A large catch of North Sea cod fish is shown in a green fishing net. The fish are densely packed and appear to be fresh, with some showing signs of being recently caught. The background is dark, suggesting they are in a boat or a dark environment.

# Survey results from a Danish collaborative biologist-fishermen project on spatially-explicit management methods (REX) for North Sea cod

**Kai Wieland**

**DTU Aqua**

(National Institute of Natural Resources, Technical University of Denmark)

NSRAC meeting,  
29-30 Oct, York

Photo: Henrik S. Lund

# Survey timing and strategy



Survey period	Days at sea	ICES Rectangles *	Survey strategy
June '06	4	NS 42F6, 42F7	a) no restrictions concerning station selection
Aug '06	9	NS 43F6, 43F7, 42F6, 42F7	
Jan/Febr '07	9	NS 44F5, 43F7, 42F7	b) pairs of different bottom types within 10 nmi distance
June '07	6	NS 43F6, 43F7, 42F6, 42F7	c) 'restricted-random': ICES rectangles divided in 5 * 5 nmi squares; 75 % of squares randomly selected, 25 % of squares selected by fishermen; total number of squares per rectangle differed between fishing method **, Fishing position within 5 * 5 nmi squares chosen by fishermen
Aug '07	9	NS 44F5, 43F6, 43F7, 42F6, 42F6	
Sept '07	6	SK western part (only flyshooter)	
Febr '08	9	NS 45F4, 44F5, 42F6, 42F7	NS: at least 25 % of the stations on sand bottom
June/July '08	6	SK western and eastern part	
Aug/Sept '08	12, 13, 14	NS 44F5, 43F5, 43F6, 43F7, 42F6, 42F7	

## northeastern North Sea:

## Skagerrak (June/July '08):

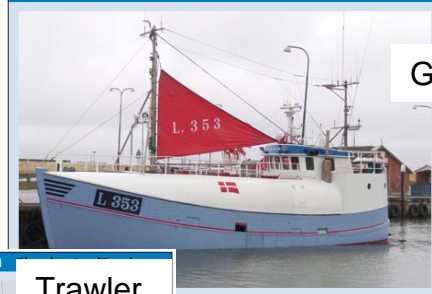
L 426 - ANDERS NEES THYBORØN

Flyshooter



L 353 - BISCAYEN THORSMINDE Gørn

Gillnetter



L 757 - AALTJE POSTMA THYBORØN

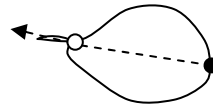
Trawler



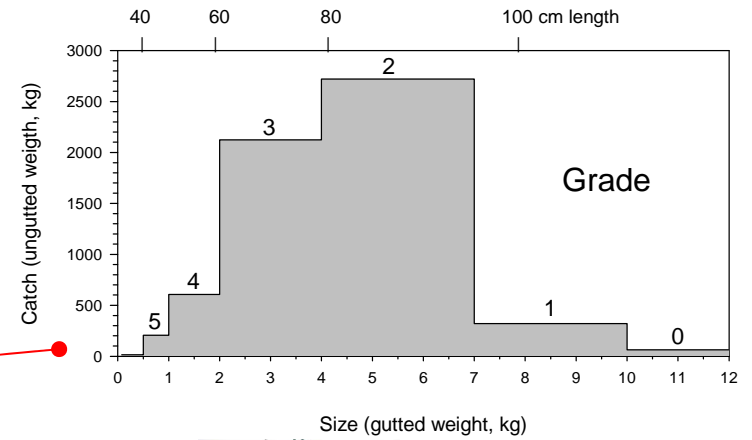
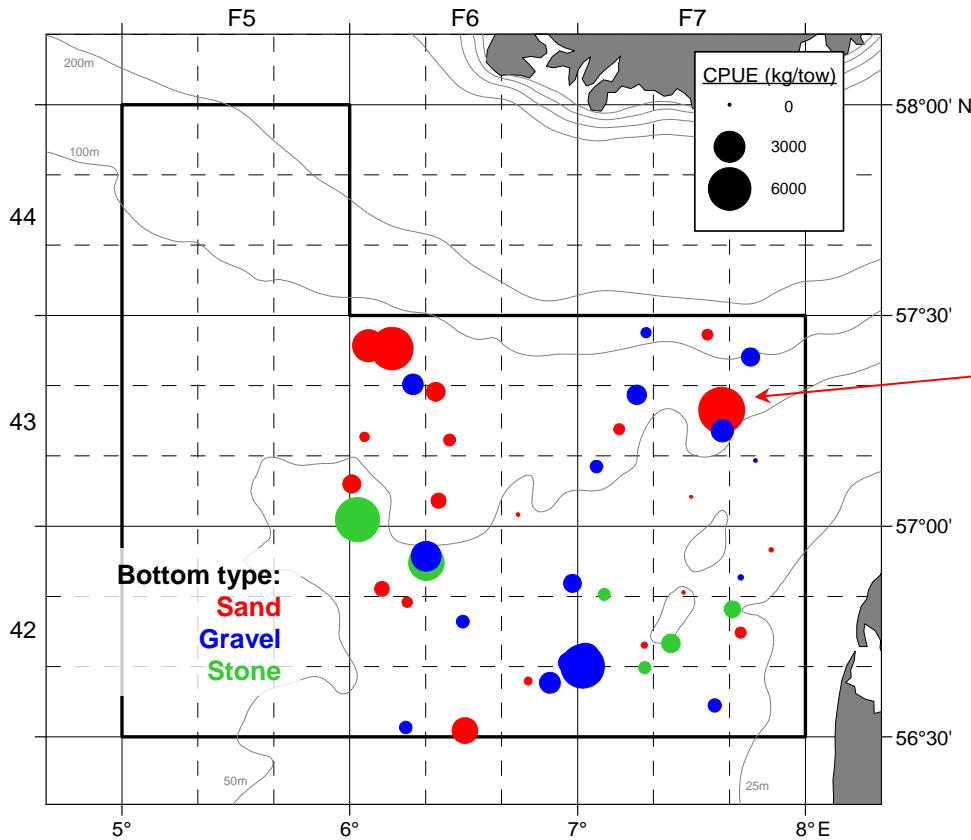
Trawler

