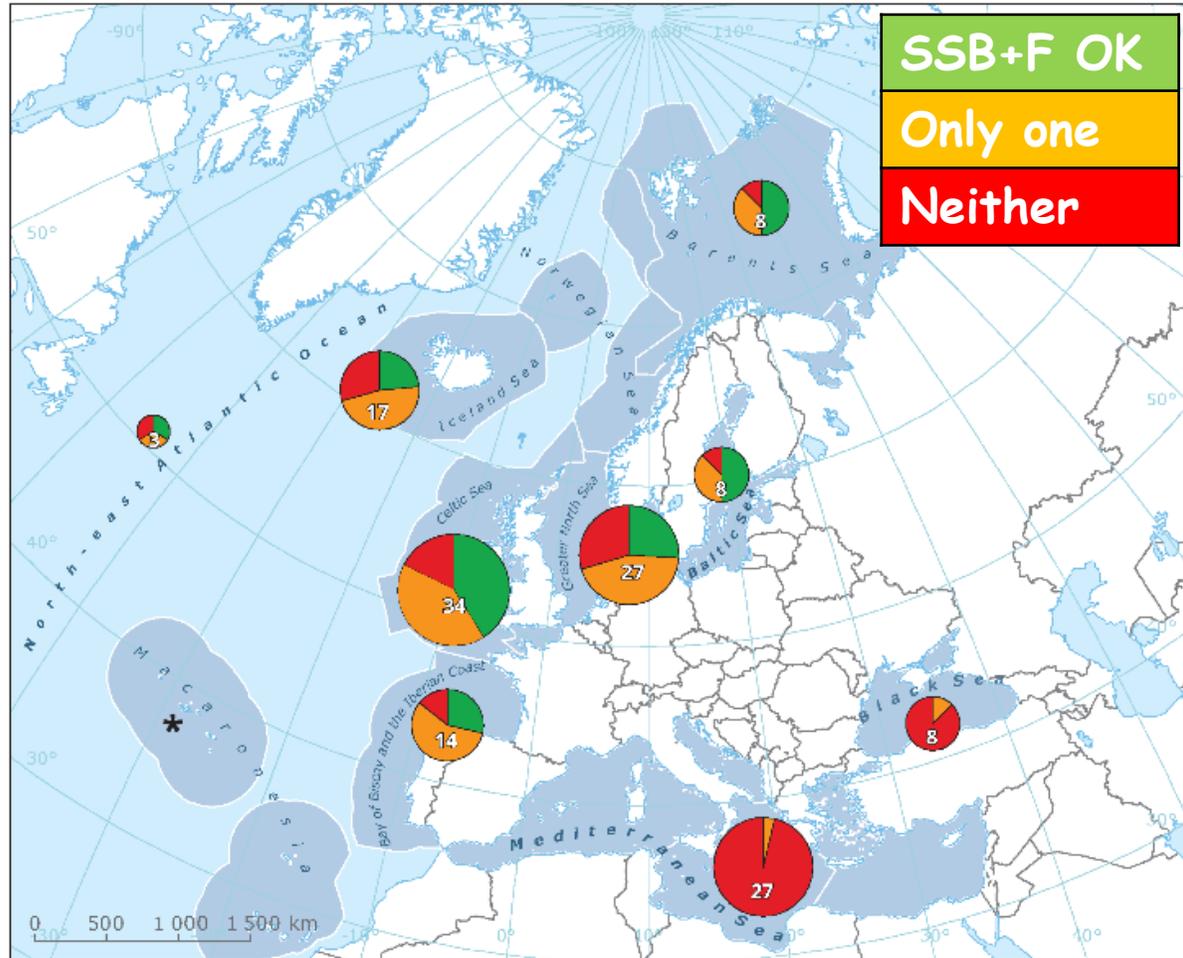
