

# Results of the Danish sandeel fishery in 2010 and outlook for the future.

*Resultater fra det danske tobisfisket i 2010 og utsiktene framover.*

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Section for Population Ecology and -Genetics

# DTU Aqua – National Institute of Aquatic Resources – is an institute at the Technical University of Denmark (DTU).



DTU Aqua was previously known as **DIFRES** - Danish Institute for Fisheries Research.



DTU Aqua

## Hirtshals

Monitoring and data  
Fisheries technology  
Aquaculture



## Dana

Marine research and monitoring

DTU Aqua  
Havundersøgelsesskibet  
Dana

Risø DTU  
Vindmølle-  
prøvestation

DTU Aqua

DTU Veterinærinstituttet

Risø DTU

DTU



## Charlottenlund

Marine research and technology  
Monitoring and data  
Administration

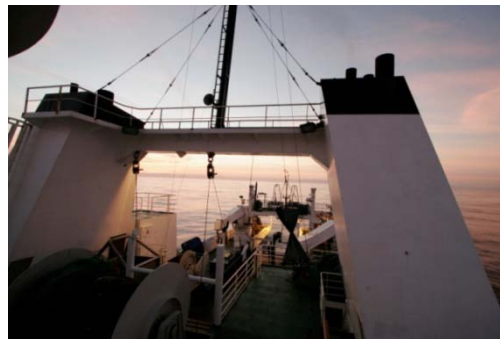


## Silkeborg

Freshwater  
Population genetics

# DTU Aqua

The purpose of **DTU Aqua** is to provide research, advice and education at the highest international level within the sustainable exploitation of living marine and freshwater resources, the biology of aquatic organisms and the development of ecosystems as well as their integration in ecosystem-based management.



# Research, public consultancy and education

## Research areas:

- Oceanography
- Marine populations and the dynamics of marine ecosystems
- Living resources and fisheries – status and forecasts
- Population genetics
- Individual physiology, behaviour and adaptation
- Fisheries management
- Integrated, ecosystem-based marine management
- Fisheries technology
- Monitoring technology
- Structure and function of coastal and estuarine ecosystems
- Aquaculture systems, methods and environmental impacts
- Nutrition, growth, welfare and quality
- Freshwater fisheries.

## Public sector consultancy and business consultancy

DTU Aqua advises the Danish Ministry of Food, Agriculture and Fisheries and other public authorities

The agreements cover research, development and monitoring activities, advisory tasks for public authorities and the fisheries industry as well as communication.

## Education

DTU Aqua has a PhD school with 30 students together with University of Copenhagen offer: MSc programme in Aquatic Science and Technology.

DTU Aqua also designs courses for various BSc programmes and offers BSc and MSc projects for students at DTU and other universities.

# Sandeel fishery – DTU AQUA activities

- Monitoring
- Research
- Advice giving



# Monitoring of sandeel

- Monitoring of the Danish sandeel fishery
  - Real Time Monitoring (RTM) by sampling from landings during the monitoring period
  - Fisheries Directorate sampling from vessels and landings
  - Fisher samples on a haul by haul basis
  - VMS and logbook records
- MIK samples
  - Modified 1 m<sup>2</sup> MIK hauls for larval abundance at fishing grounds
- Dredge survey
  - Nov.-Dec. abundance of the recruited 0-group sandeels at fixed stations on fishing grounds
  - 1<sup>st</sup> Q IBTS dredge samples (occasional)



# Development of the Danish sandeel fishery

## Background

### DFAD (Danish Fisheries Analysis Database)

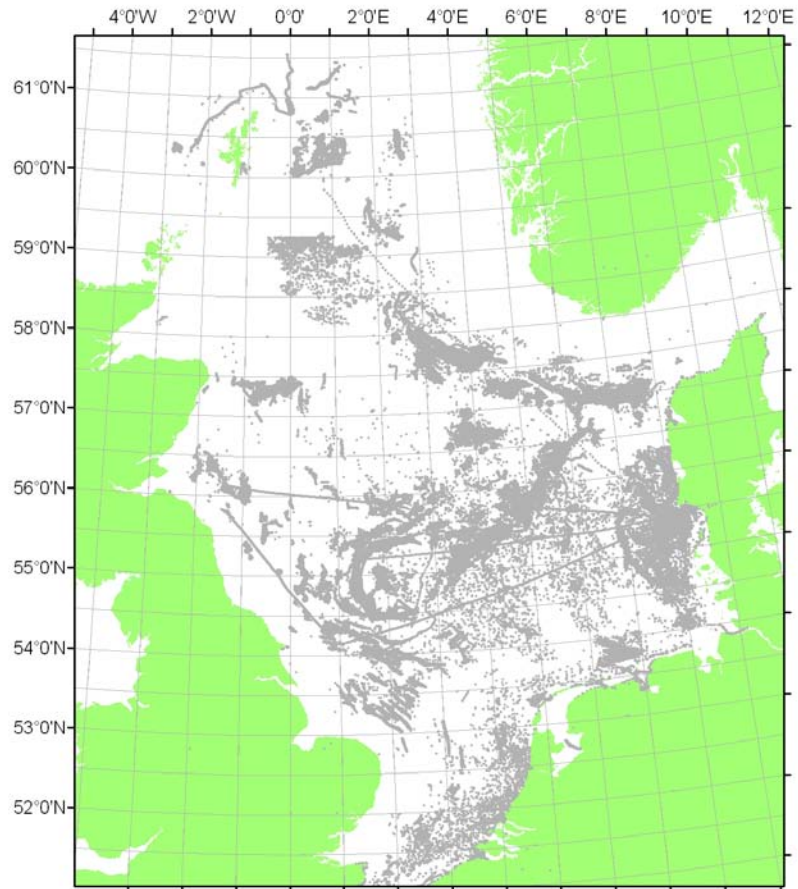
- Combination of the logbook register, the sales slips register and the vessel register from the Danish Directorate of Fisheries
- On trip basis (the logbooks are based on fishing days)
- ICES square
- 1987-2010

### VMS (Vessel Monitoring System)

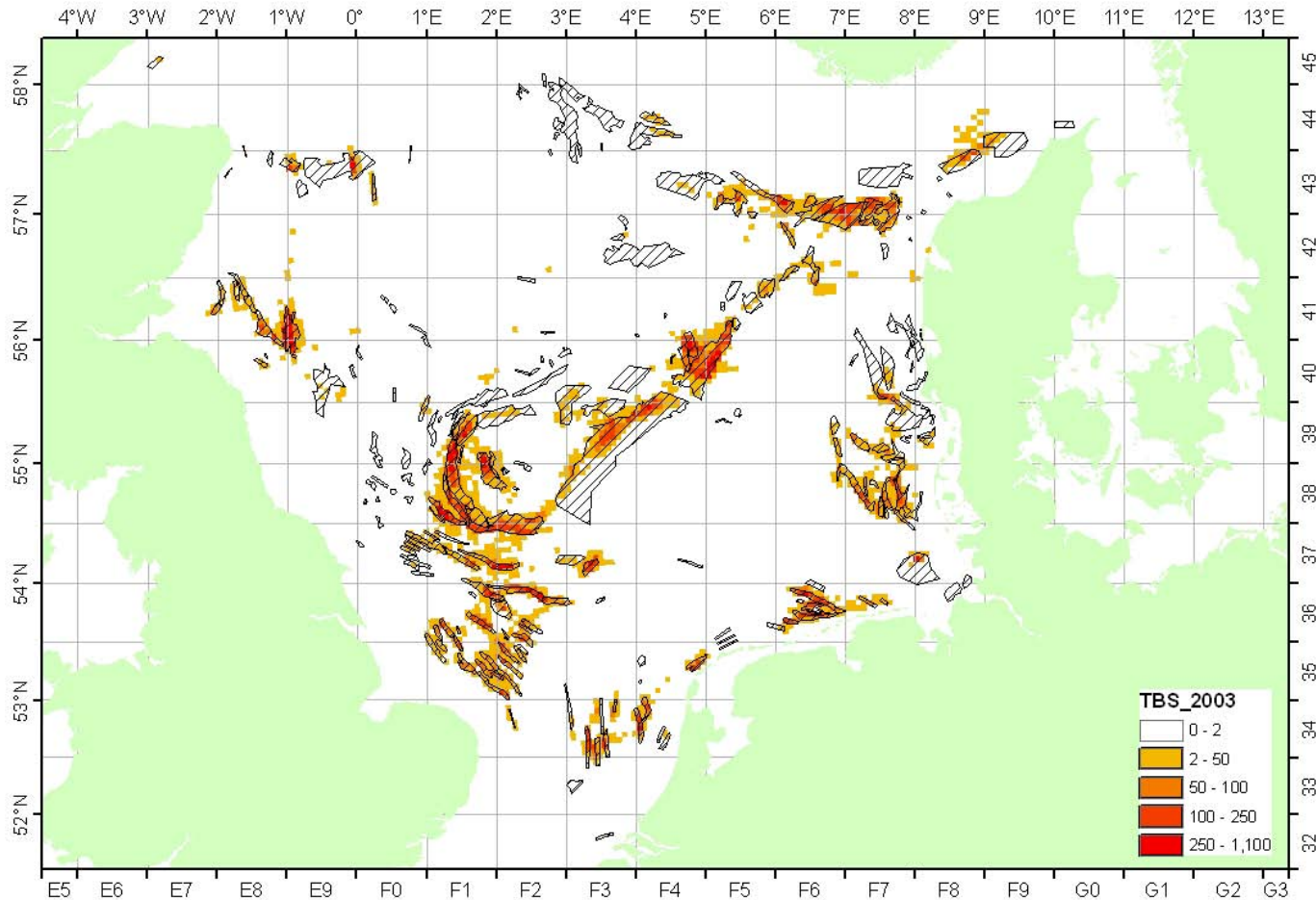
- Positions every hour
- Contains information about:
  - Vessel ID
  - Date
  - Time
  - Longitude
  - Latitude
  - Direction
  - Speed
- The maps are based on VMS data from 2003 to 2010



