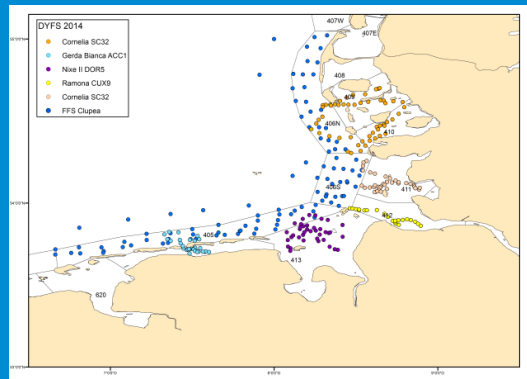


# Demersal Young Fish Survey

Stock indices and distribution of selected forage fish in the German Wadden Sea

Dr. Holger Haslob

Thünen Institut für Seefischerei



Wilhelmshaven

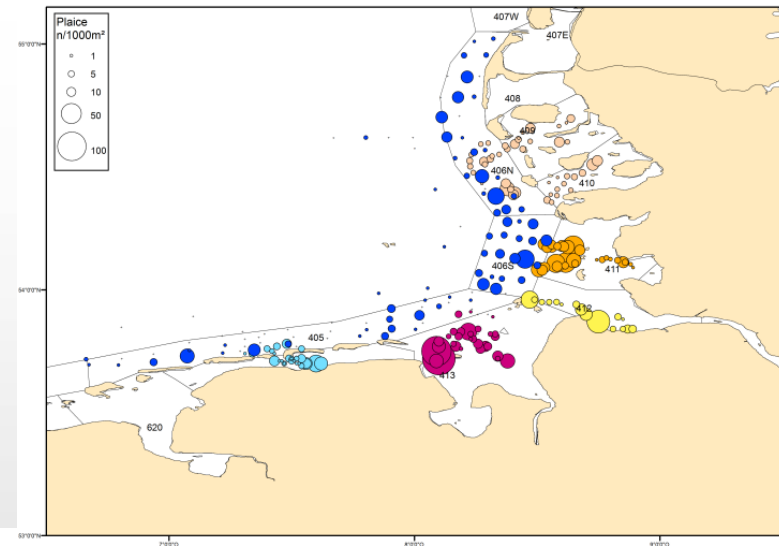
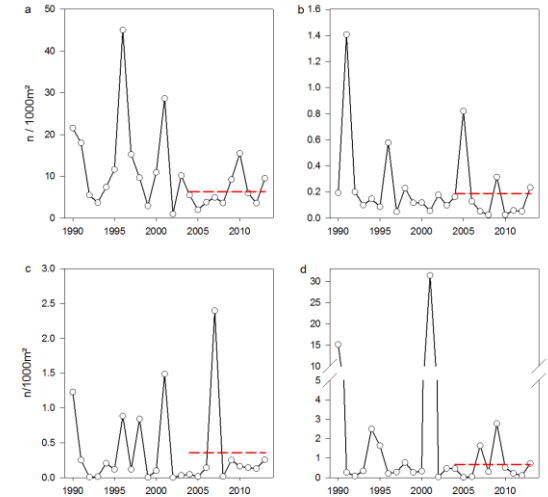
11.04.2019

# Demersal Young Fish Survey – Historical Background

- In 1969 the Netherlands started a Demersal Young Fish Survey (DYFS) in Dutch waters (*Zijlstra, 1972*)
- Since 1972/1973 Germany is carrying out a Demersal Young Fish Survey
- Internationally coordinated by ICES WGBEAM: Belgium, Netherlands, Germany
- 0-group index for plaice and sole

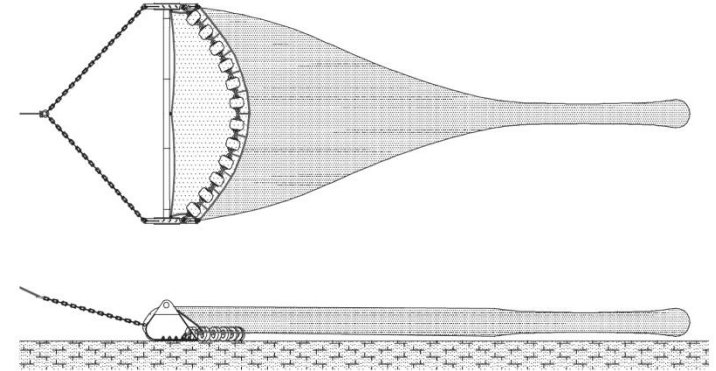
# DYFS - Objectives

- 0-group indices for plaice and sole -> stock assessment
- Abundance and distribution patterns of other (juvenile) demersal fish species
- Abundance and distribution of brown shrimp
- Abundance and distribution of epibenthos



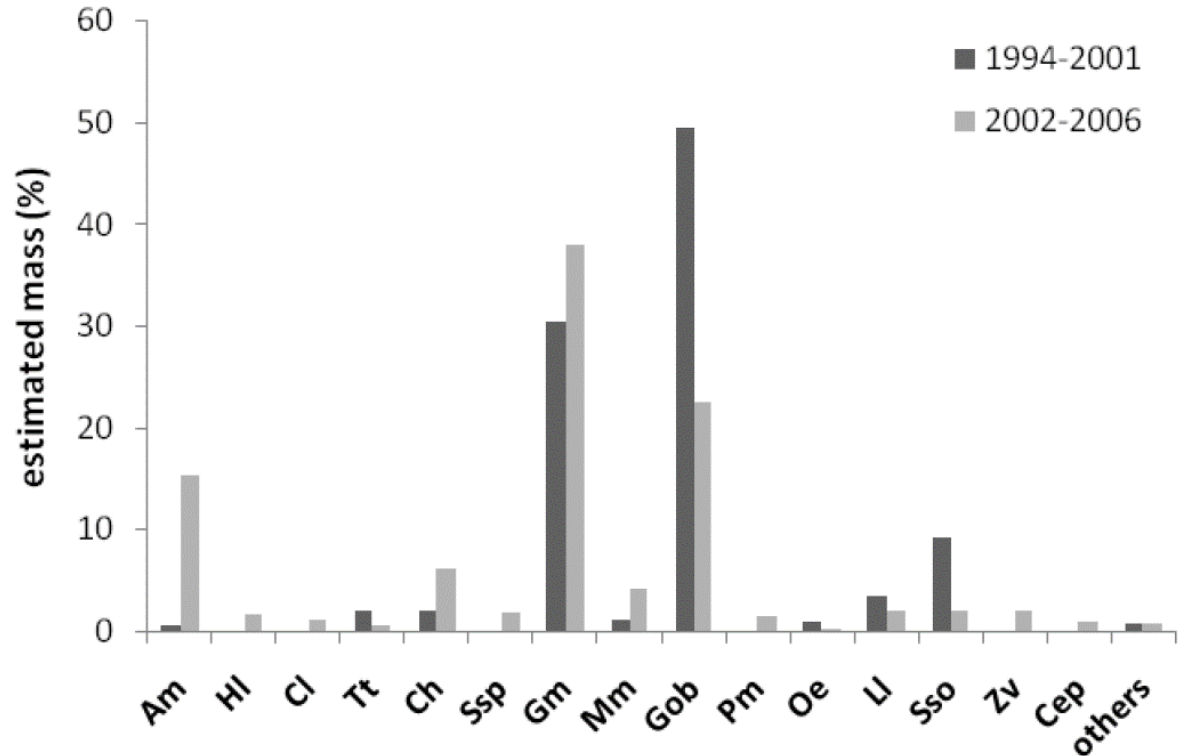
# DYFS - Methodology

- Gear: 3m Beam Trawl, 20mm mesh size in the cod end
- Haul duration ~ 15min at 3 knots
- Quarter 3
- Chartered commercial vessels in different areas within the German Wadden Sea
- Since 2012 RV „Clupea“ operating seaward of the island chain
- Recording of all fish and evertibrate species - > data base from 1975 – 2018 available



# Potential forage fish species of harbour porpoise

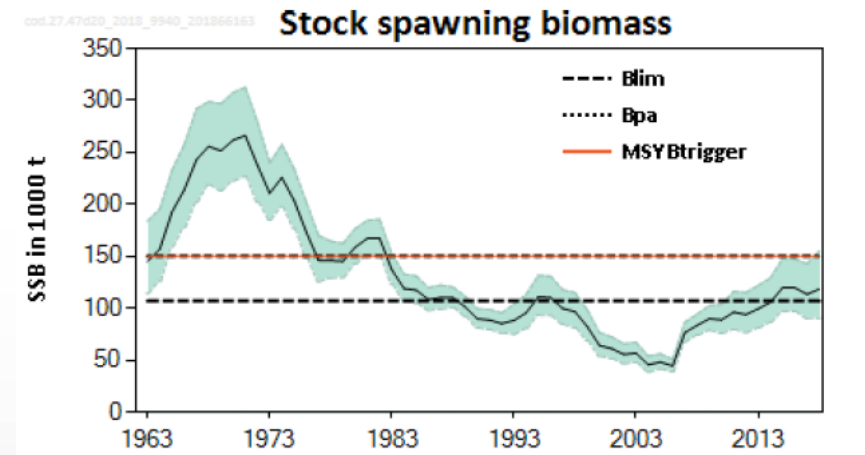
- Gadidae (Gm, Mm)
- Gobiidae (Gob, Pm)
- Sole (Sso)
- Sandeel (Am)
- Dab (LI)
- (Plaice)
- Herring (Ch)
- Smelt (Oe)



Gilles, A. 2008. Characterisation of harbour porpoise habitat in German waters.