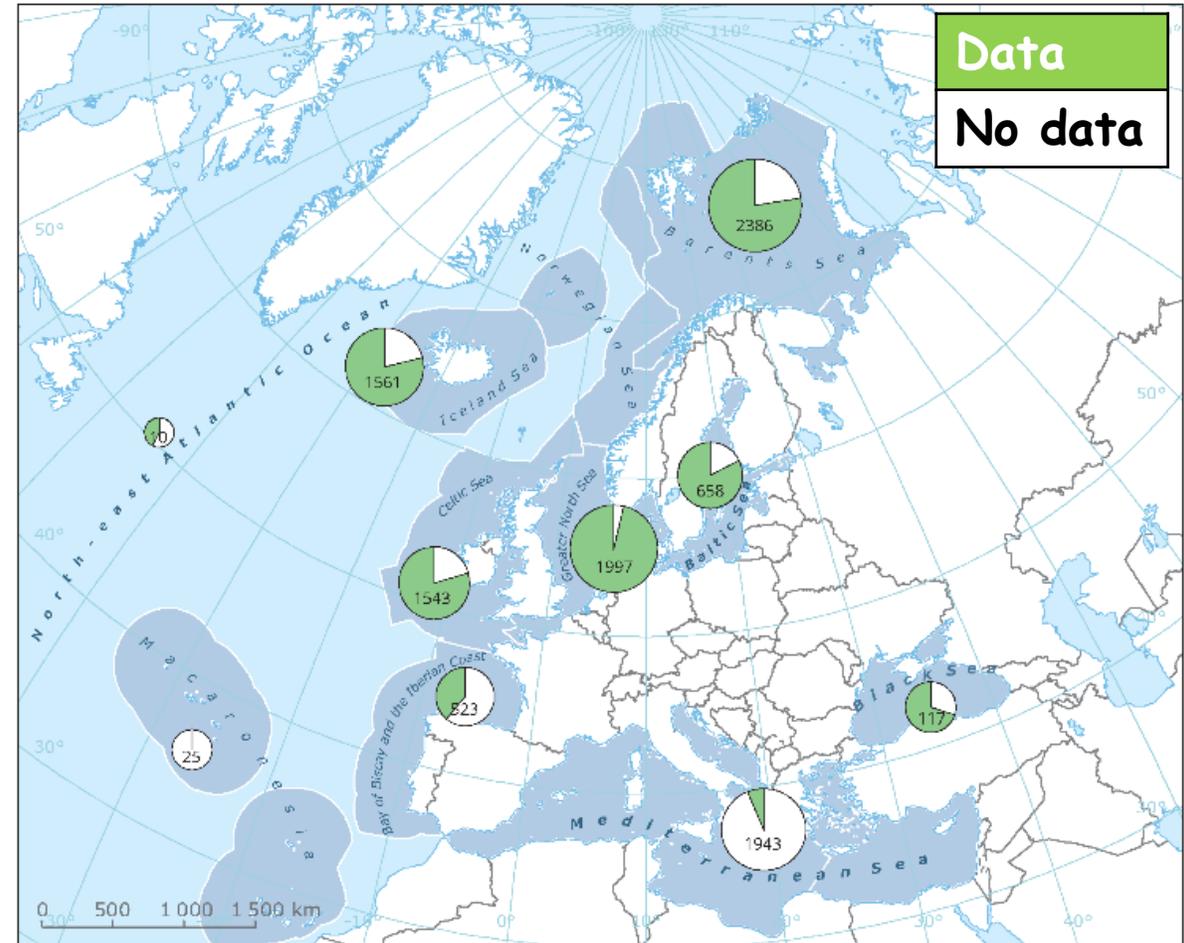