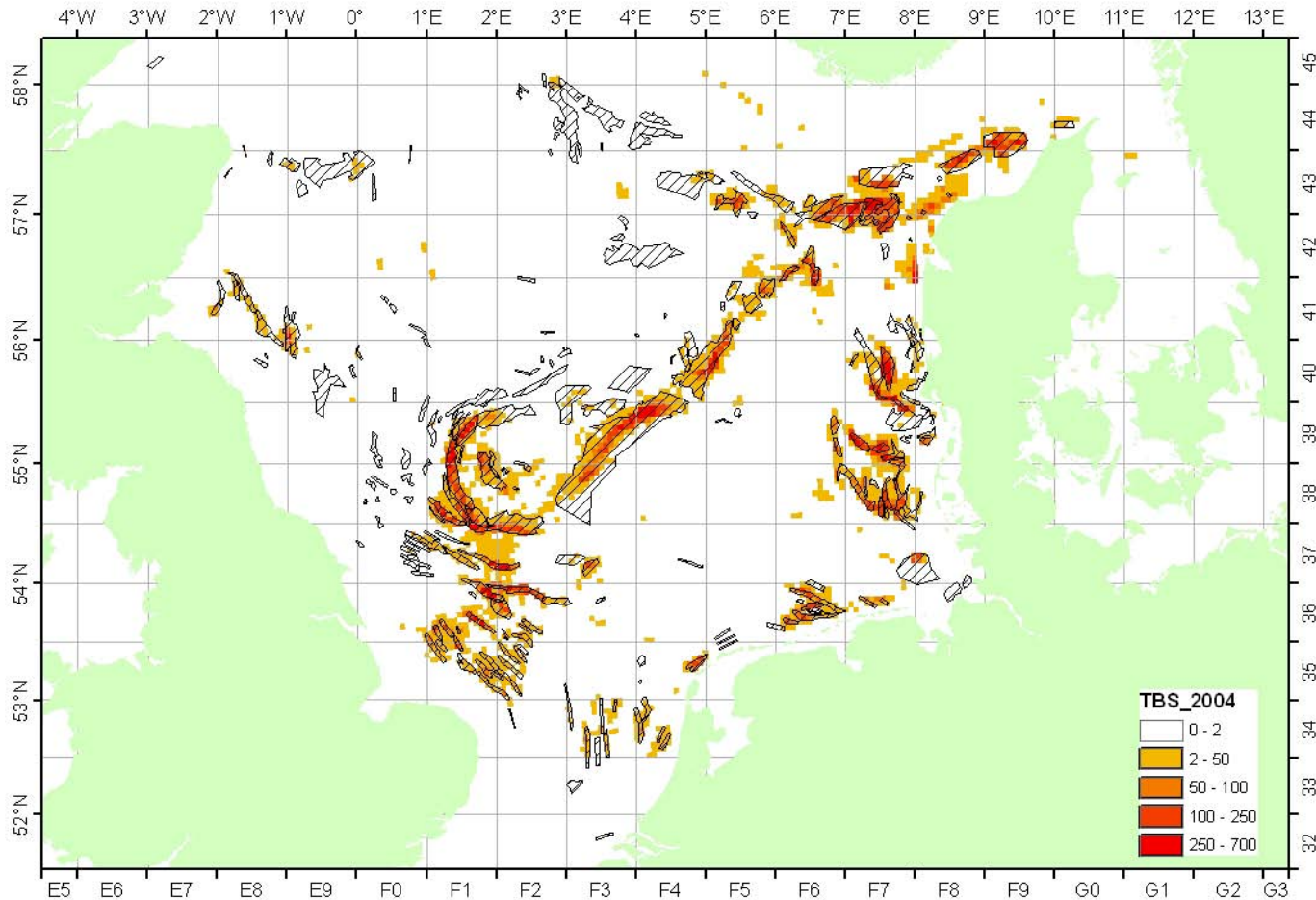
# Sandeel banks – from fishing track records and sediment analyses to maps