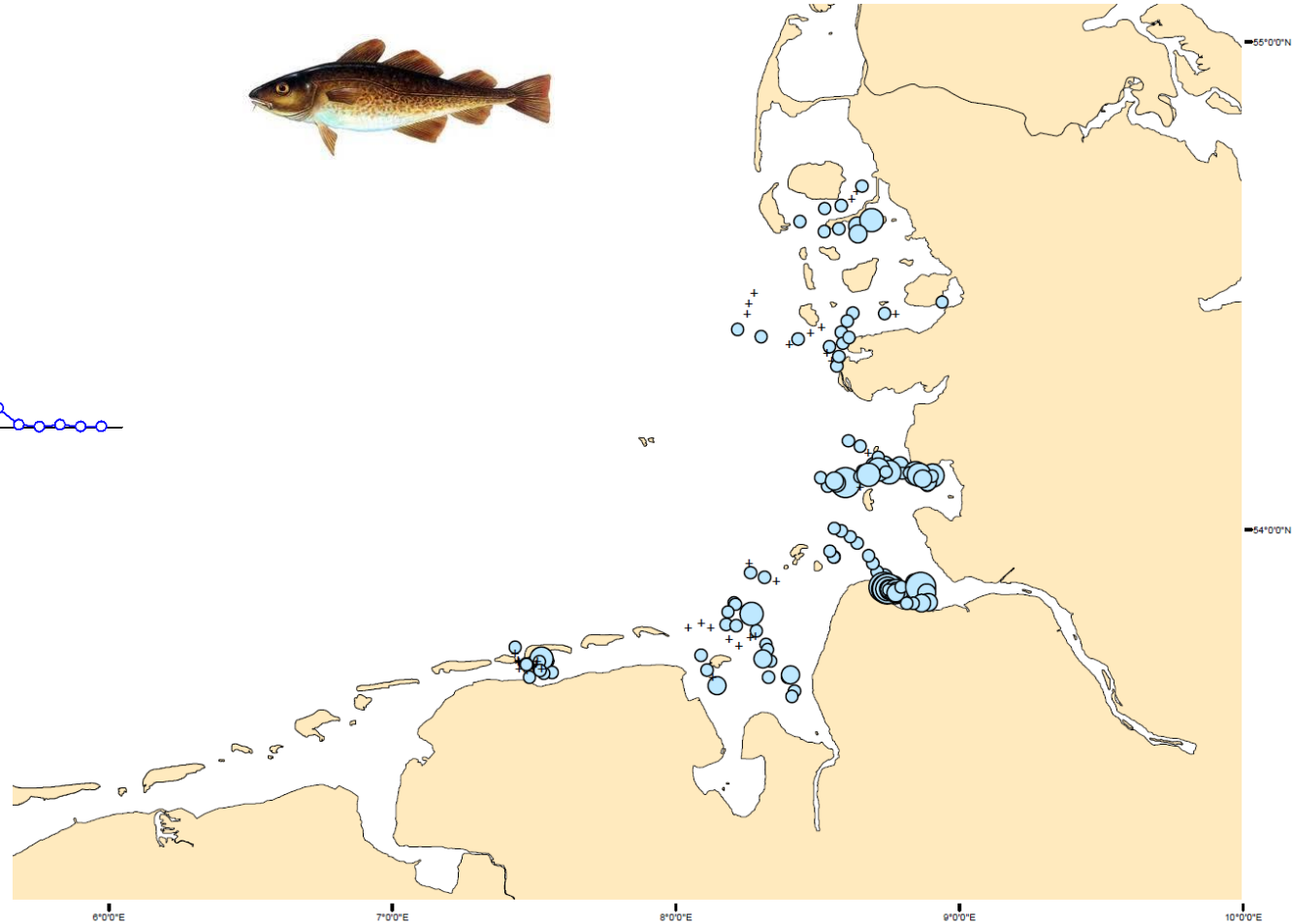
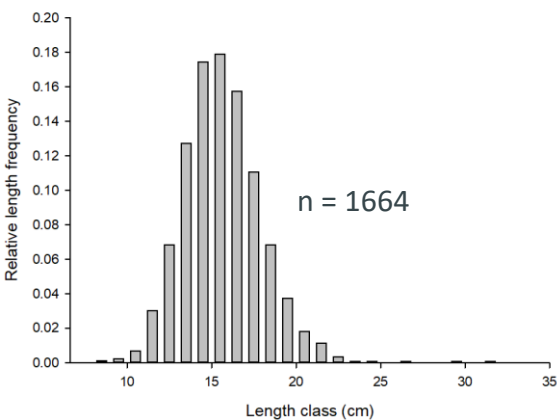
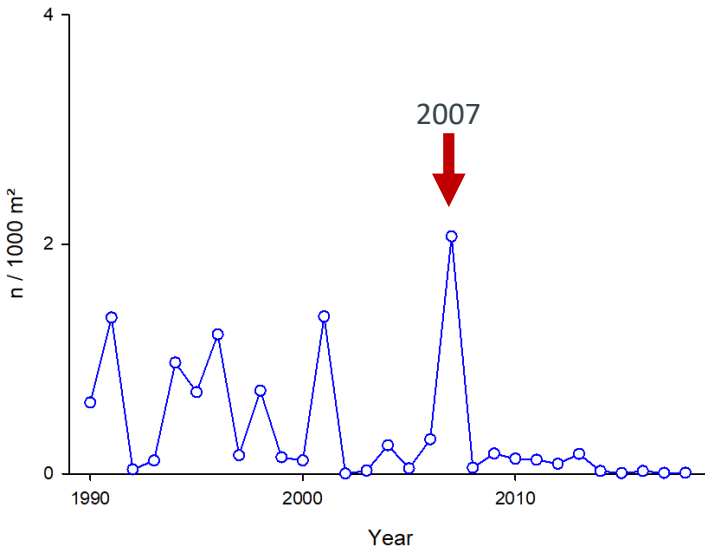
# Potential forage fish species of harbour porpoise in the Wadden Sea - Cod

- North Sea Cod
- SSB increases slowly since 2003, F declined in recent years
- Decline of productivity caused by warming of North Sea (O'Brian et al. 2000, Nature)
- Shift of distribution towards northern part of the North Sea
- Gadoids are a common prey for harbour porpoises (Gilles, 2008; Leopold, 2015)
- Cod was only caught in relatively low numbers in recent years by the DYFS in the Wadden Sea