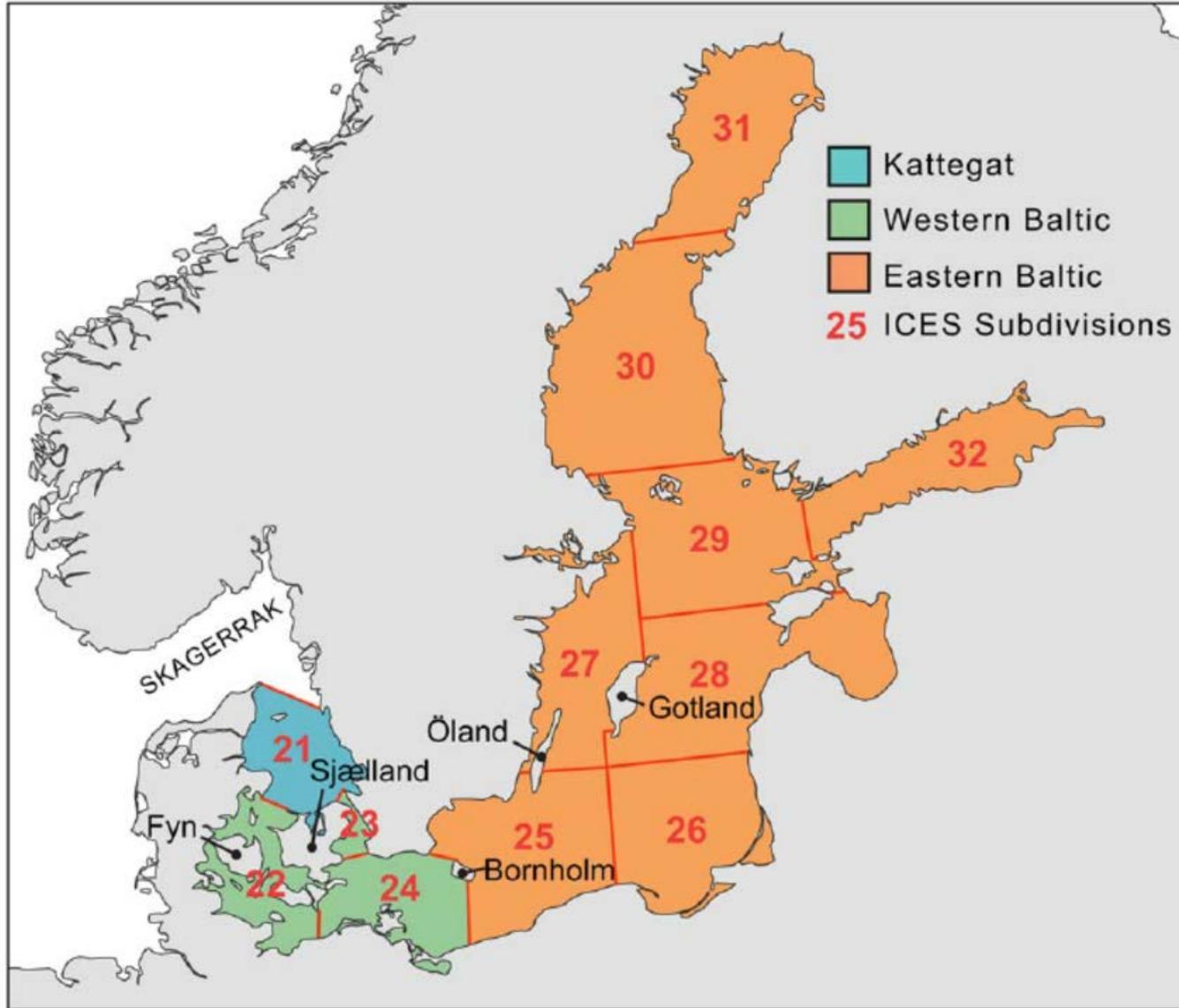