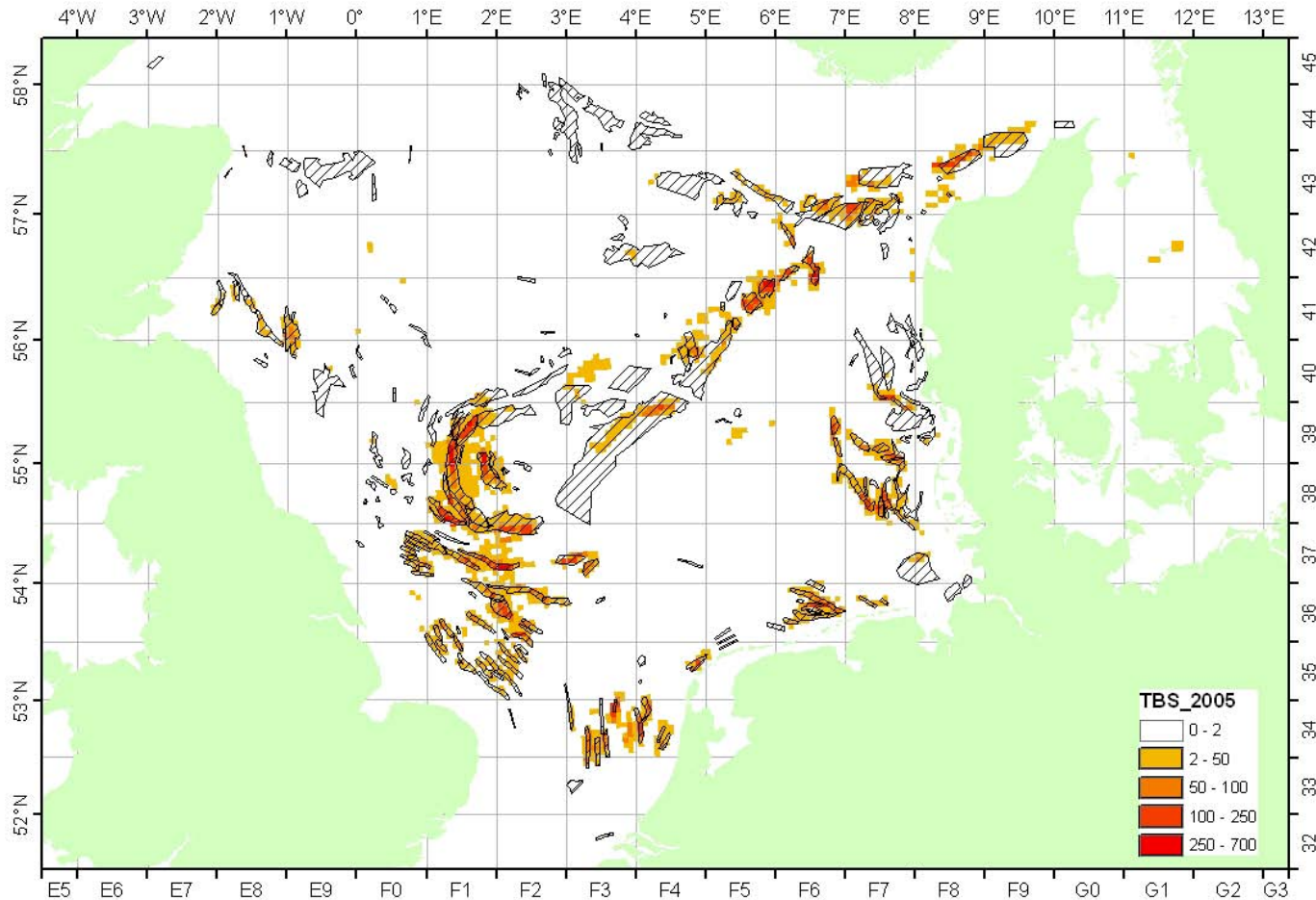
# Effort distribution per year - 2003



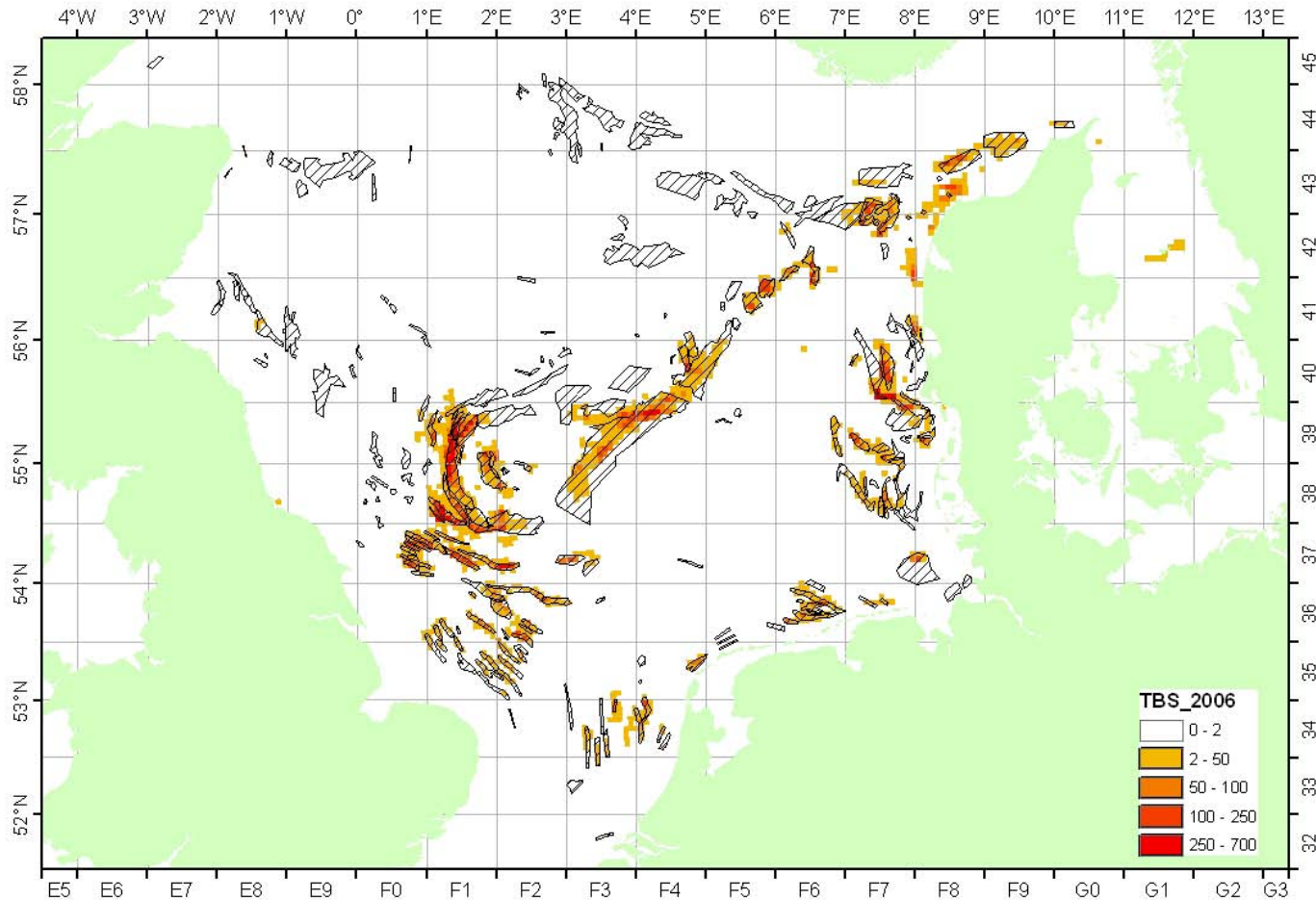
# Effort distribution per year - 2004



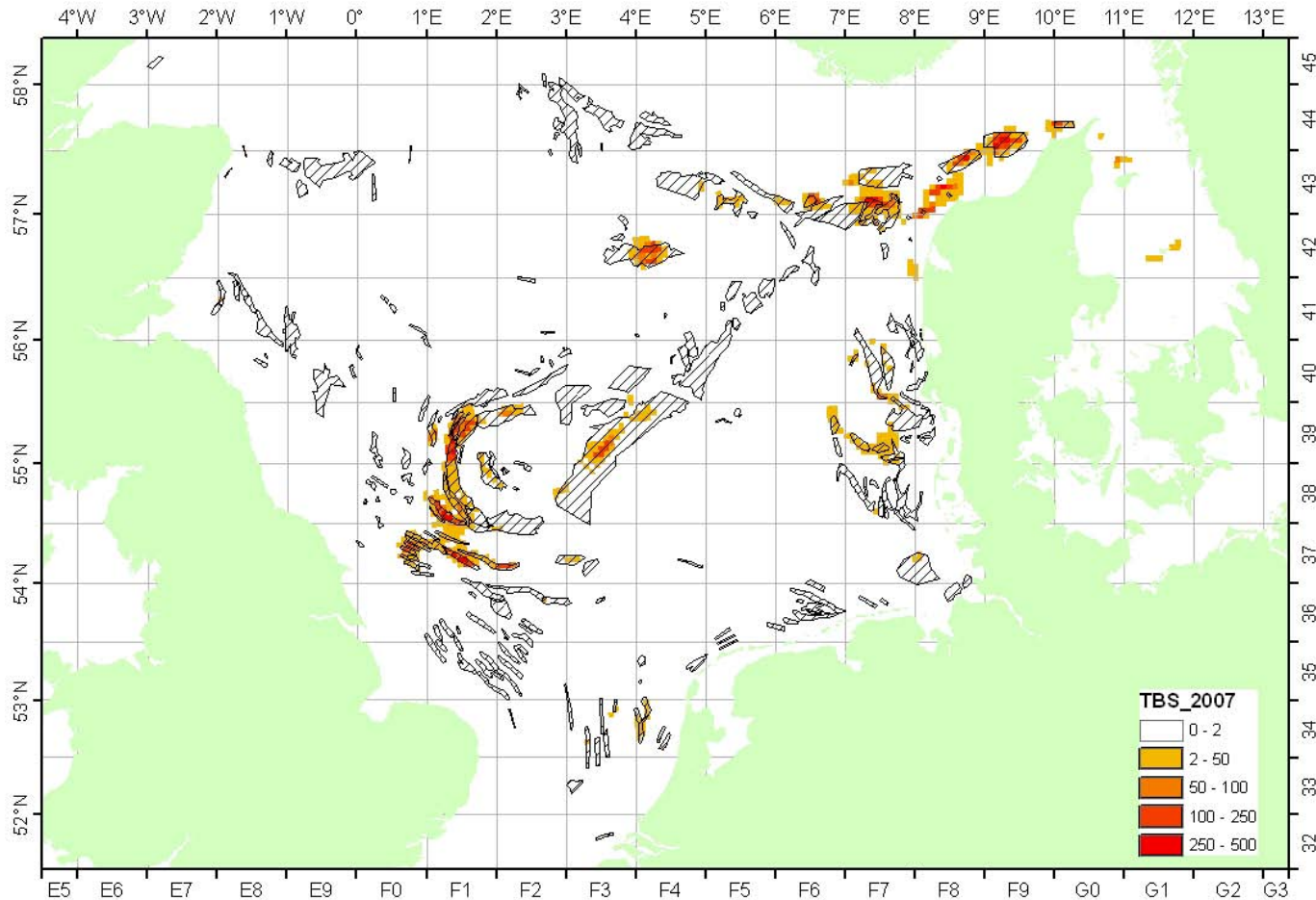
# Effort distribution per year - 2005



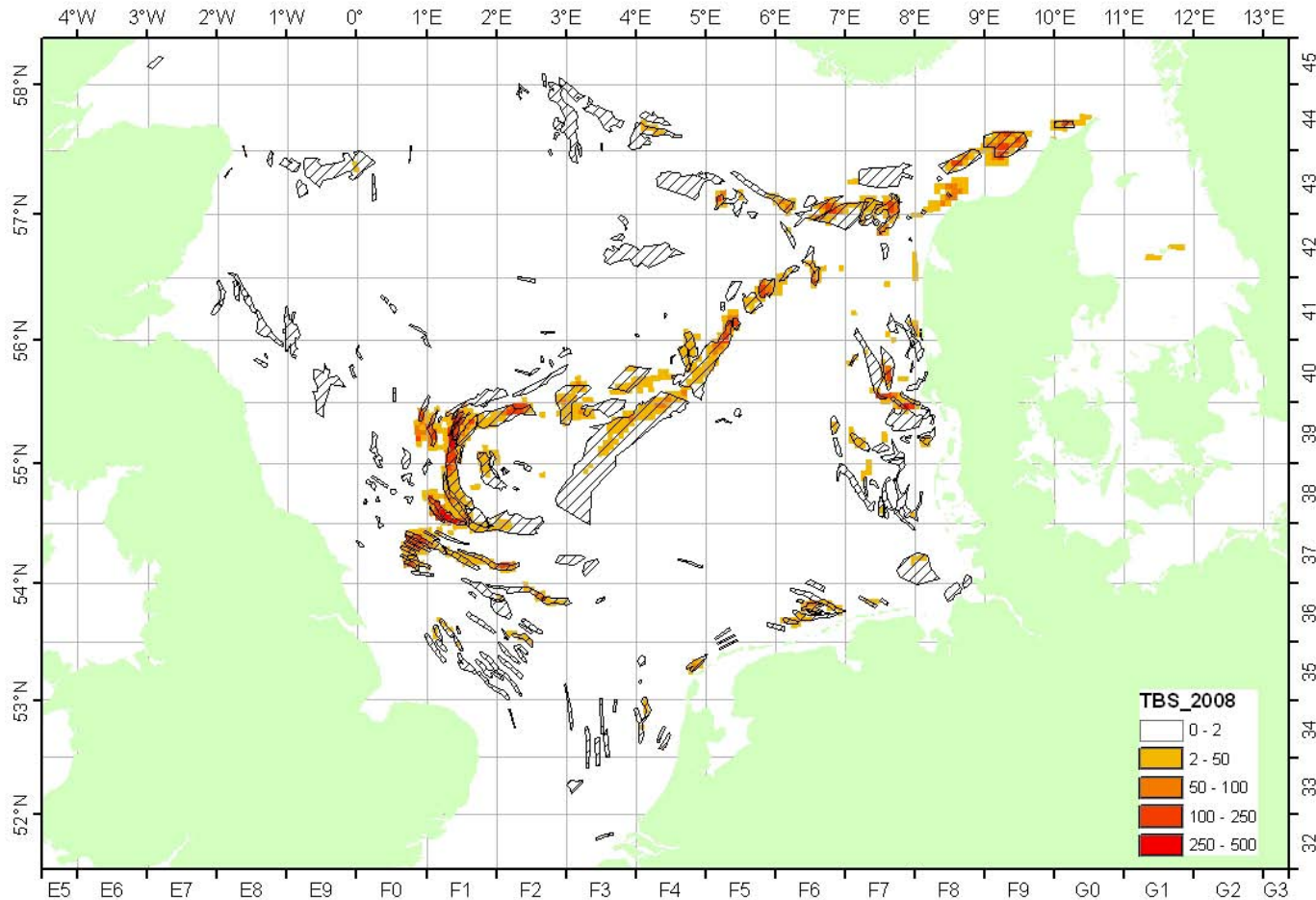
# Effort distribution per year - 2006



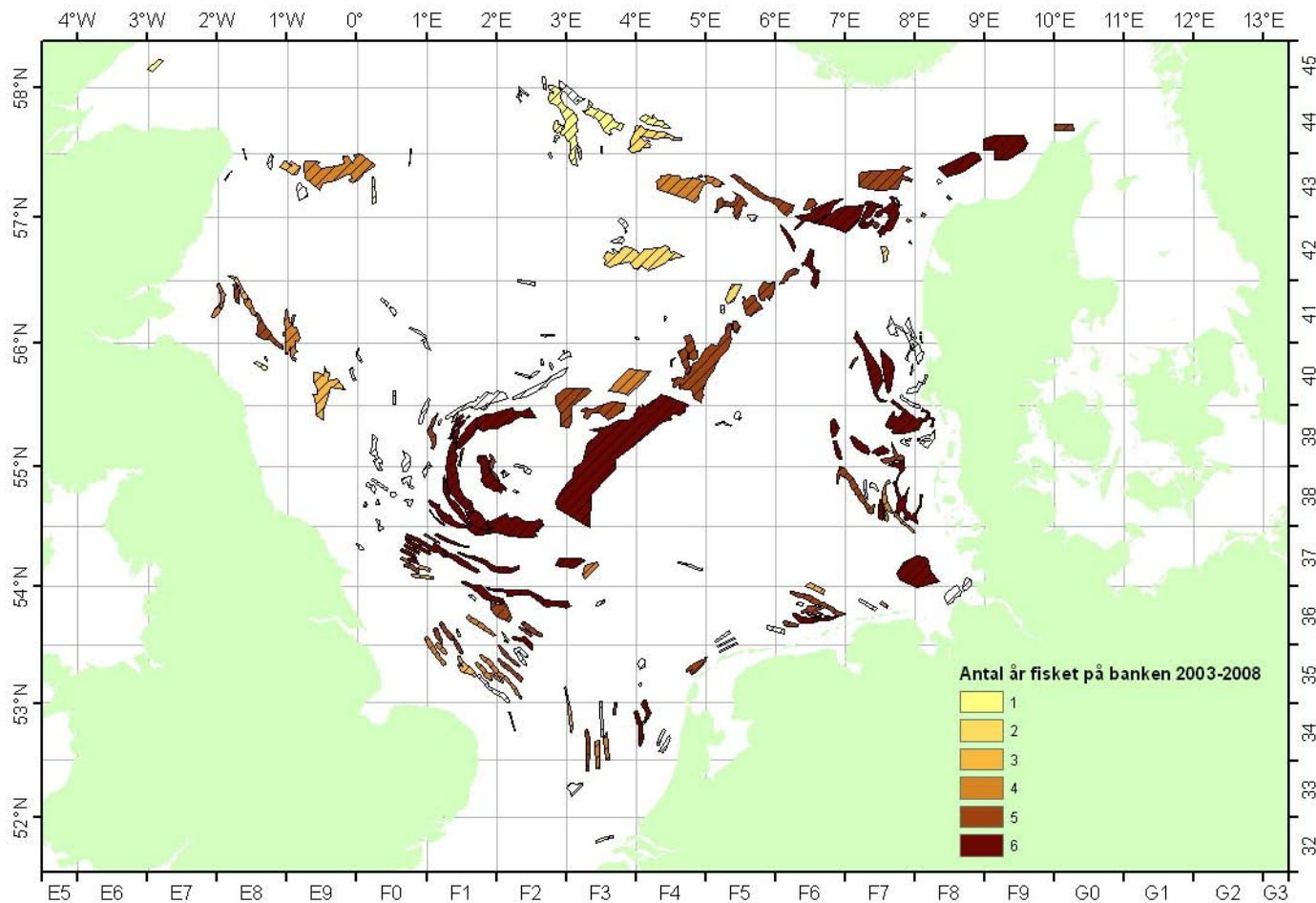