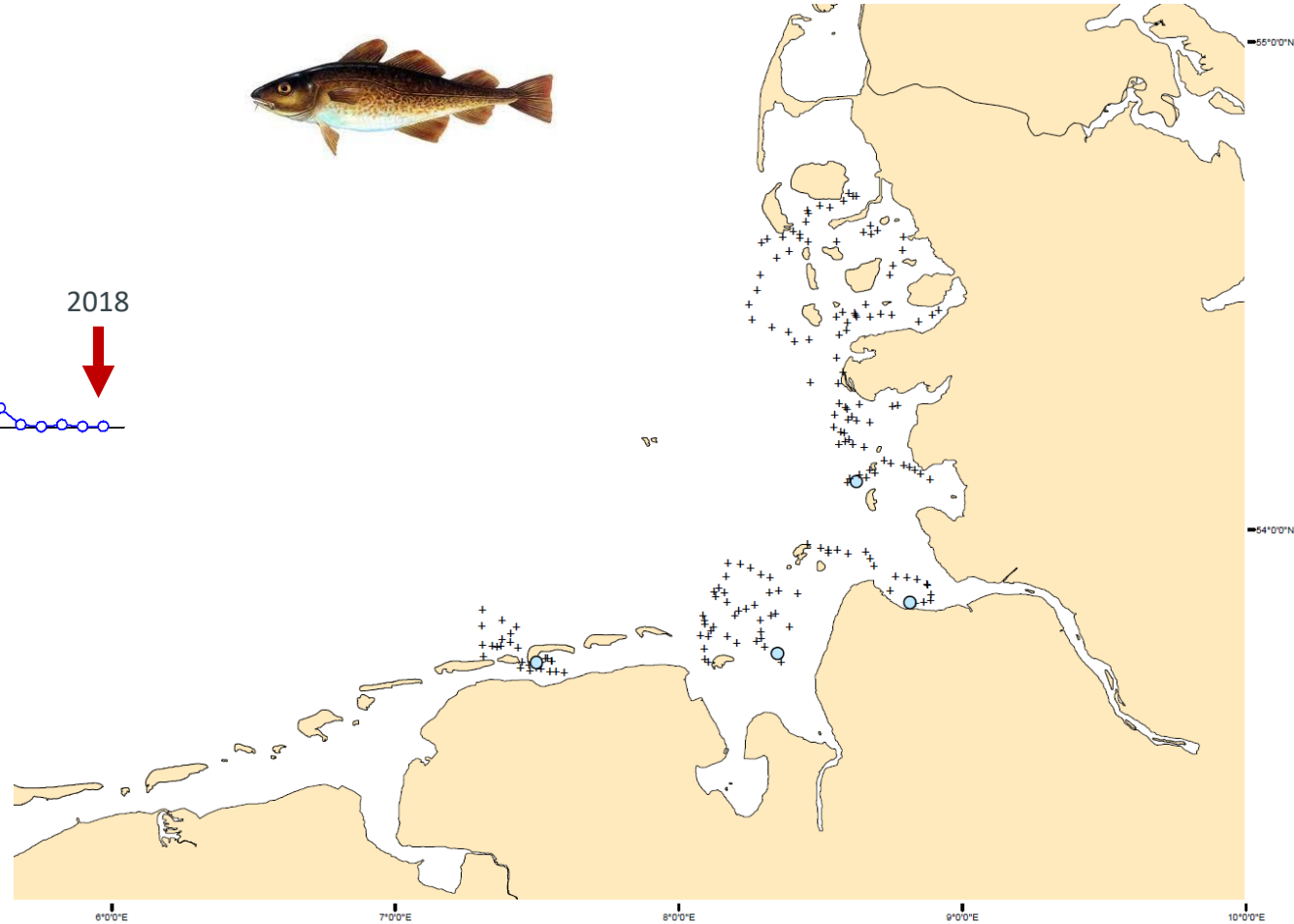
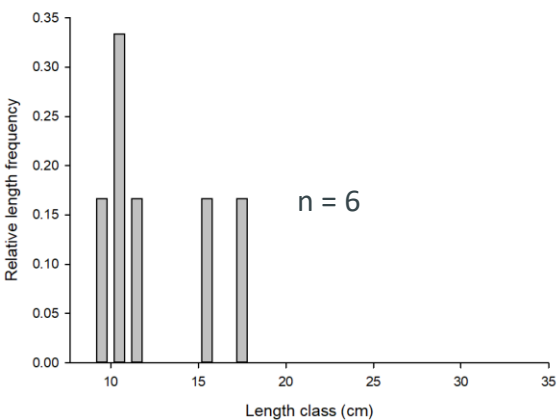
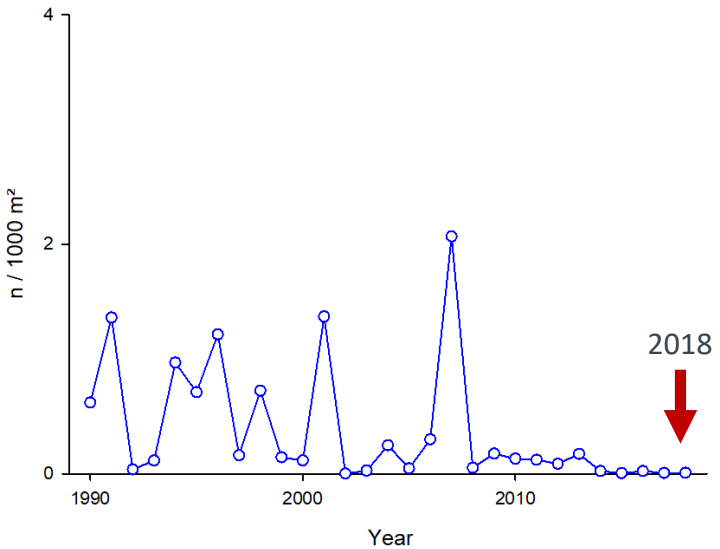


(ICES Advice; [www.ices.dk](http://www.ices.dk))

# Potential forage fish species of harbour porpoise in the Wadden Sea - Cod



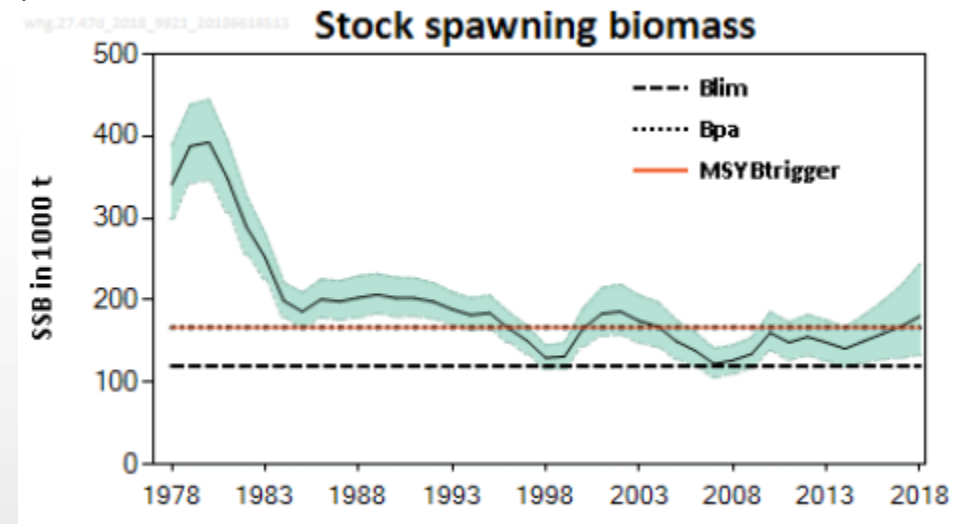
# Potential forage fish species of harbour porpoise in the Wadden Sea - Cod





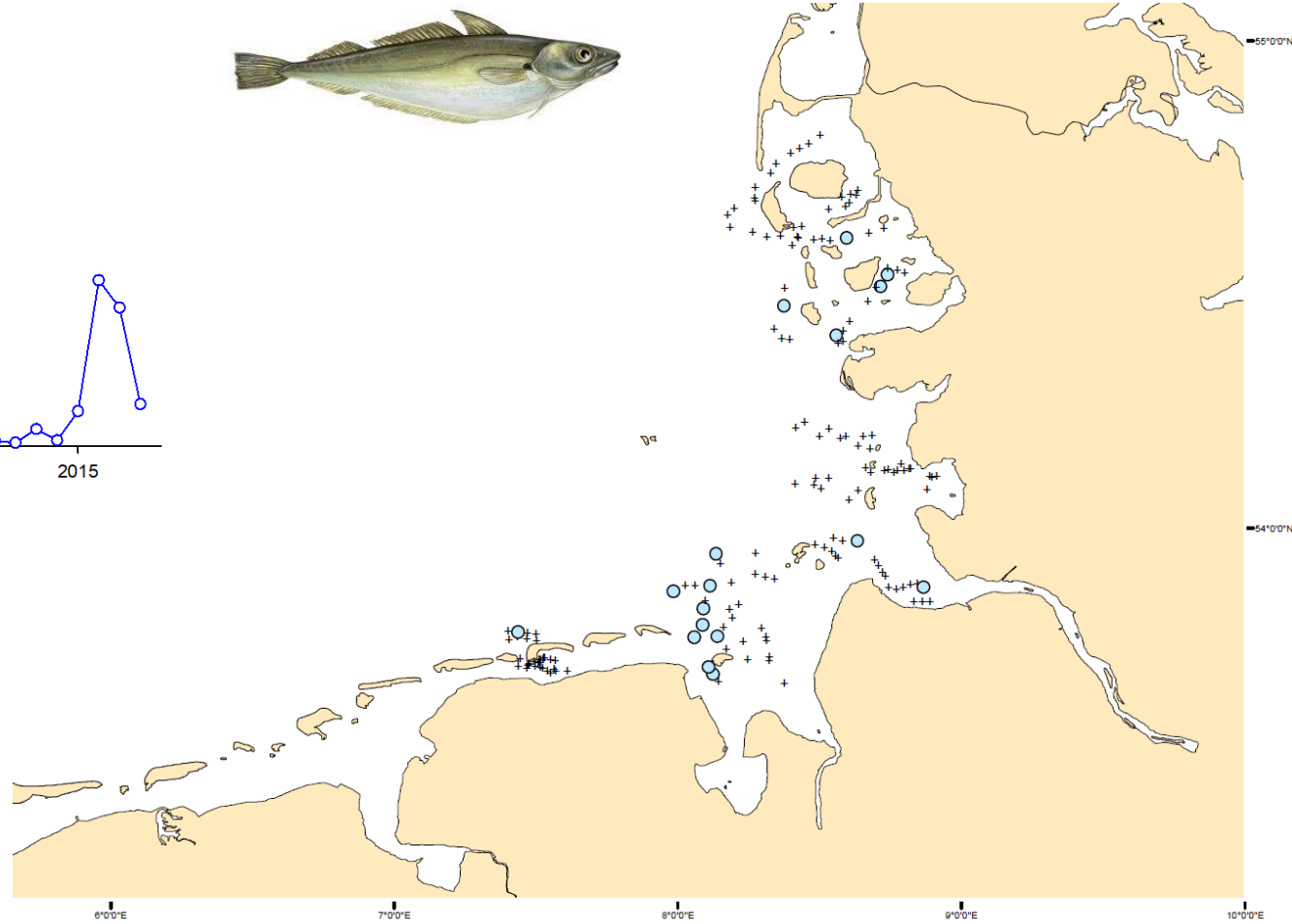
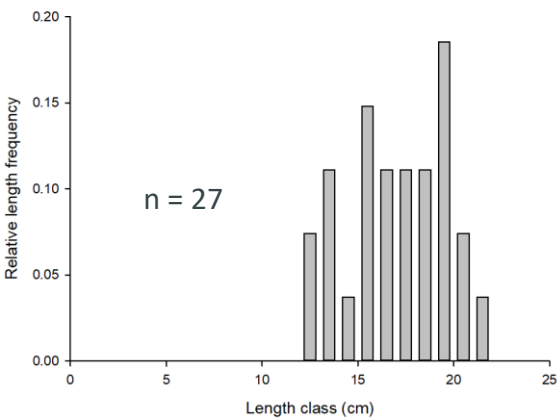
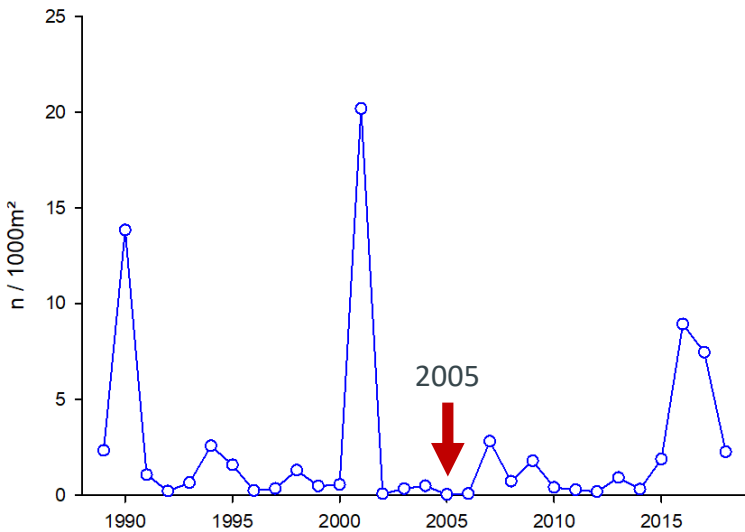
# Potential forage fish species of harbour porpoise in the Wadden Sea - Whiting