Figure 2. Proportion of fish and shellfish landings with Good Environmental Status information



# Baltic fish stocks

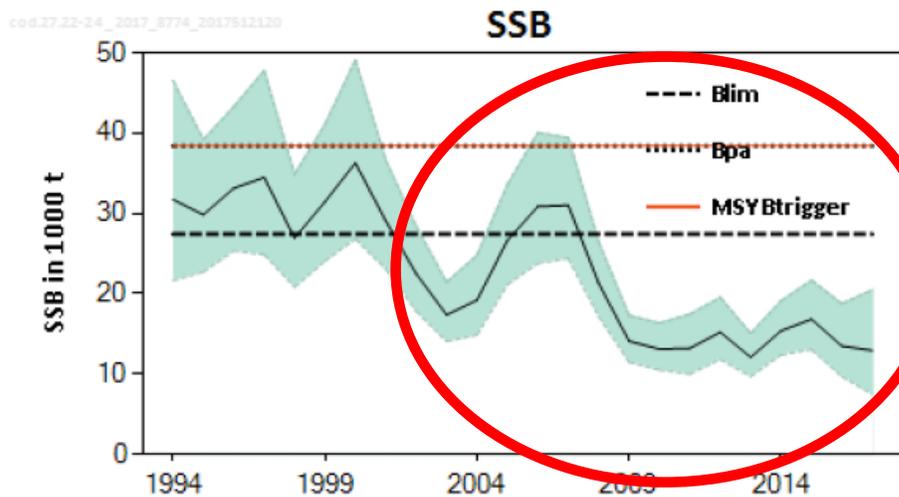
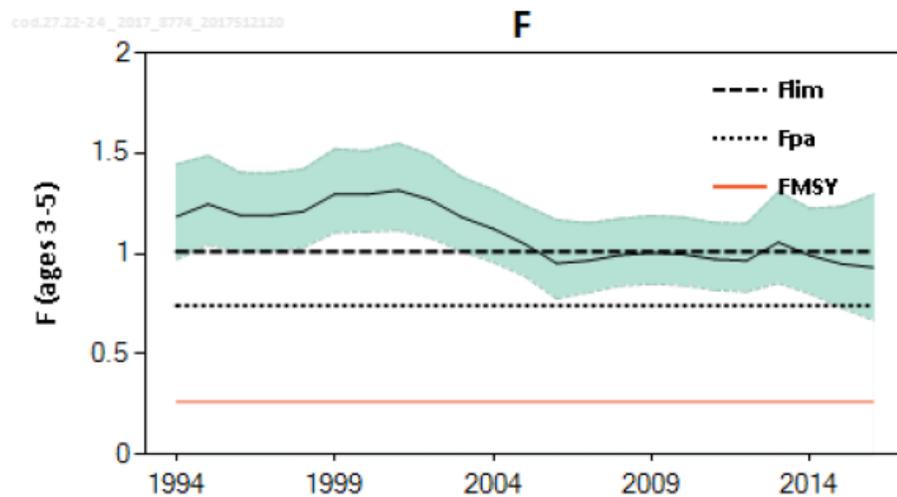
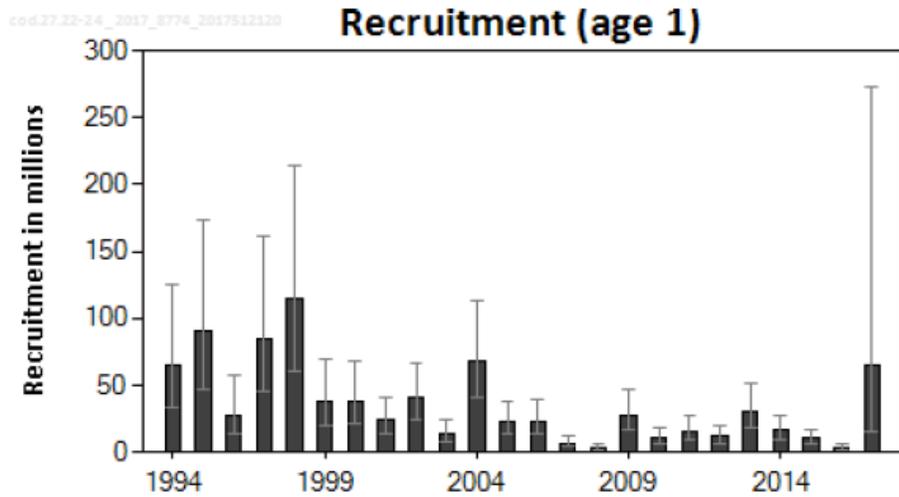
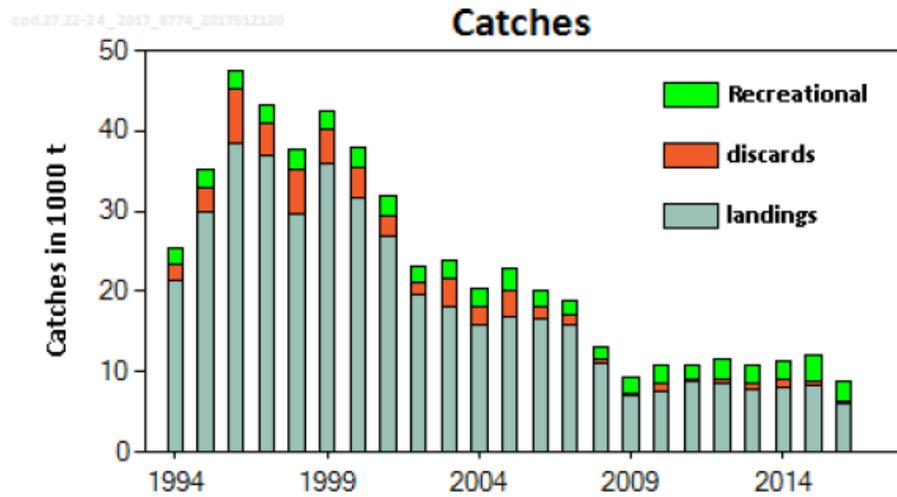


## ICES assesses:

- Cod
- Sprat
- Herring
- Turbot, flounder, plaice, dab, salmon, sea trout, eel, spurdog