\*: area coverage differed between vessels

# Flyshooter (Aug/Sep '08)

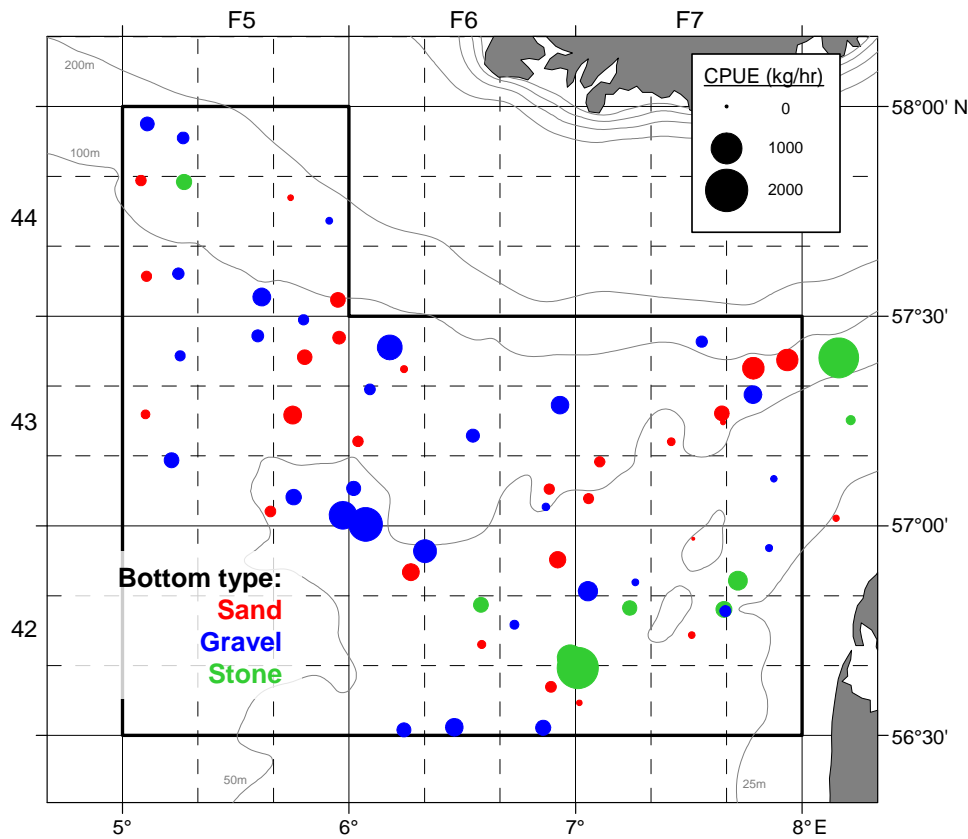


Each 'tow' covers about 1 square mile  
( $\cong$  2 hrs in total, 1 hr 'trawling')