- North Sea Whiting
- SSB increases slowly since 2007, F declined in recent years
- The stock dynamic of whiting is mainly driven by recruitment and natural mortality.
- Mass invasions of whiting occur in the Wadden Sea, e.g. in 1990, 2001, 2016, 2017

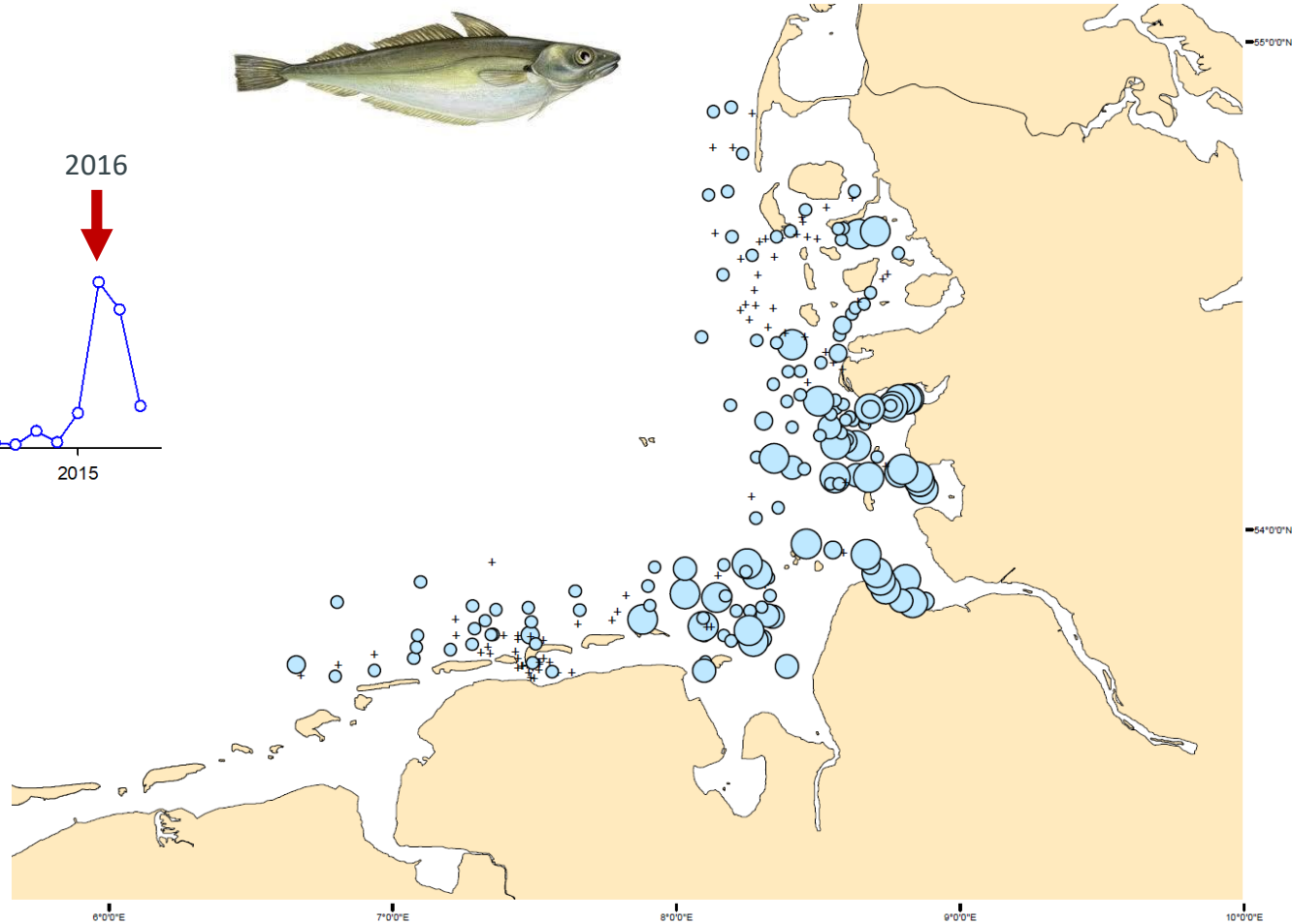
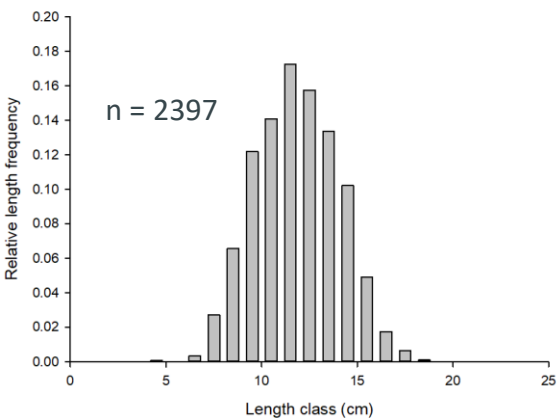
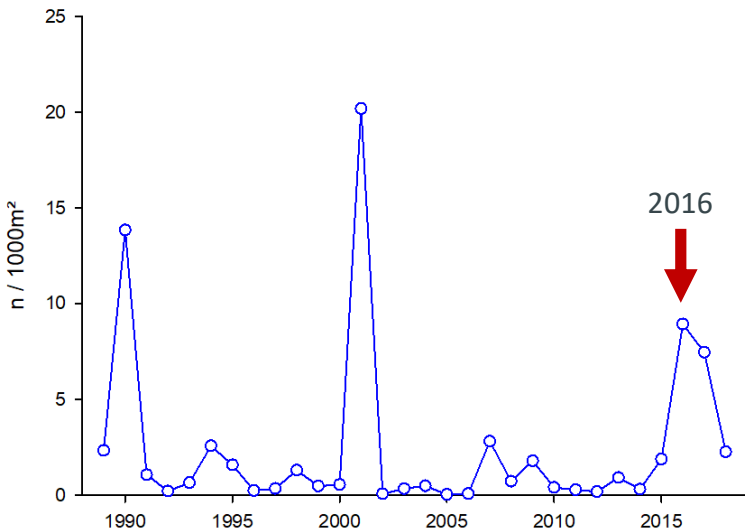


(ICES Advice; [www.ices.dk](http://www.ices.dk))