# Effort distribution per year - 2007



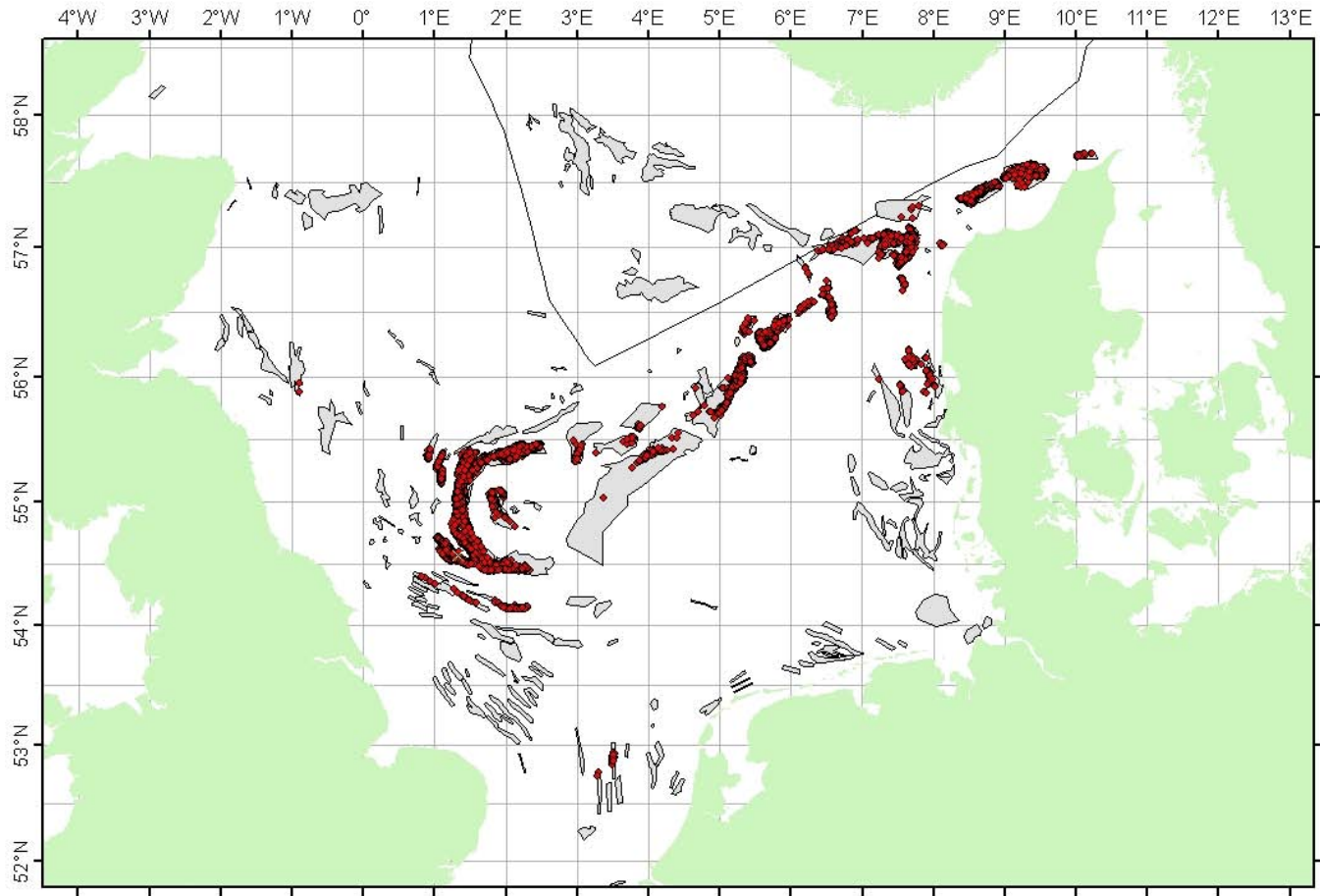
# Effort distribution per year - 2008



# Number of years (2003-2008) with a sandeel fishery by bank



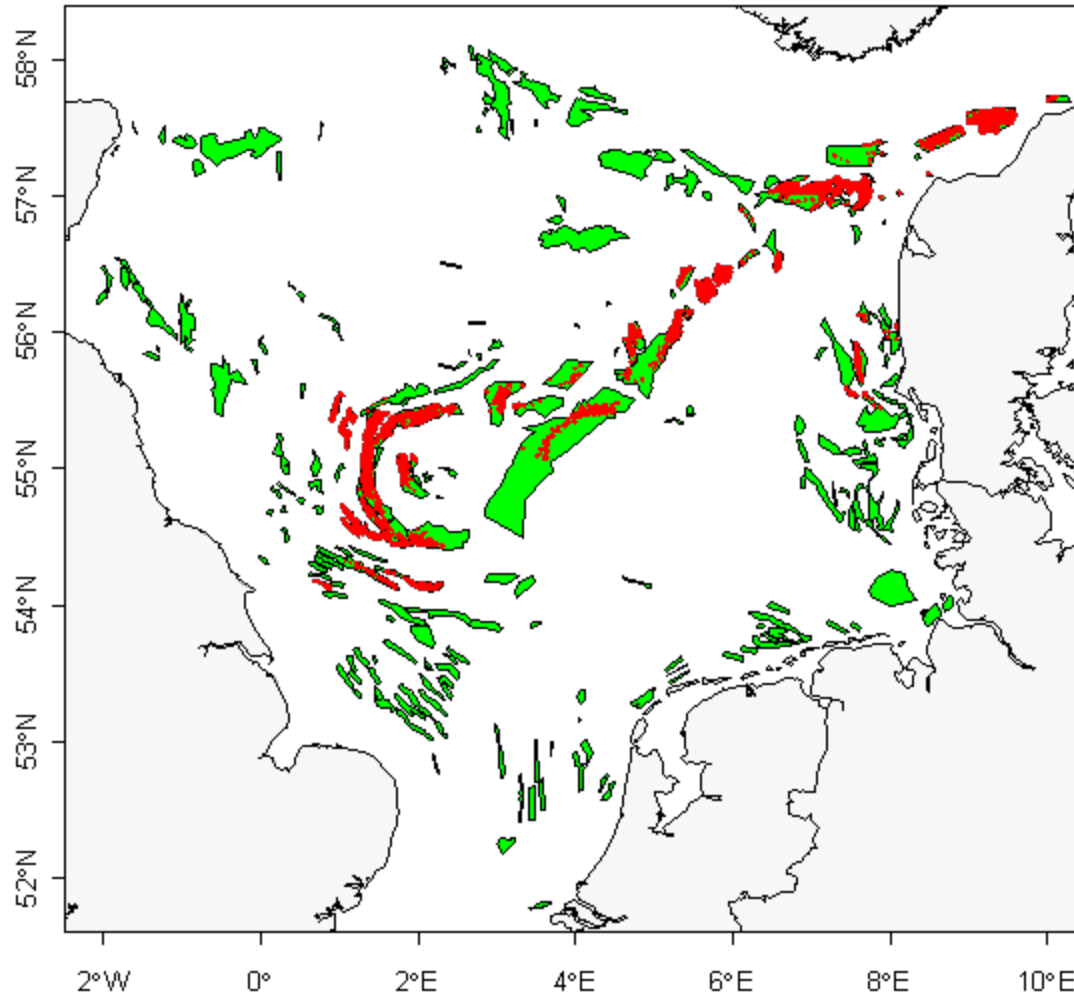
# Distribution of effort during RTM 2009



## VMS data, Danish vessels in the **RTM sandeel fishery**.