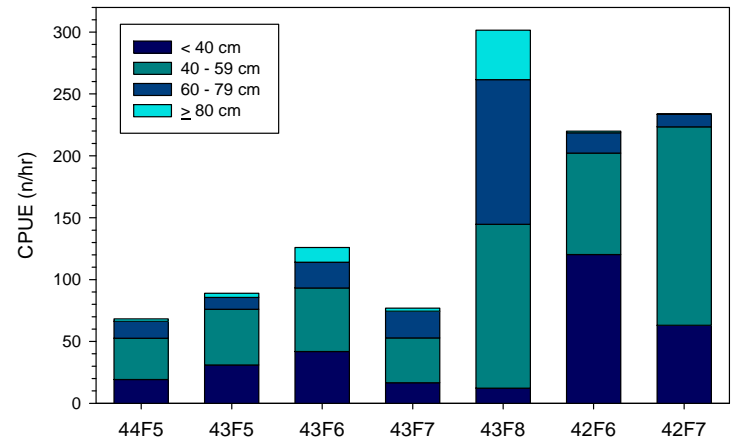
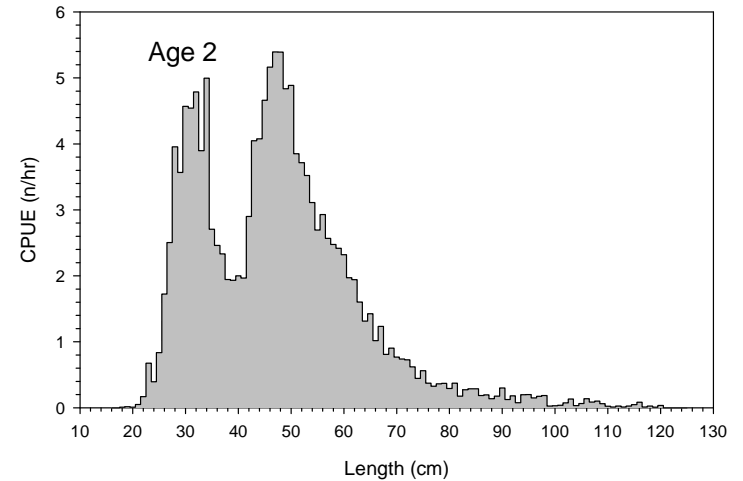
- High catches in 43F6 and 43F7 on 'sand' where
- stomachs were filled with sandeel
  - mainly 'large' (> 60 cm ~ > 2 kg) cod was found
  - in 2 cases catches larger than the codend could hold
  - 1 'station' yielded 15 t in 4 subsequent sets on the same spot
- Cod catches at other stations accompanied by large haddock and hake