# Potential forage fish species of harbour porpoise in the Wadden Sea - Whiting

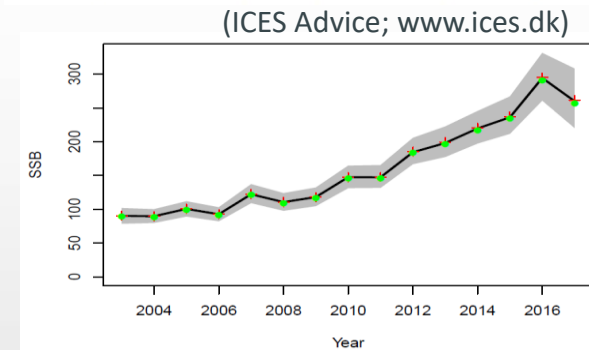
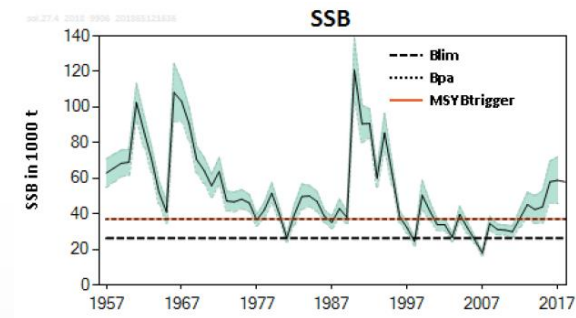
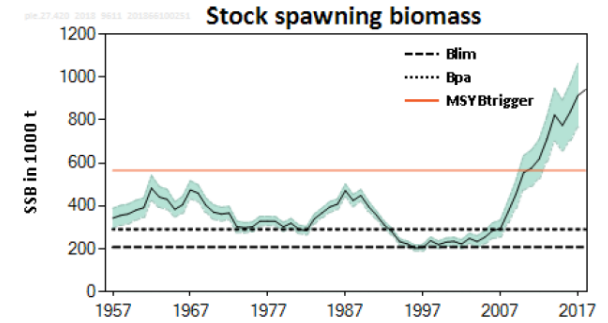


# Potential forage fish species of harbour porpoise in the Wadden Sea - Whiting



# Potential forage fish species of harbour porpoise in the Wadden Sea – Flatfish species

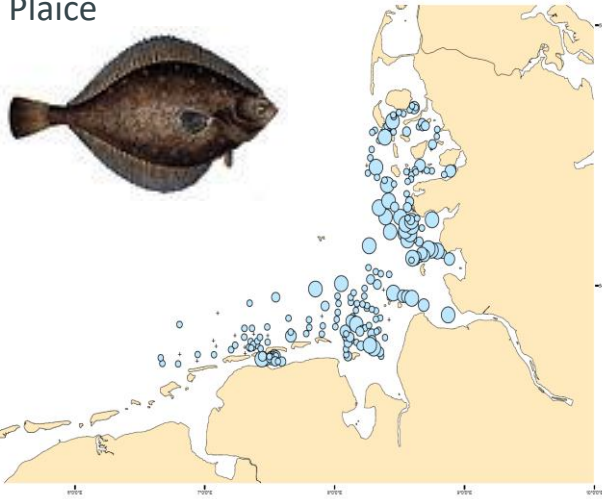
- Since 2007 there is an increase of SSB for the plaice, sole and dab stocks in the North Sea. F was reduced.
- The Wadden Sea is a nursery ground for plaice, sole and dab (...and other fish species).
- However, in recent years there was a decline of these common flatfish in that area.
- Sole was found in 15% of harbour porpoise stomachs (Gilles, 2008). Other flatfish are not that important but are also potential prey.



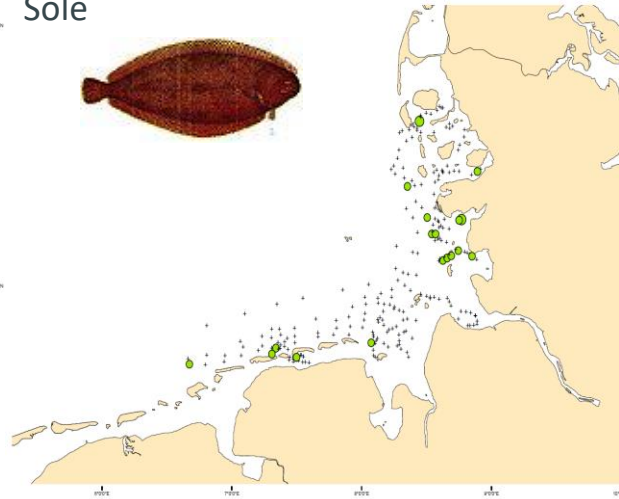
(ICES WGNSK 2018)

# Potential forage fish species of harbour porpoise in the Wadden Sea – Flatfish species

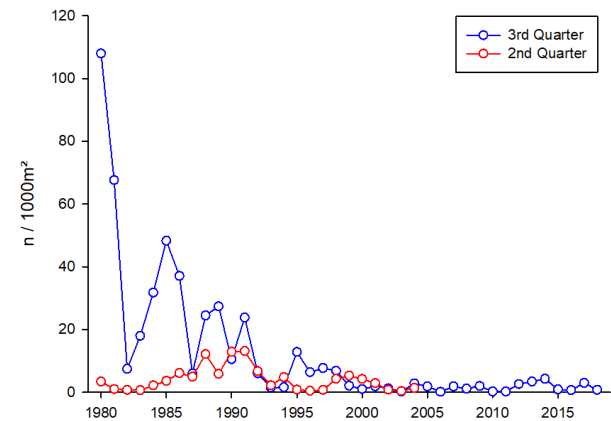
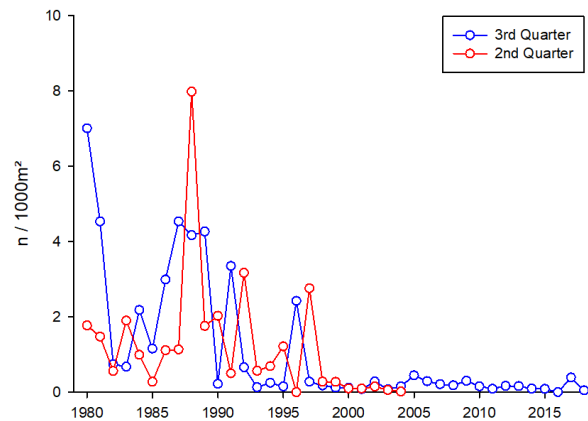
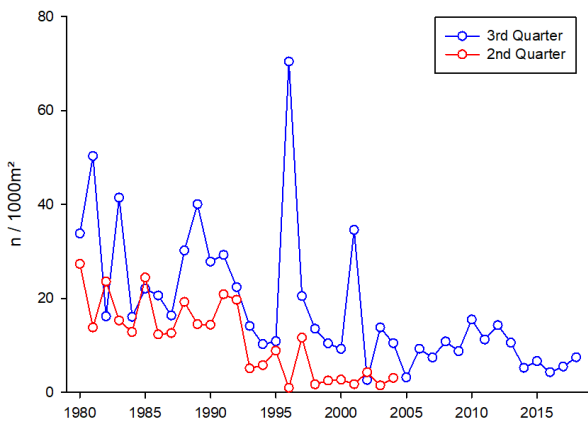
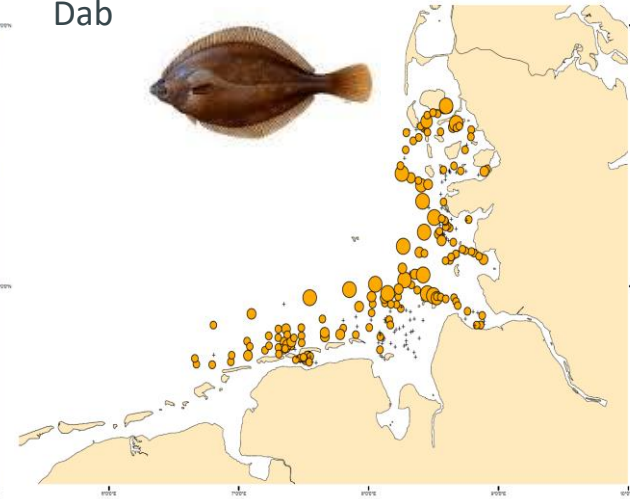
Plaice