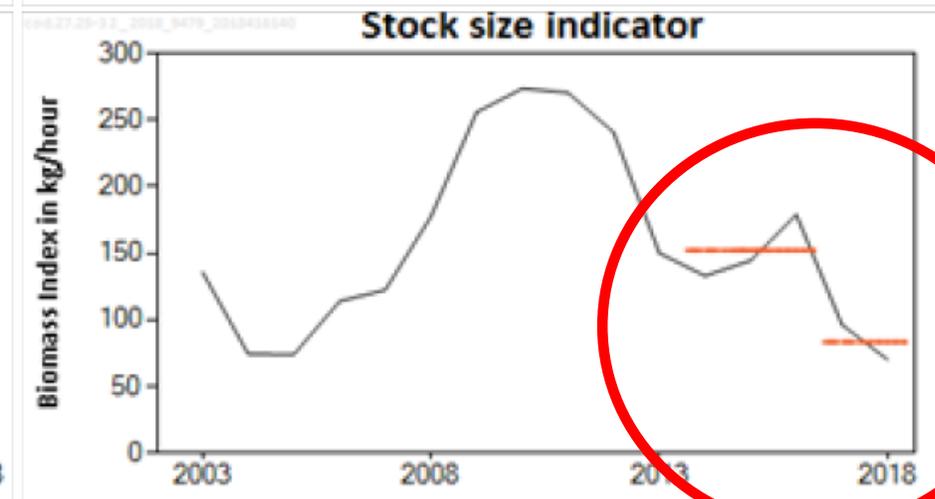
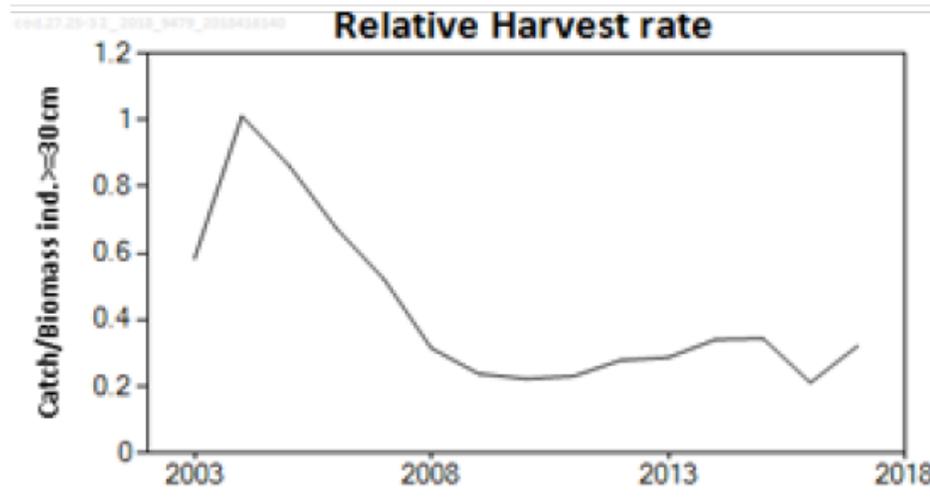
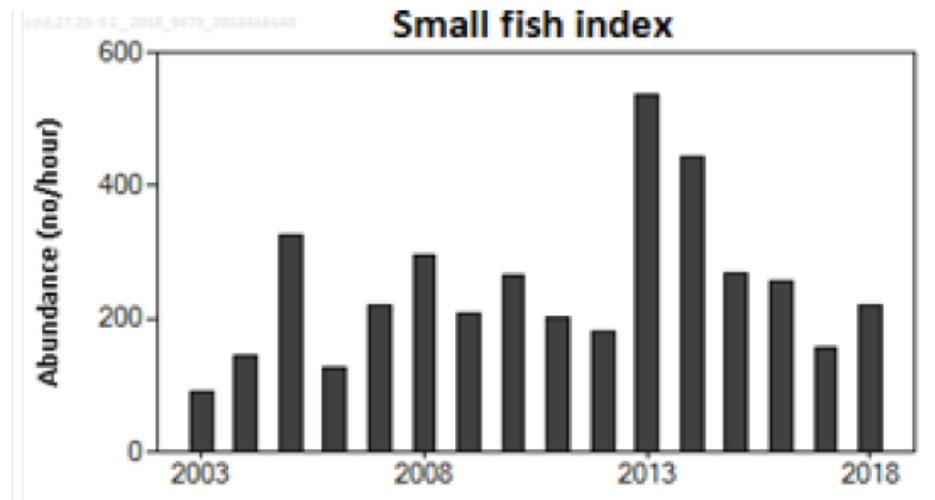
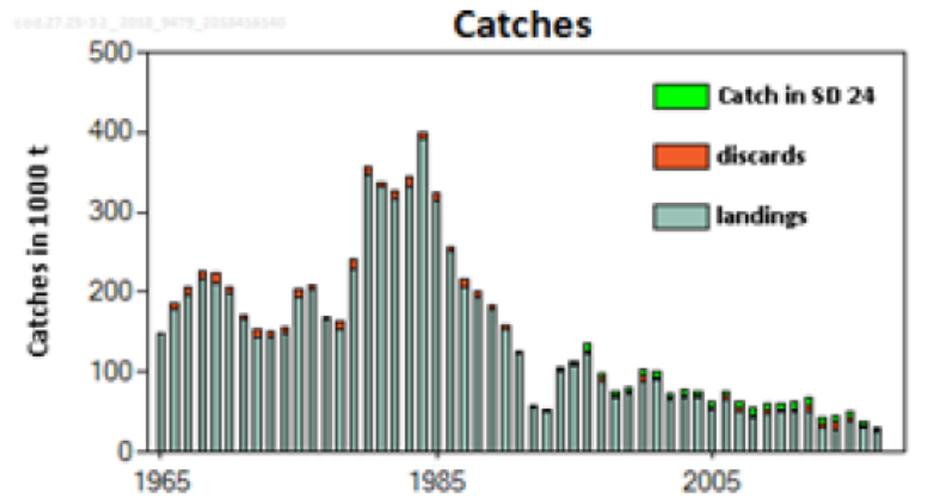
# Western Baltic cod (ICES Advice, 2017)