Red dots represent each one hour of fishing on known sandeel grounds.

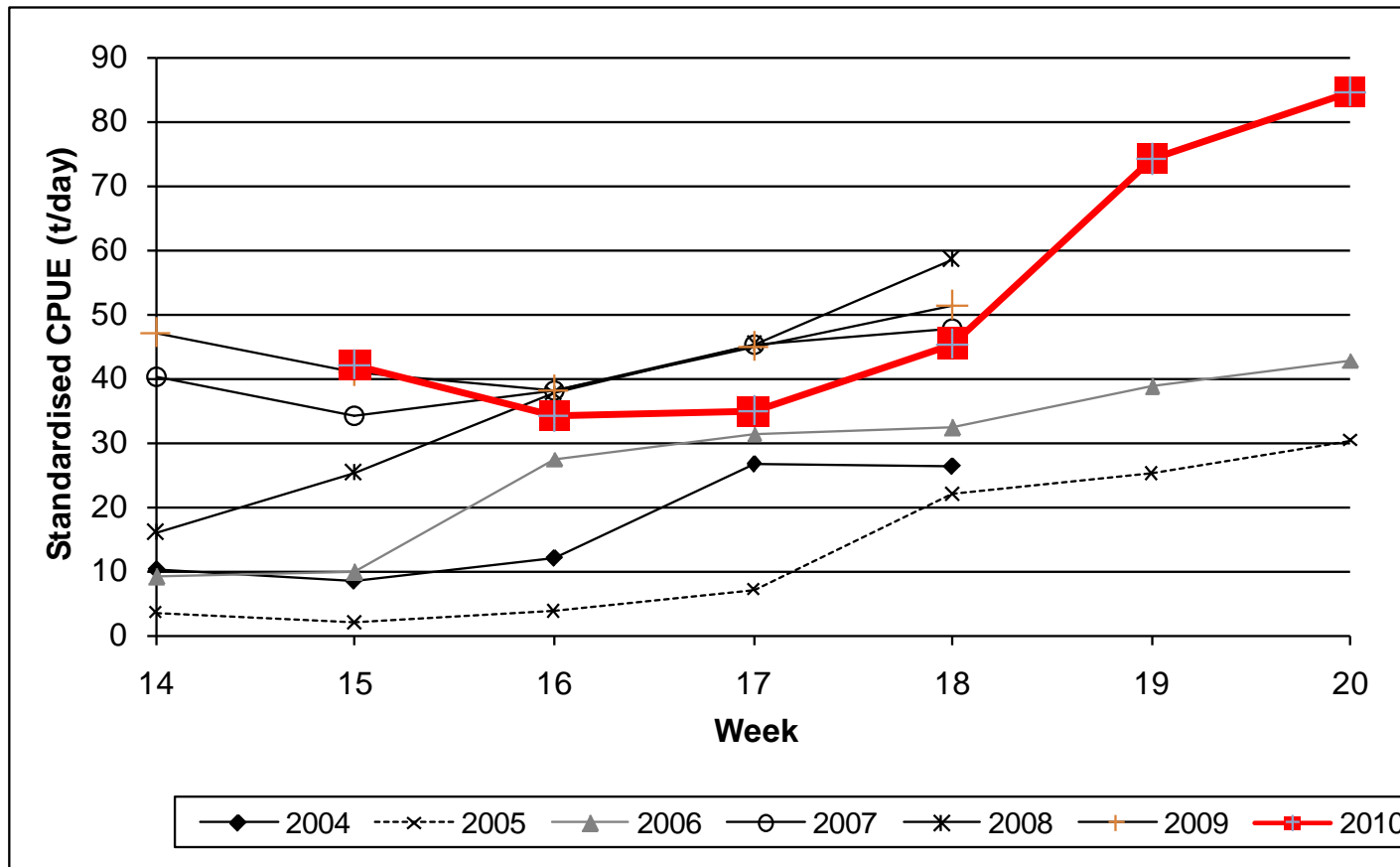
*(ship velocity between 1-5 knots logged between 4am to 9pm)*



**RTM** Landings in weight from all available trips (left hand panel) and number of biological samples (right hand panels) by ICES rectangle for the Danish North Sea sandeel fishery.