# Trawler (Aug/Sep '08)



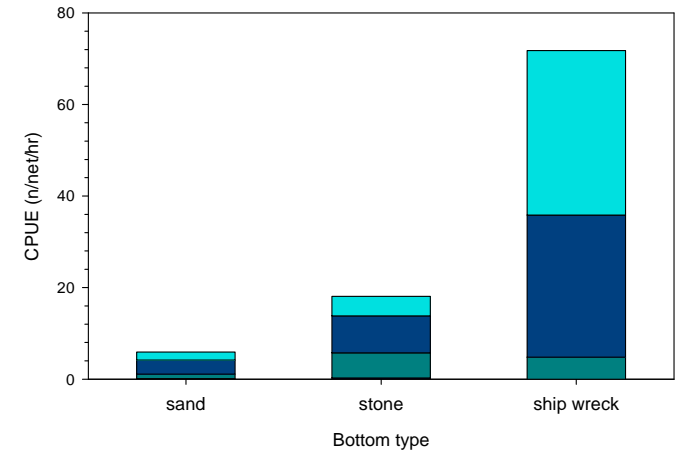
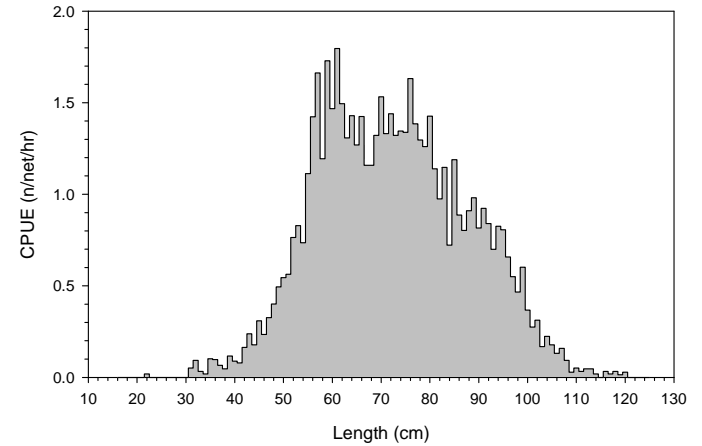
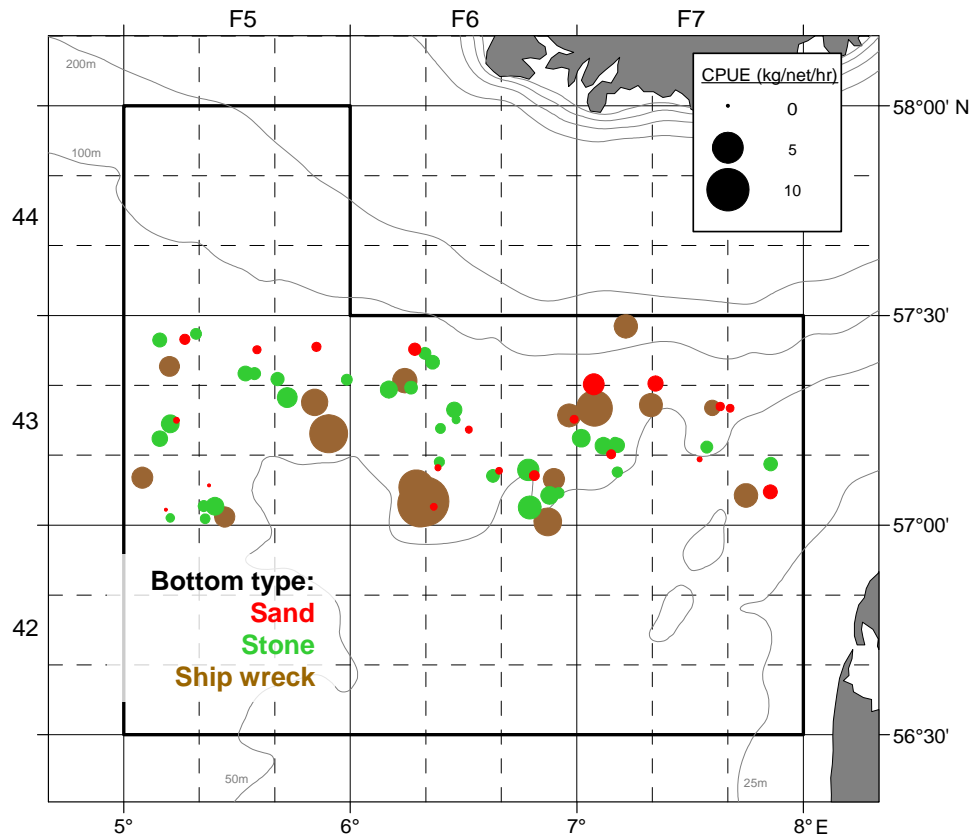
- medium size cod widely distributed
- large cod in high numbers also at the border to the Skagerrak
- cod at most stations caught together with haddock, hake and saithe

105 mm meshsize in cod end (instead of 125 mm, which is usually used) :



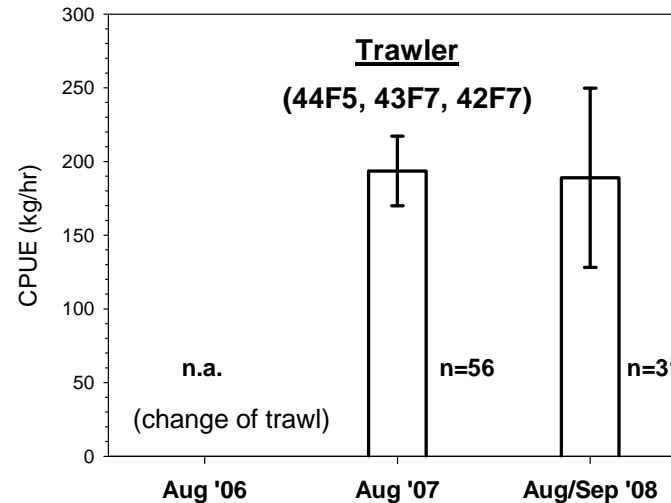
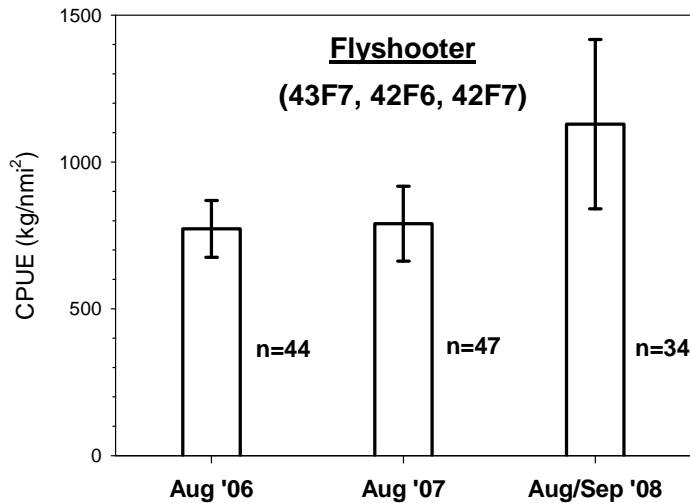
# Gillnetter (Aug/Sep '08)