The spawning-stock biomass (SSB) has been below the limit reference point ( $B_{lim}$ ) since 2008. The fishing mortality (F) is well above  $F_{MSY}$ . Recruitment (R) has been low since 1999; however, recruitment in 2017 is estimated to be the highest since 2005.

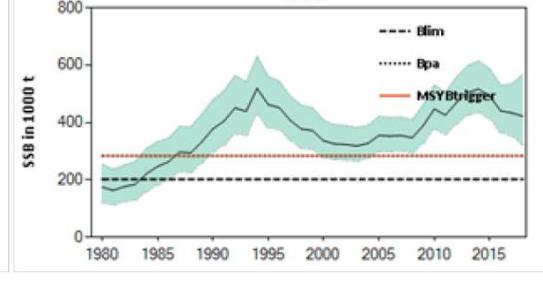
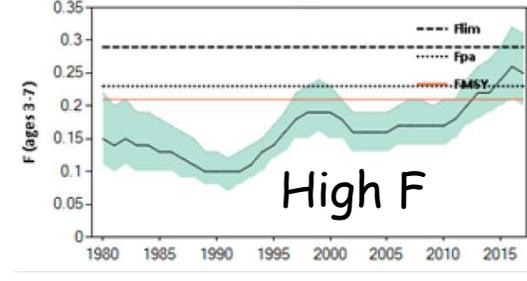
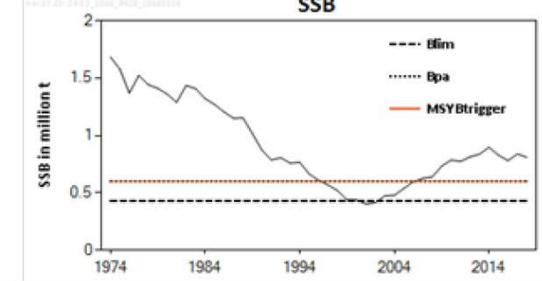
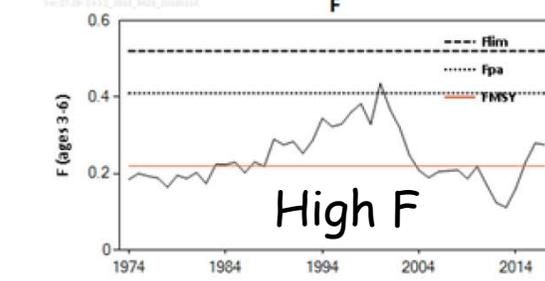
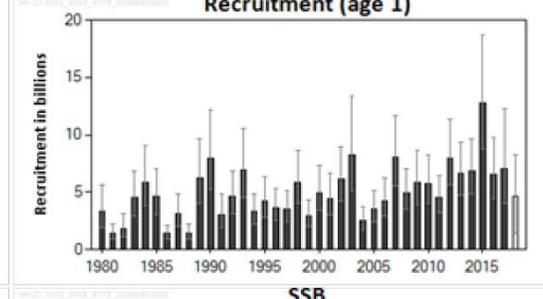