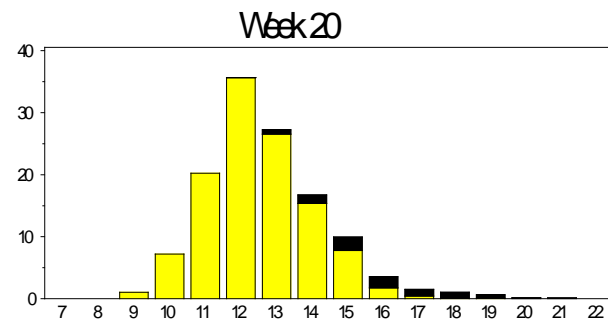
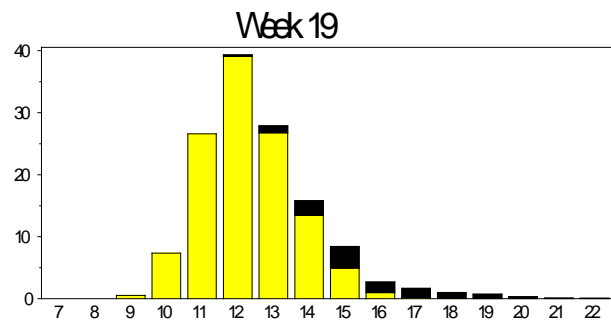
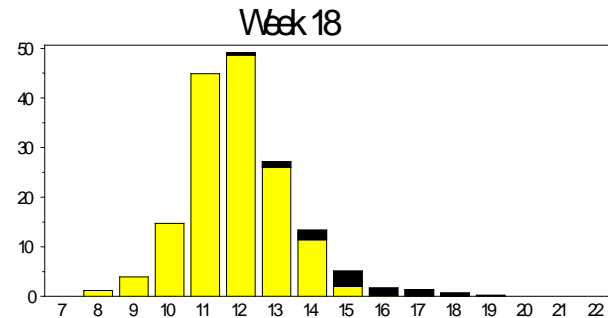
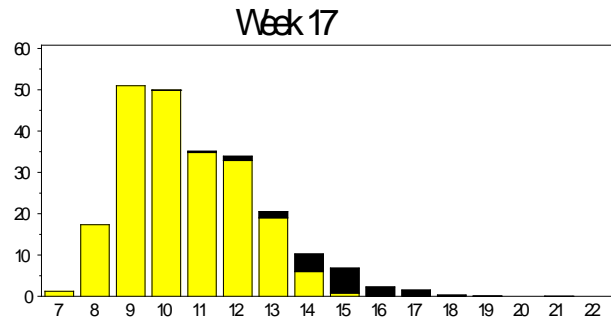
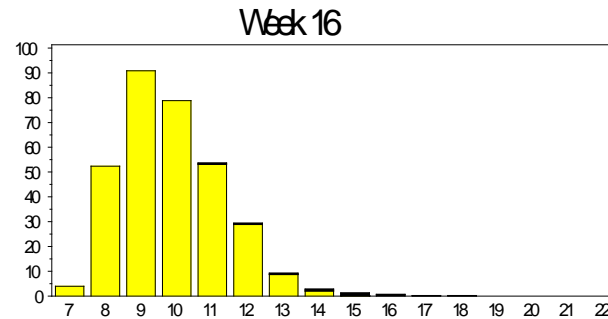
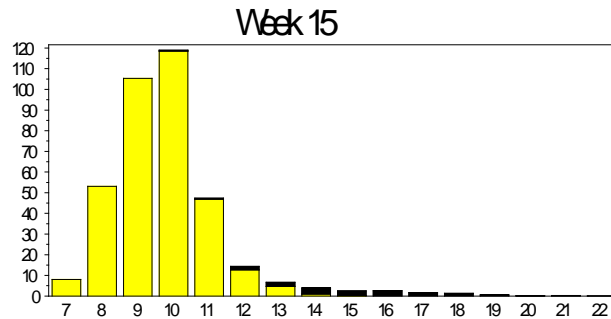