three different mesh sizes (65, 75 and 85 mm half-mesh),  
usually six nets of each mesh size per station,  
14 hrs soaking time (on average)

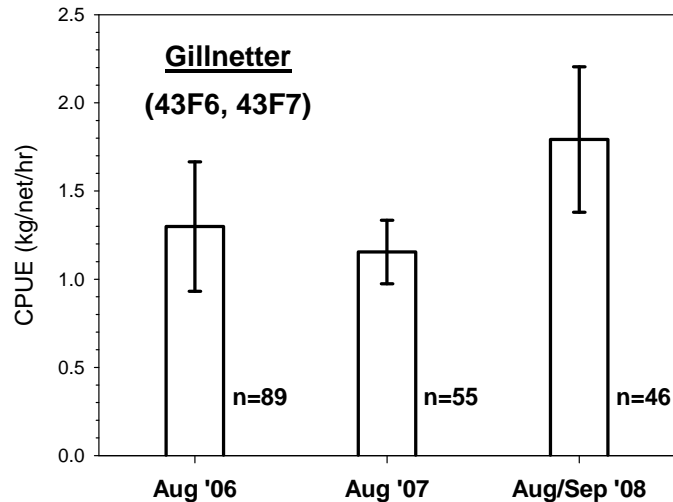


- almost no cod below minimum landing size
- more (large) cod at ship wrecks than on other bottom types

# North Sea – Comparison between years



n: number of stations



- Increase in cod density for flyshooter and gillnetter
- Not such change for the trawler

but:

change in survey strategy (increase in restriction of fishing site selection, in particular since 2007, and lower number of station per rectangle in 2008)

only few rectangles covered at all three survey dates

# Comparison with IBTS

## – CPUE ratios

Assessment says that IBTS catchability is almost constant for age 2 to age 5, but:

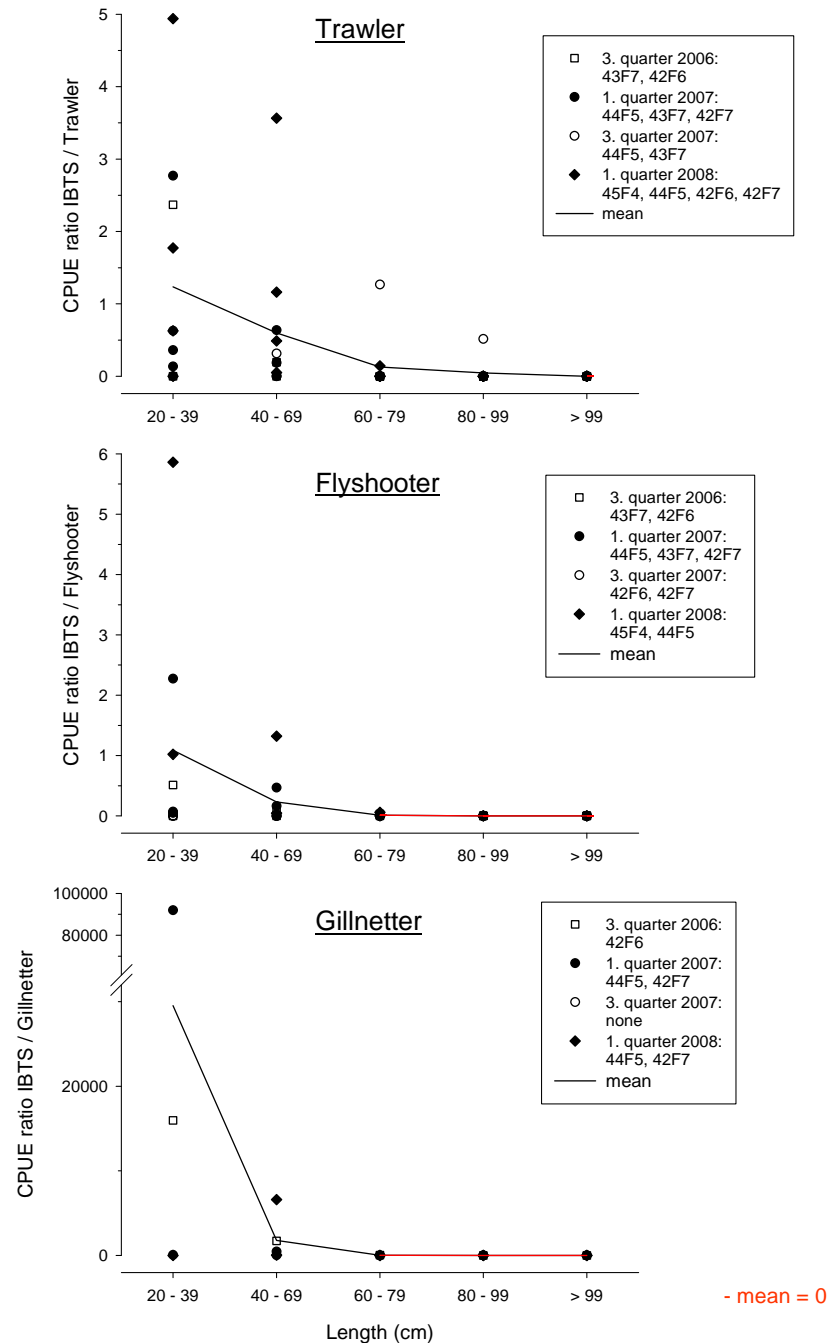
- IBTS catches declines drastically for cod  $\geq 40$  cm, and