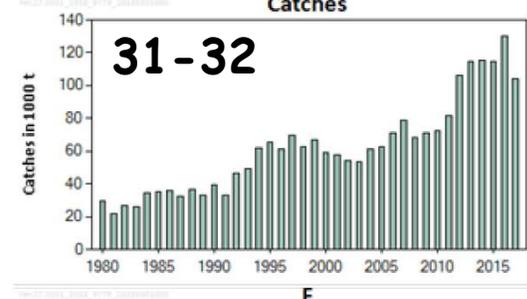
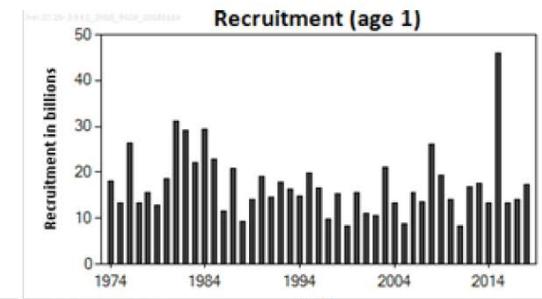
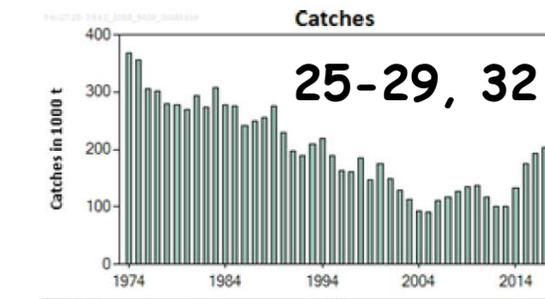
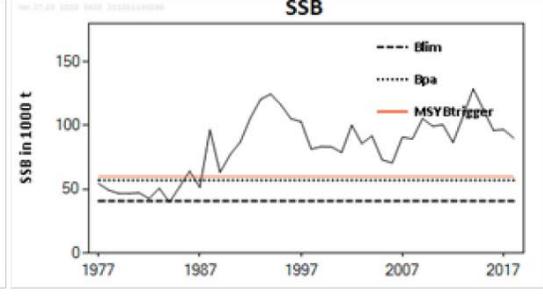
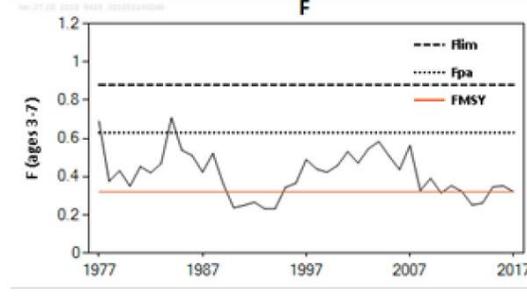
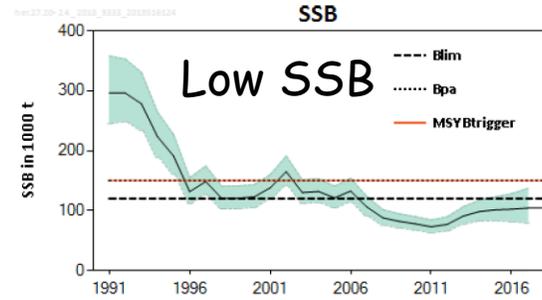
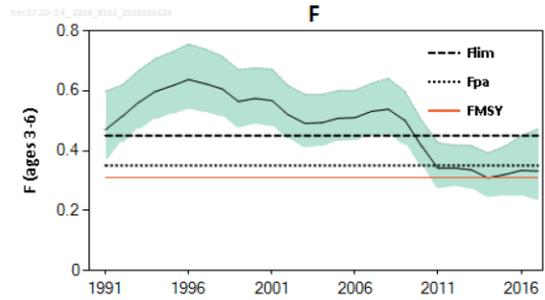
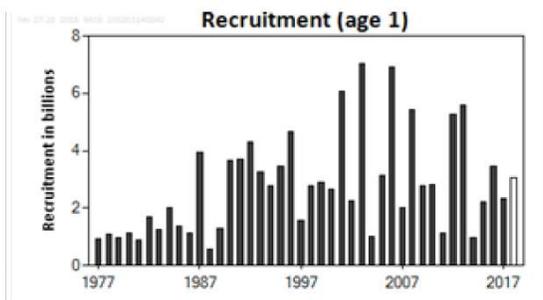
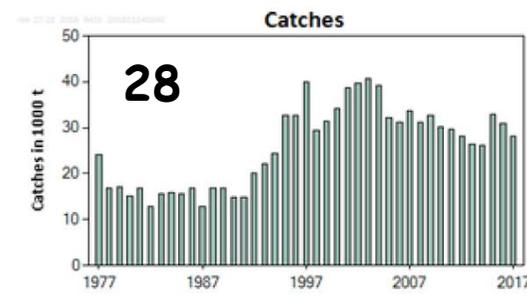
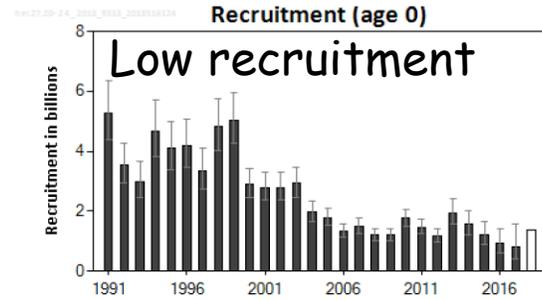
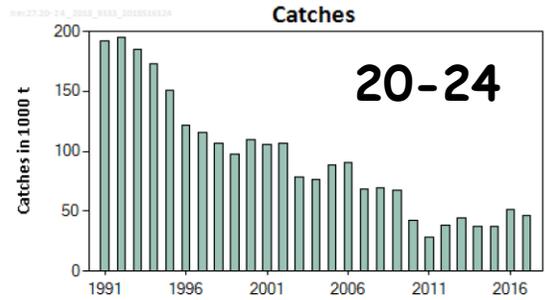