# RTM Standardised CPUE by week and year.

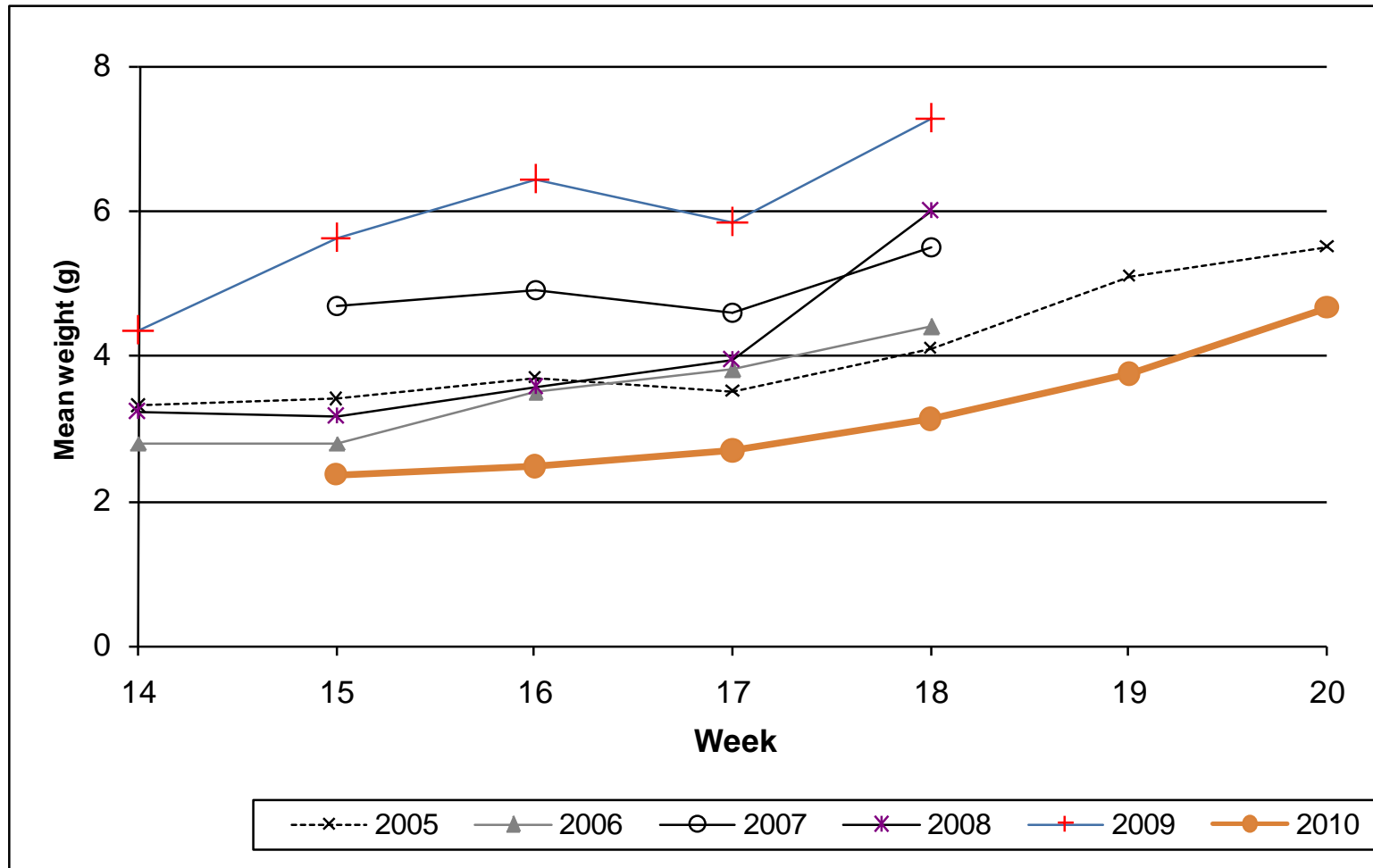


# RTM 2010 Number of sandeels at length in one kg fish for each week.

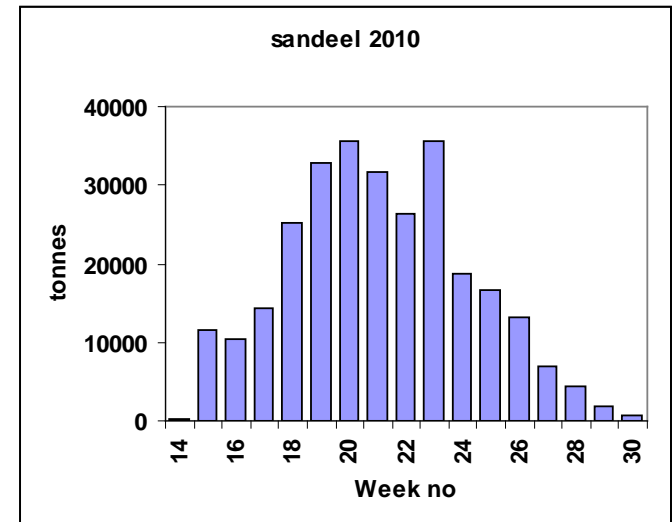
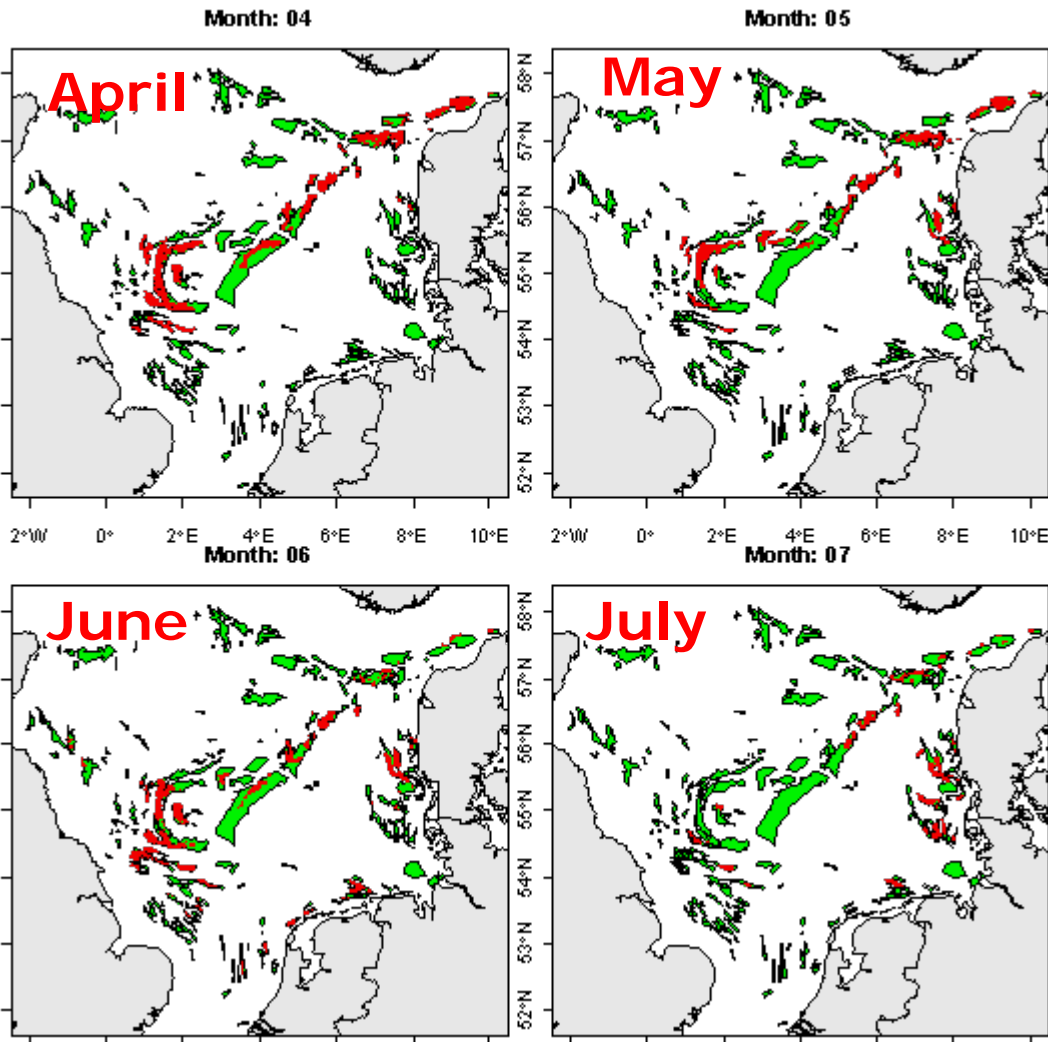
age 1 = yellow, age 2 and older = black.



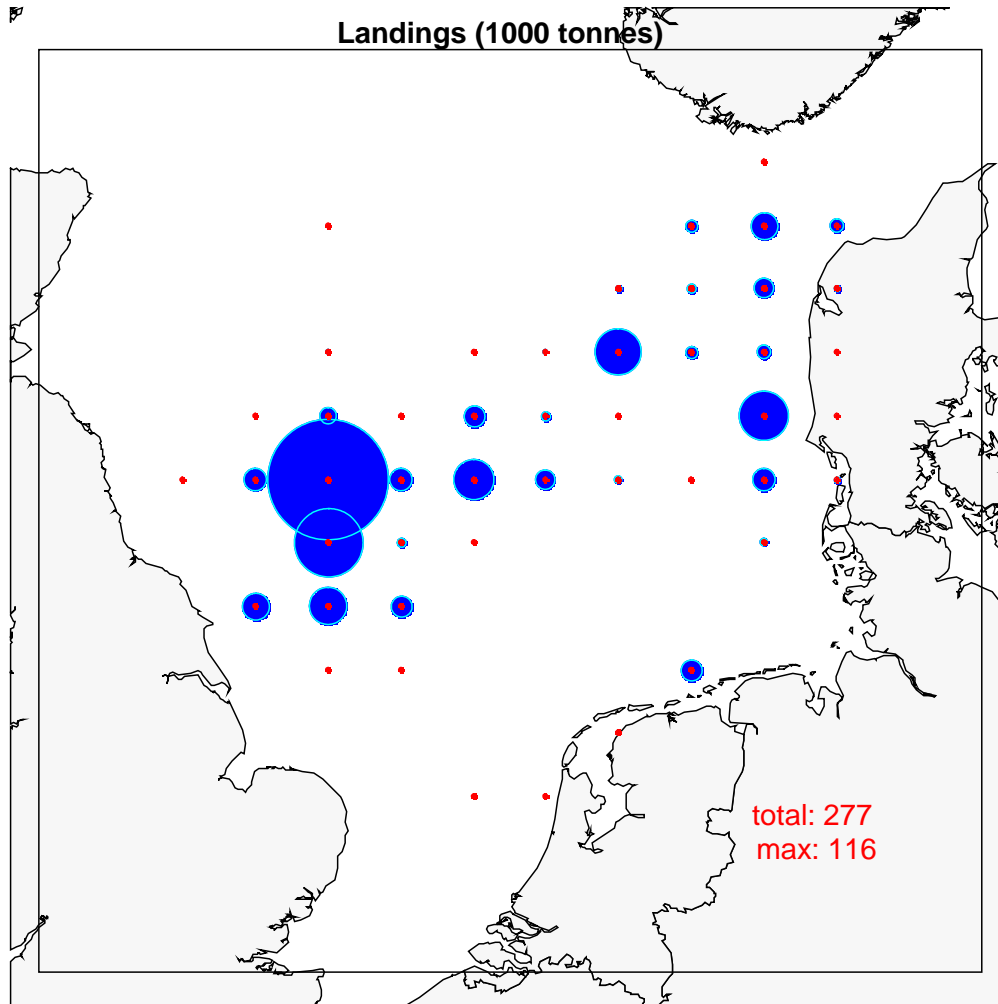
## RTM: Mean weight of 1-group sandeels by week and year



# Danish sandeel fleet distribution of effort by month in 2010



# Danish total sandeel catches 2010

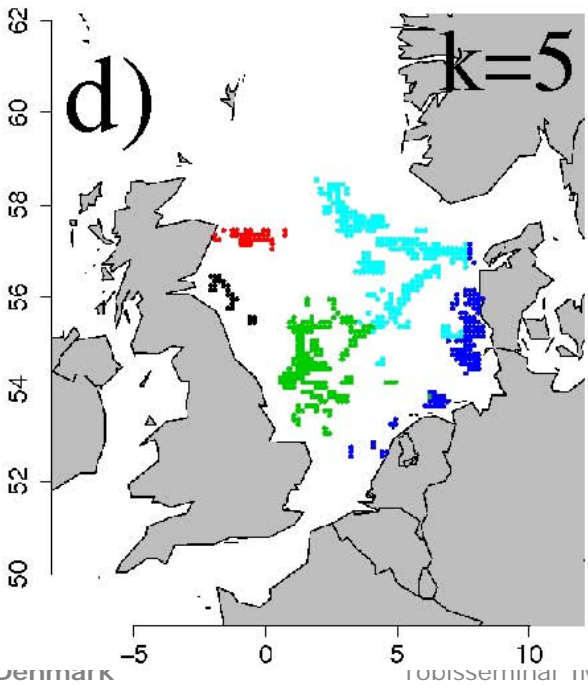
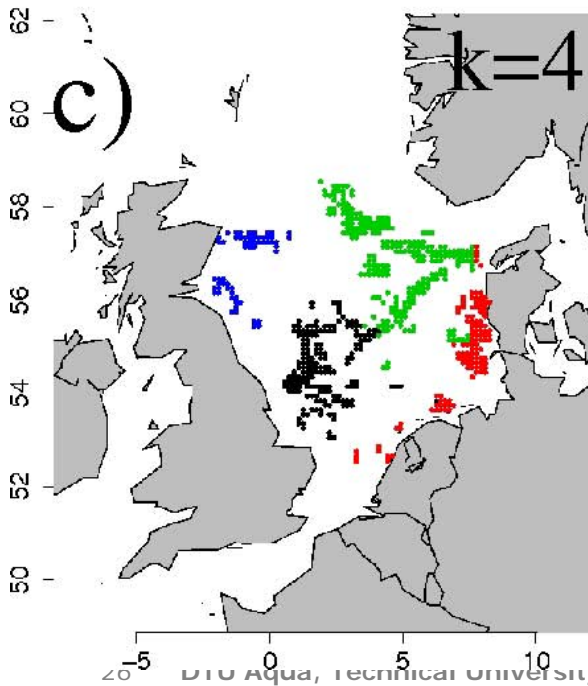
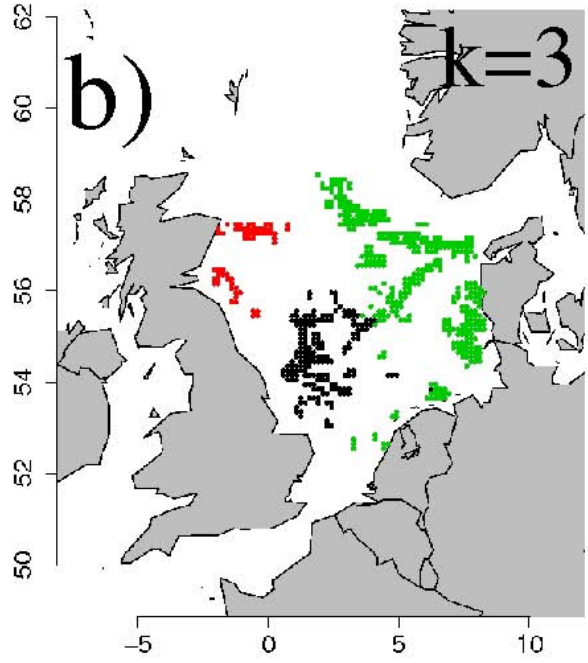
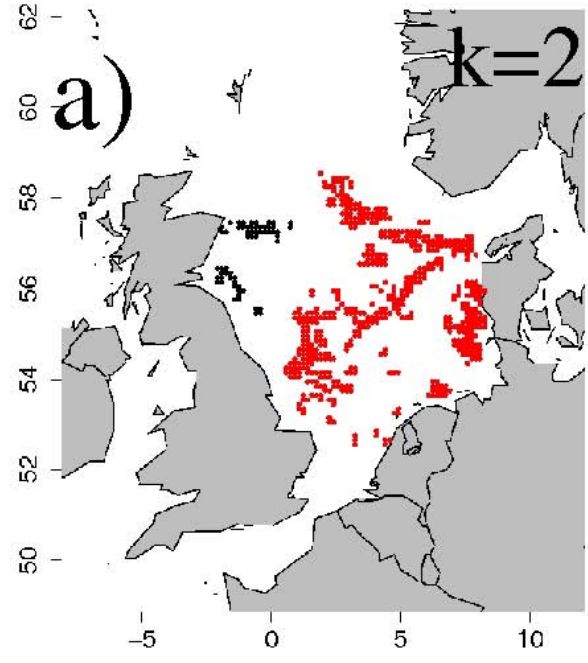