- are almost zero for cod  $\geq 60$  cm

in contrast to commercial catches the northeastern North Sea

Needs more detailed analysis:

- by age and quarter
- include more data (3rd quarter '08 and 1st quarter '09)
- restrict to rectangles with positive catches in the IBTS

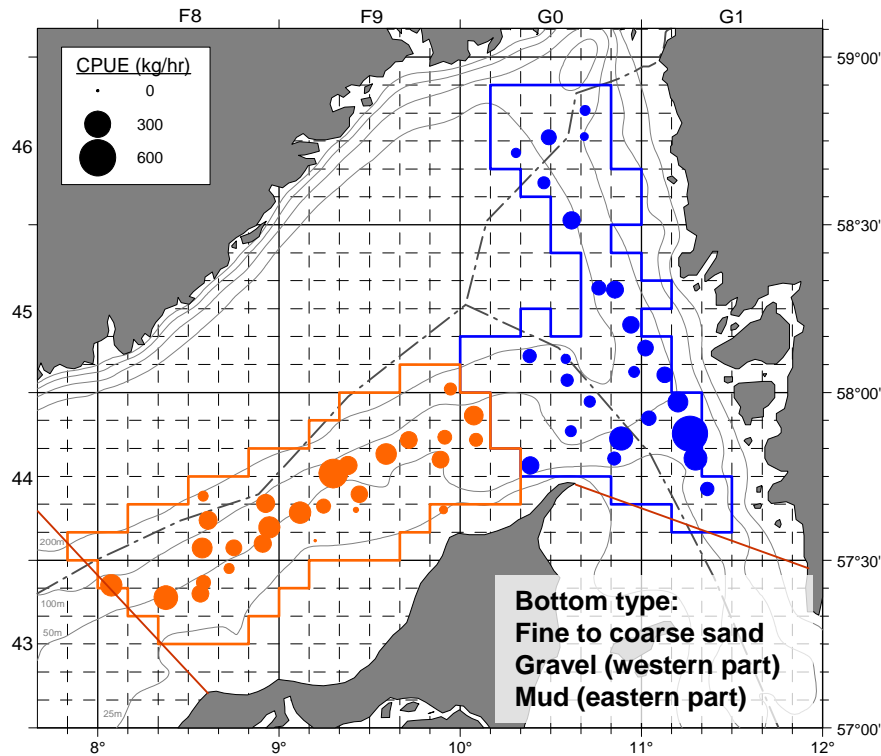


- mean = 0

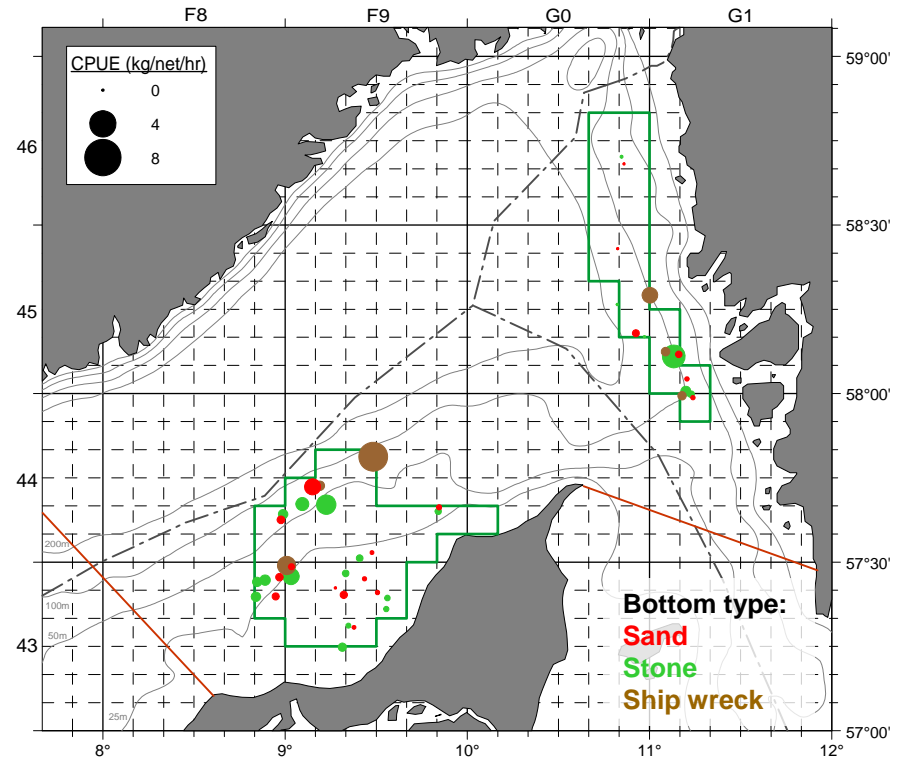
# Skagerrak (June/July '08)

## - Distribution

Trawler:



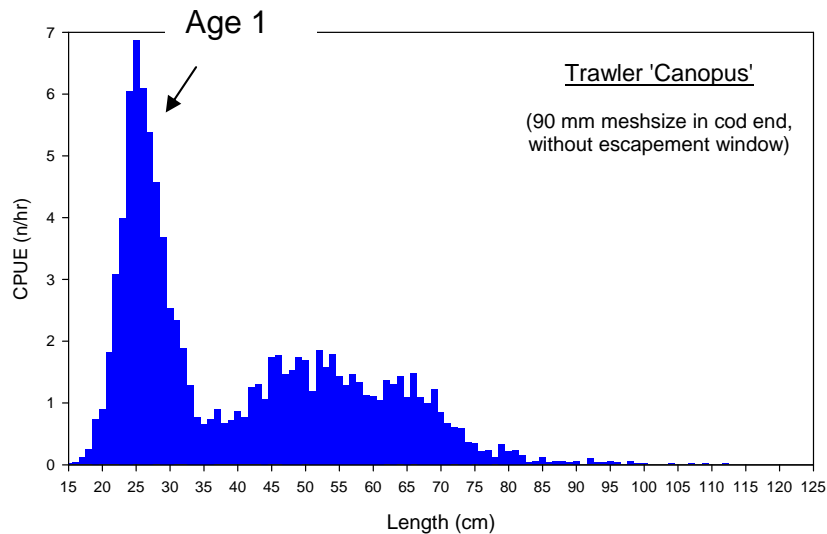
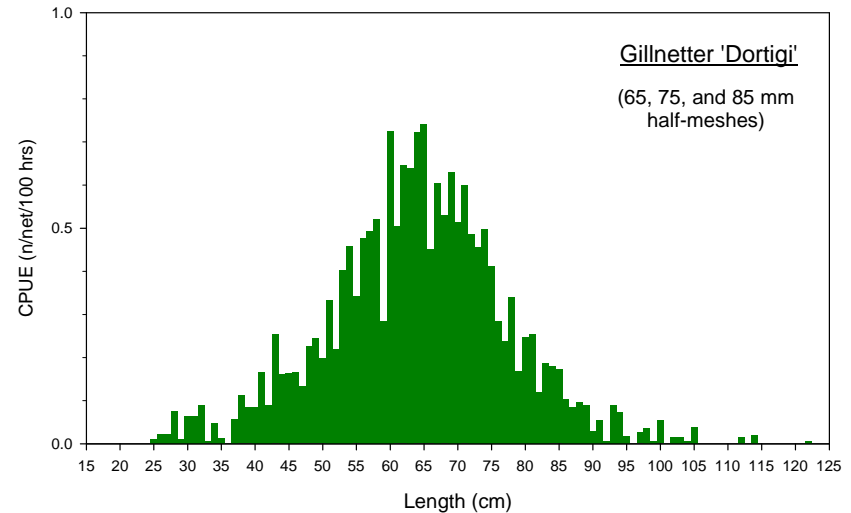
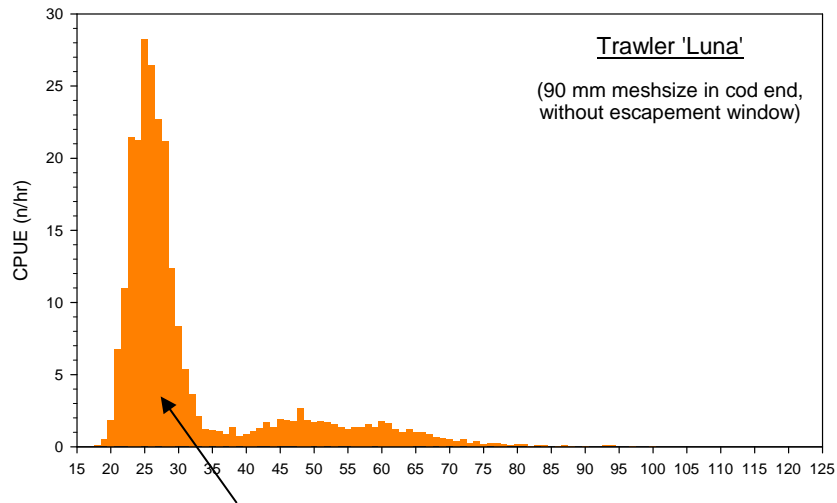
Gillnetter:



- main distribution of cod covered well by the two trawlers
- in addition some good catches by the gillnetter at ship wrecks

# Skagerrak (June/July '08)

## - Size composition



- wide distribution of cod > 40 cm
- high amount of age 1 in trawl catches indicates promising recruitment

Note: size distribution not representative for commercial (trawl) fishery due to:

- small mesh size without escapement window
- restrictions in selection of fishing sites

# Relevance for assessment and management

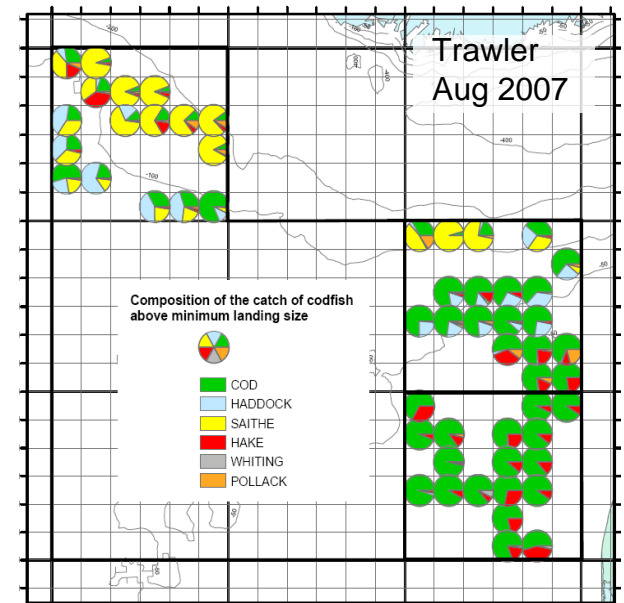
Supplementary information for cod on:

- Distribution by size (and age): geographically and related to habitat
- Catchability in IBTS by size and age (constant for age 2+ ?)
- Catchability in IBTS (dependent on stock size ?)
- Co-occurrence with other commercial species

Justification for:

- Inclusion of fishermen's knowledge
- Re-establishing of representative CPUE series from commercial fleets

(← international reference fleet rather than surveys with commercial vessels covering the entire North Sea, eastern English Channel and Skagerrak ?)



## Acknowledgements

### Coordination:

Jan Beyer (DTU Aqua)   Kurt Madsen (DF)

### Fieldwork:

#### Skipper

Tonny Nees  
Tamme Bolt  
Kenneth Nielsen  
Jesper Nielsen  
Jens Poulsen  
John Jacobsen  
and their crews

DF: Henrik S. Lund

#### DTU Aqua:

Kai Wieland  
E. Maria F.-Pedersen  
Hans J. Olesen  
Per Christensen  
Søren L. Grønby  
Jan Pedersen  
Rasmus F. Jensen  
Jan Jensen  
Flemming Thaarup

.... and others

Funding: Danish Ministry of  
Food, Agriculture and Fishery



Photos: Henrik S. Lund