Sole

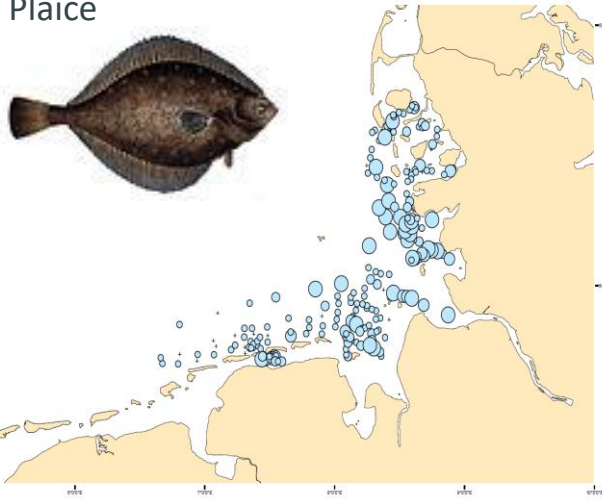


Dab

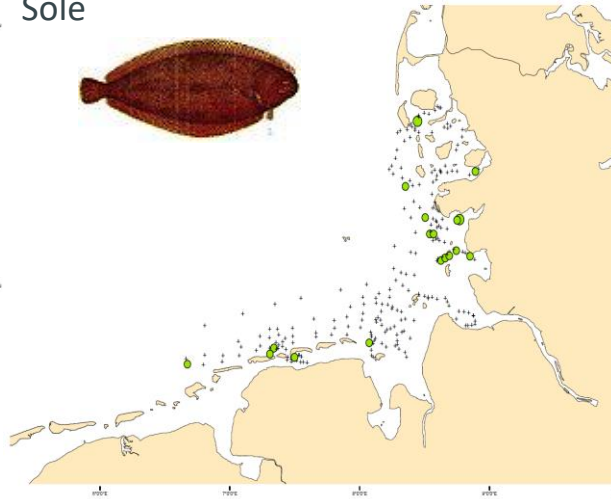


# Potential forage fish species of harbour porpoise in the Wadden Sea – Flatfish species (2018)

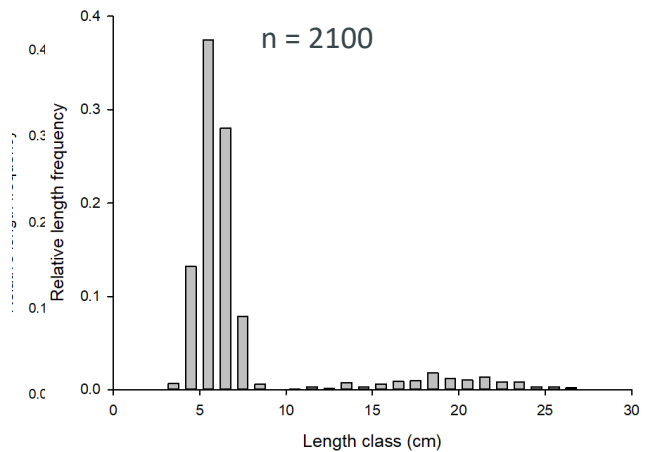
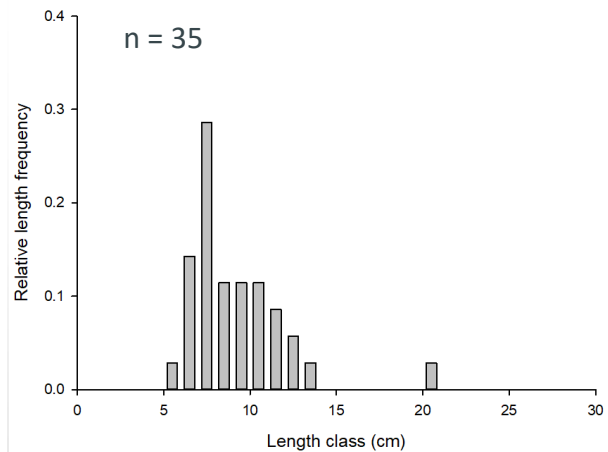
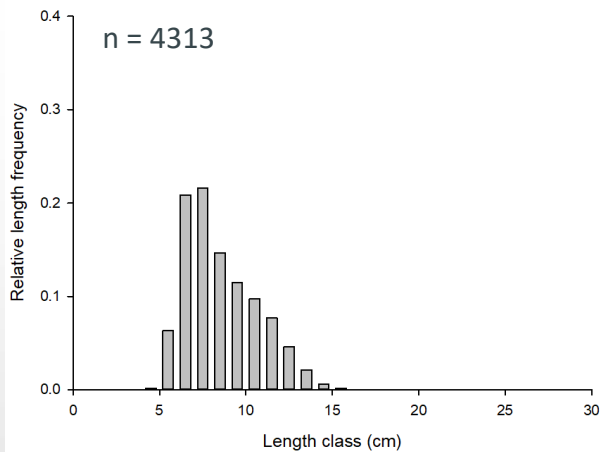
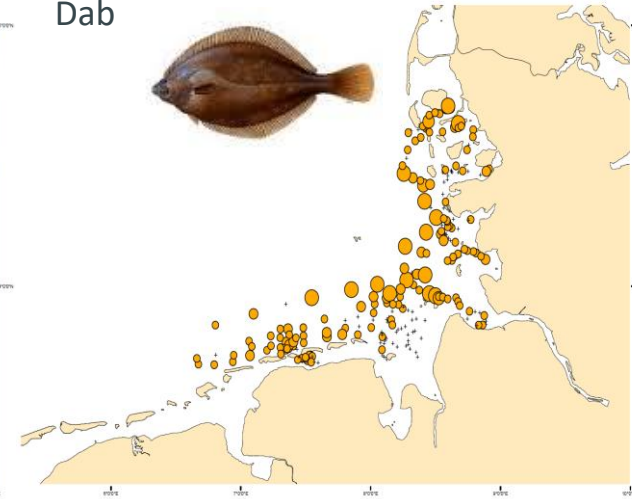
Plaice



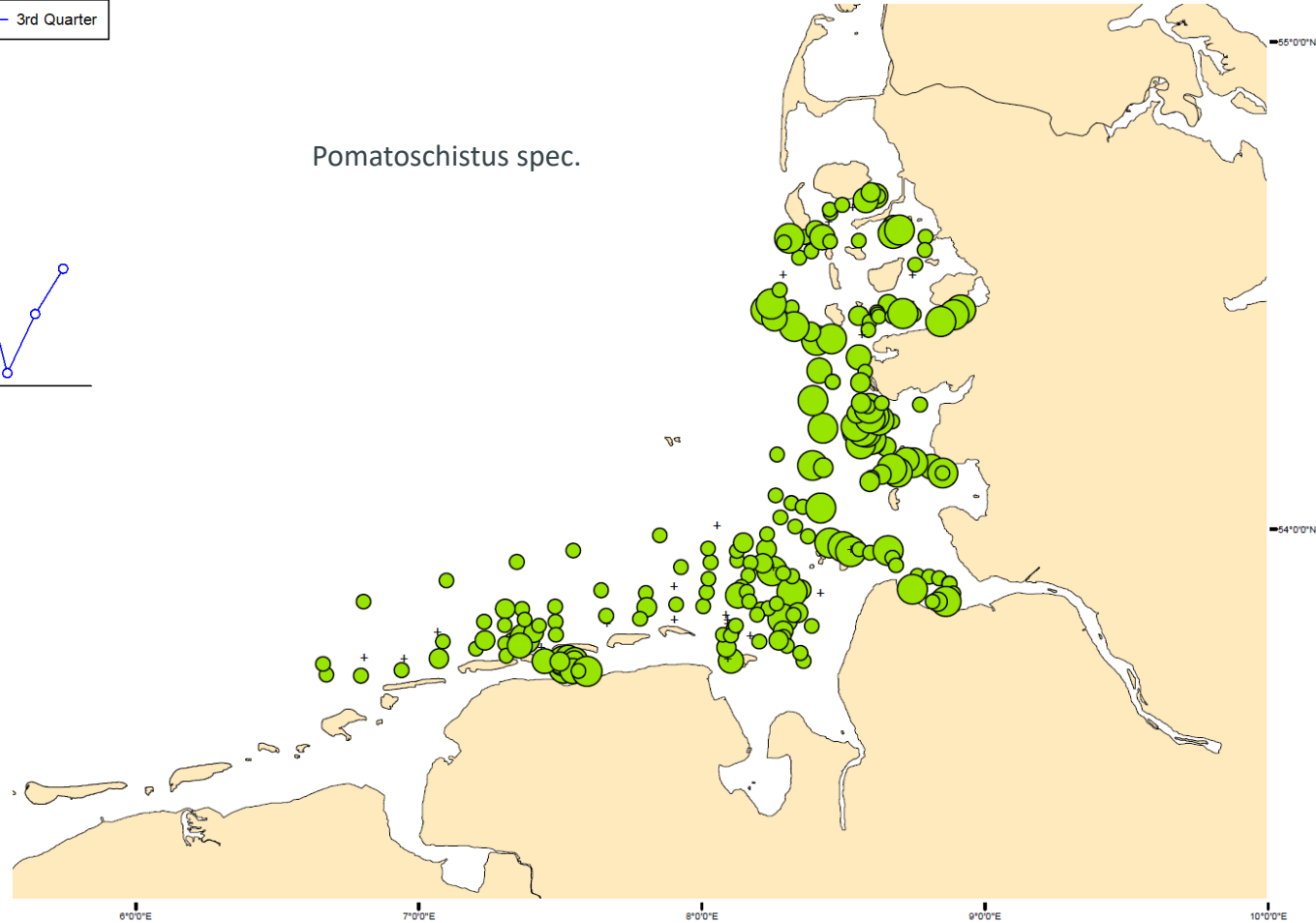
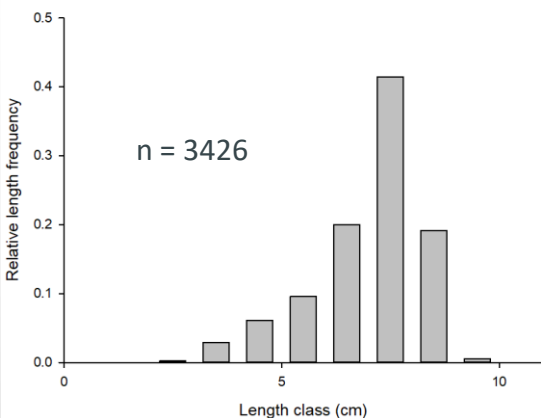
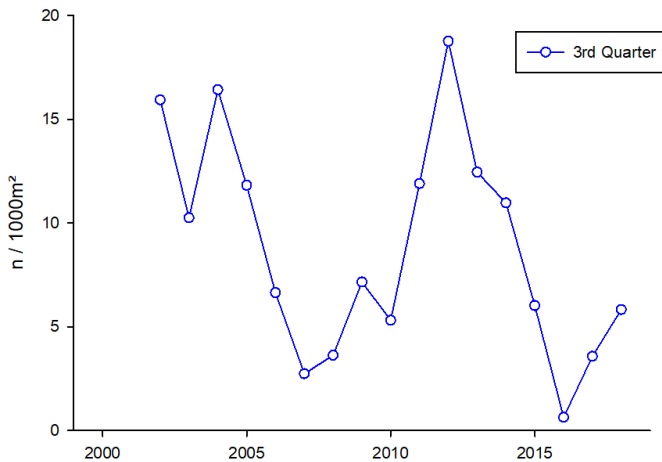
Sole