# Eastern Baltic cod (ICES Advice, 2018)

The stock size indicator shows an overall decrease since the peak in 2010, and the value for 2018 is the lowest observed in the time-series. The index for small cod has continuously declined from its highest value (in 2013) until 2017, with a slight increase in 2018. A steep decline in the harvest rate between 2004 and 2009 was followed by a slight increase until 2015, and with no clear trend afterwards.



# Baltic herring, ICES Advice, 2018)



# A caveat about the relevance of ICES stock assessments

“there are limitations around how useful these stock assessments can be. **Stock assessments relate to fish that have recruited to the fished population. Mostly, porpoises and common dolphins at least feed on pre-recruits**, so on its own this would not be an appropriate way to determine food availability. Sandeels are an exception, as these are fished at small sizes. In the North Sea sandeel fishery catches have declined since 2002, and spawning stock biomass is stable or increasing” (UK Report to ASCOBANS)

# 3. National reports - prey depletion

Country assessment (2017)	a ) Notable fish depletion? Which species?	b) and where?	c) Management measures for depleted fish stocks?	d) Evidence of impacts on cetaceans?	e) National surveys to evaluate cetacean body condition?	f) Relevant new research etc
Belgium	No			No	Target 50% of stranded porpoises investigated	None
Denmark						
Finland	No			No	No	None
France					Condition index from measuring stranded dolphins	Develop condition index
Germany	No			No	No	None
Lithuania	No			No	No	None
Netherlands	No			No	Necropsies of ca 50 (yearly) stranded porpoises by Faculty of Veterinary Medicine	
Poland	Cod (depleted, smaller and thinner)	Baltic: 22-24: depleted, 24-32: smaller / thinner	Ban coastal trawling + ban fishing on sprat during cod spawning. Request to EC to reduce industrial fishing of sprat + herring.	No	Porpoise bodies are examined for nutritional status and health.	None
Sweden	Cod	Baltic: 21, 25-32	Reduced TAC + technical measures (closed areas, selective gears) to minimize bycatch mortality	Yes, Since 2016, ≤20 porpoise necropsies/year + condition estimated.	No	None
UK	ICES: Cod, whiting, haddock, mackerel, blue whiting F>FMSY	North Sea (sea bass, cod, herring, horse mackerel, sandeel, sole)	Fish stocks are managed by European Commission, according to advice by ICES and STECF.	Cases of starvation recorded every year	Yes/no : evaluated by CSIP, but not done routinely	Stomach contents analysis <i>versus</i> condition and pregnancy rate.

3. (continued) Presentations by Parties

4. Discussion and recommendations