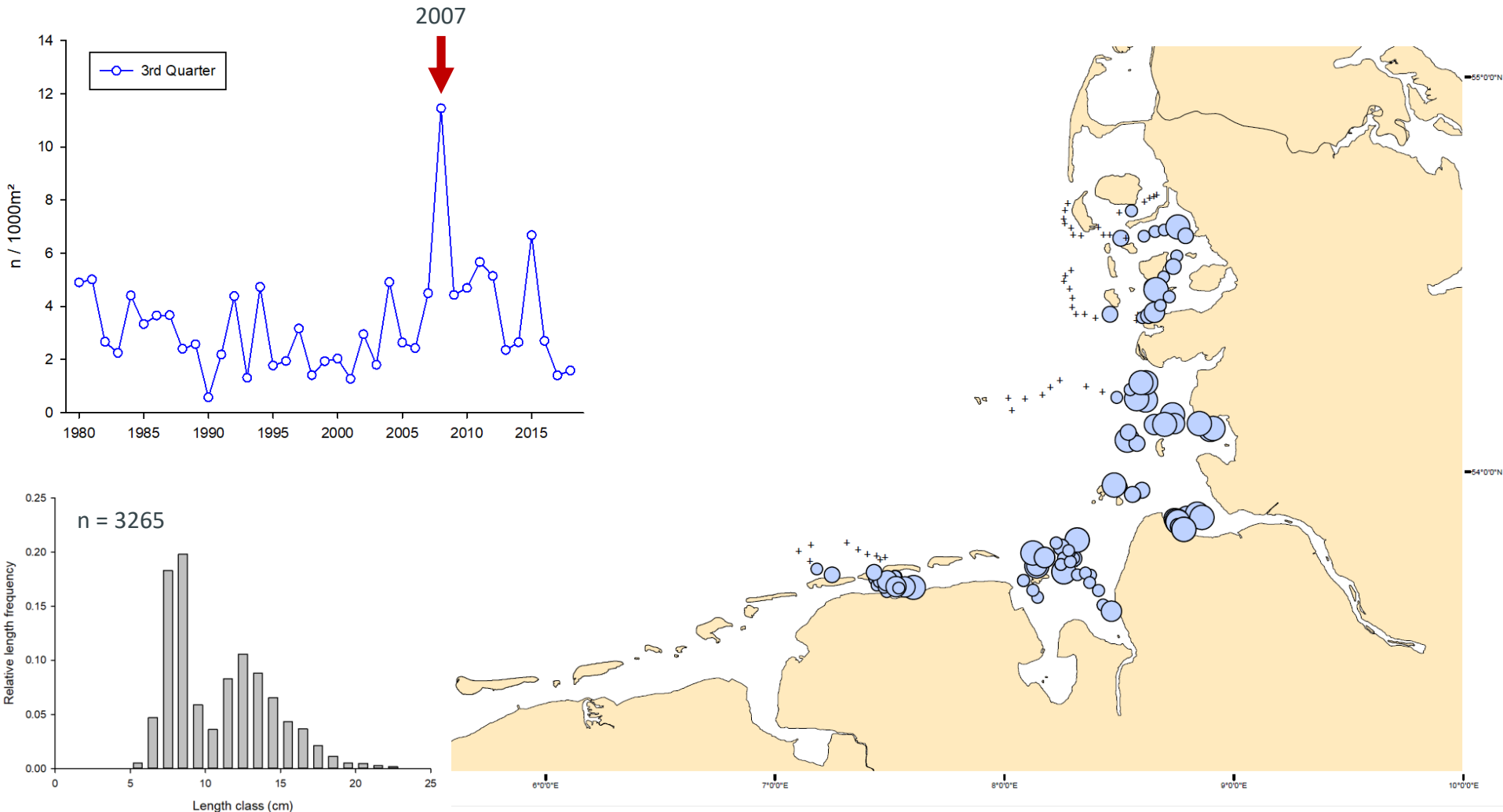
Dab



# Potential forage fish species of harbour porpoise in the Wadden Sea – Gobiidae

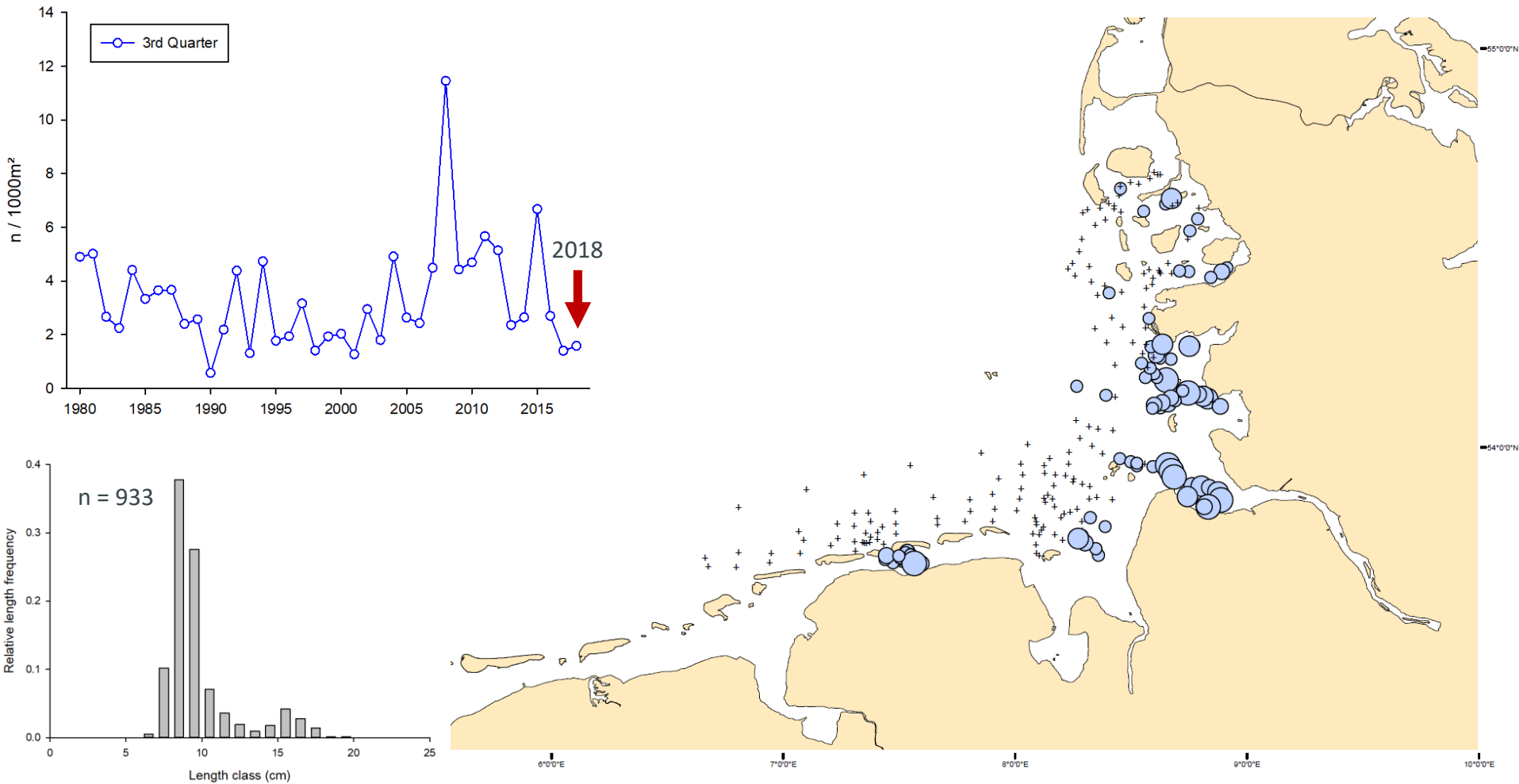


# Potential forage fish species of harbour porpoise in the Wadden Sea – Smelt



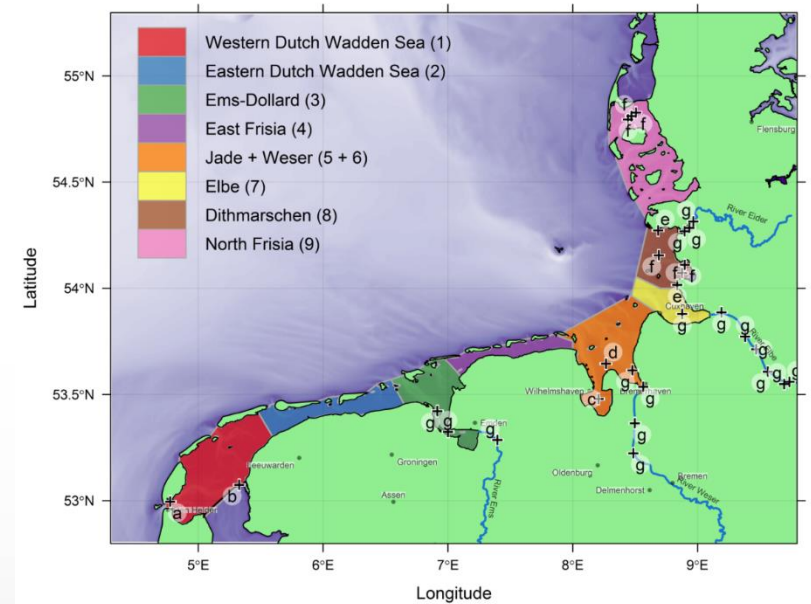


# Potential forage fish species of harbour porpoise in the Wadden Sea – Smelt



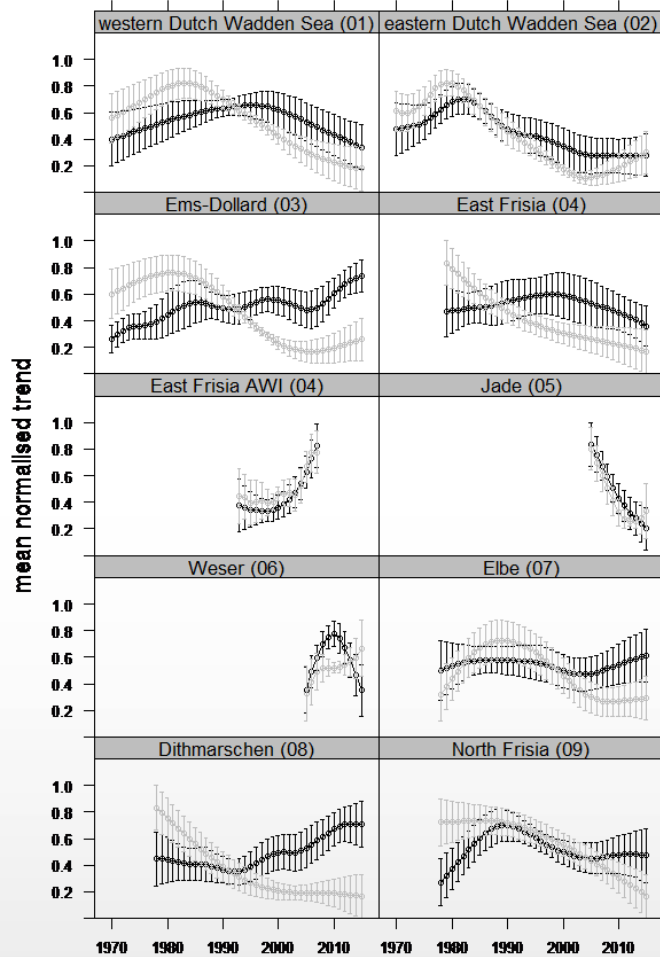
# Other monitoring activities in the Wadden Sea

Monitoring programme	Sampling period	Sampling areas	Years
DFS (beam trawl)	Sep	western Dutch Wadden Sea (1)	1970 - 2015
		eastern Dutch Wadden Sea (2)	1970 - 2015
		Ems-Dollard (3)	1970 - 2015
DYFS (beam trawl)	Sep-Oct	East Frisia (4)	1979 - 2015
		Jade (5)	2005 - 2015
		Weser (6)	2005 - 2015
		Elbe (7)	1978 - 2015
		Dithmarschen (8)	1978 - 2015
		North Frisia (9)	1978 - 2015
AWI (beam trawl)	Mar, Jul	East Frisia (4)	1993 - 2007
NIOZ (fyke)	Mar-Jun, Sep-Oct	western Dutch Wadden Sea (a)	1960 - 2015
IMARES (fyke)	Apr-Jun, Sep-Nov	western Dutch Wadden Sea (b)	2000 - 2015
Jade (stow net)	Apr-Aug	Jade (c)	2005 - 2015
Oyster reefs (fyke)	May, Jun, Sep	Jade (d)	2014
Salt marshes (fyke)	monthly	Dithmarschen (e)	Mar 2015 - Feb 2016
Schleswig-Holstein (stow net)	Aug	Dithmarschen (f)	1991 - 2015
	Aug	North Frisia (f)	2001 - 2014
German estuaries (stow net)	May, Sep-Oct	Ems (g)	2009 - 2015
		Weser (g)	2009, 2011, 2013, 2015
		Elbe (g)	2000 - 2014
		Eider (g)	2009, 2012, 2015
Danish rivers (multiple methods)	by species	Danish rivers	1975 - 2015

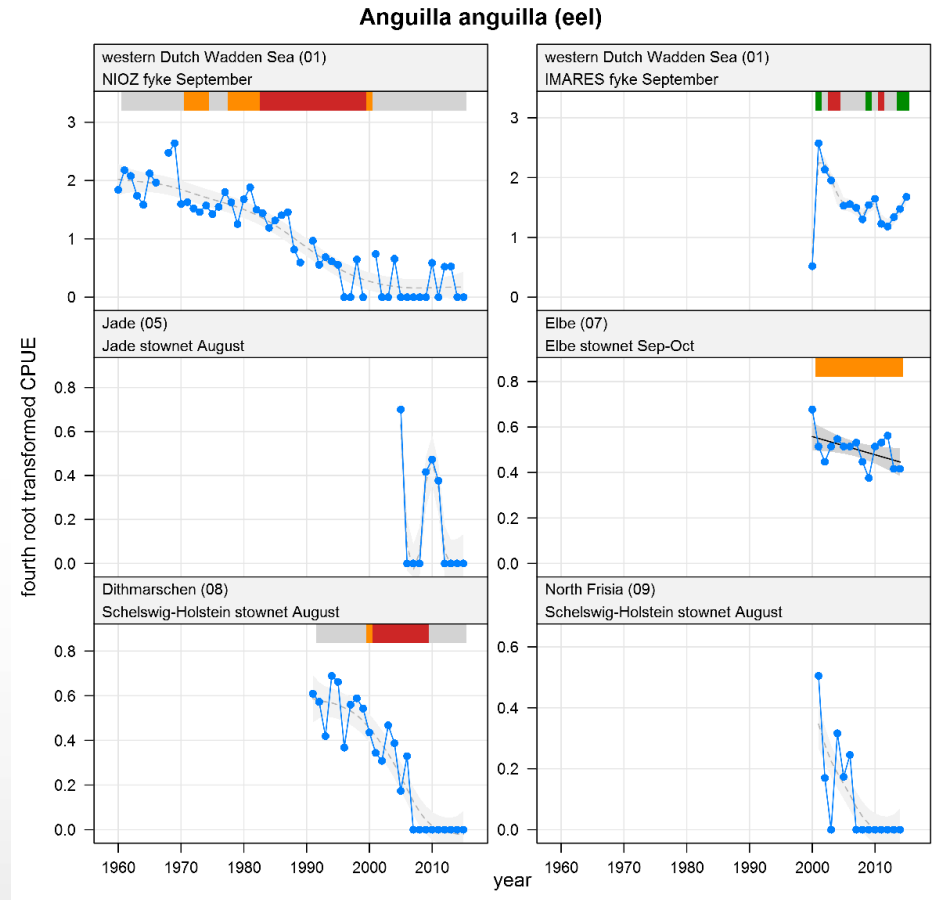


(Tulp et al. (2017). Fish. In: Wadden Sea Quality Status Report 2018.

# Other monitoring activities in the Wadden Sea



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(Tulp et al. (2017). Fish. In: Wadden Sea Quality Status Report 2018.

# Conclusions

- as opportunistic feeders harbour porpoise will prey on what is in or what migrates into the Wadden sea -> quality and quantity?
- There is a general decline in many fish species in the Wadden sea
- There are many diadromous fish species which showed a decline in abundance -> twait shad, smelt, eel, lampreys, salmon
- There can be many reasons for the decline in fish biomass -> climate driven, fishery, migratory routes not passable, loss of spawning habitats, etc...