# Danish weekly sandeel catches 2010

# Research

- Oceanography
- Sandeel biology
- Survey design and analysis
- Assessment methodology
- Management models





**Construction of areas from clustering of hydrographic connected habitats**

# Advice

- Ministry of Food, Agriculture and Fisheries
- Other Danish National bodies
- ICES
- STECF
- Stakeholders

Table 4.1: Stock assessment areas

Area	
Eastern area	
Northern area	
Southern area	
Western area	
Shetland area	
Viking bank area	

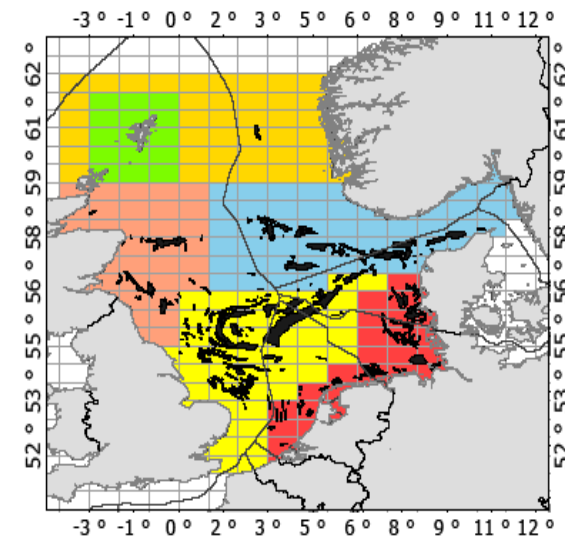


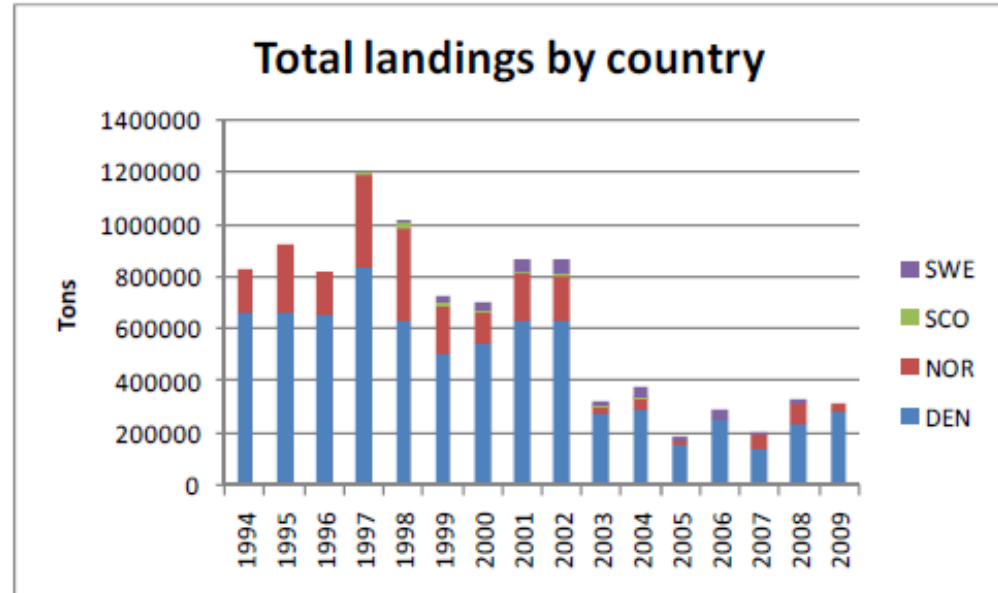
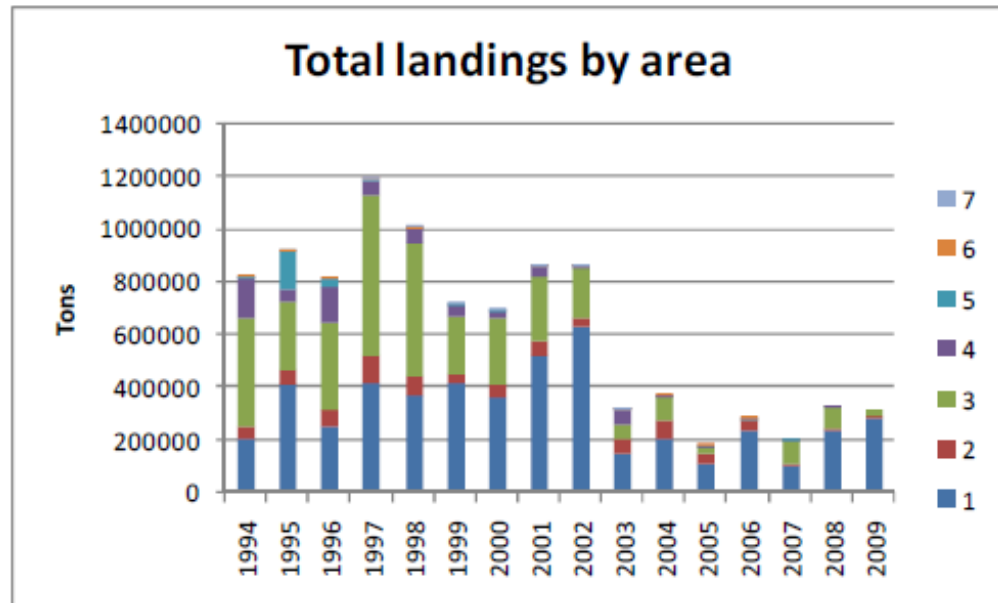
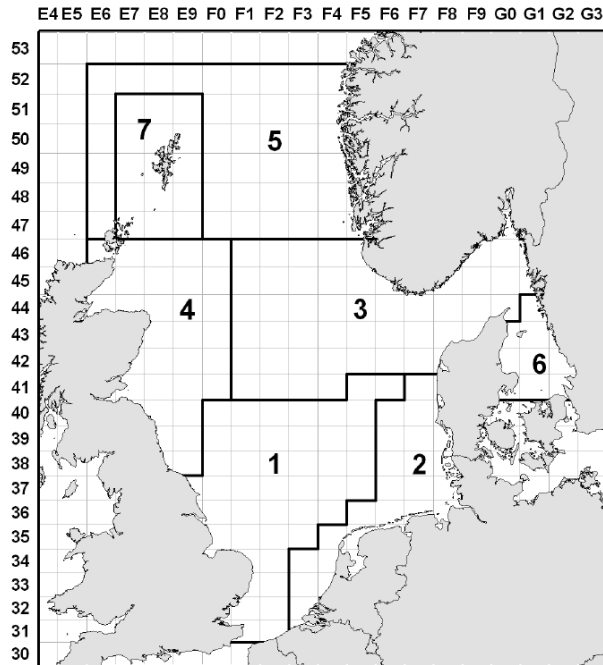
Figure 4.2: Sandeel fishing banks (black areas), EEZ borders, eastern area (red), northern area (blue), southern area (yellow), western area (dark orange), Shetland area (green) and Viking bank area (light orange).

## ADGSAN2 in ICES 2009

# Present situation

- ICES benchmark
- ICES stock assessment of sandeel
- ICES Advisory Committee (ACOM)
- EC STECF
- EU – Norway negotiations
- EU council meeting

# Development of sandeel catches from the different areas



# Dredge survey November – December 2009

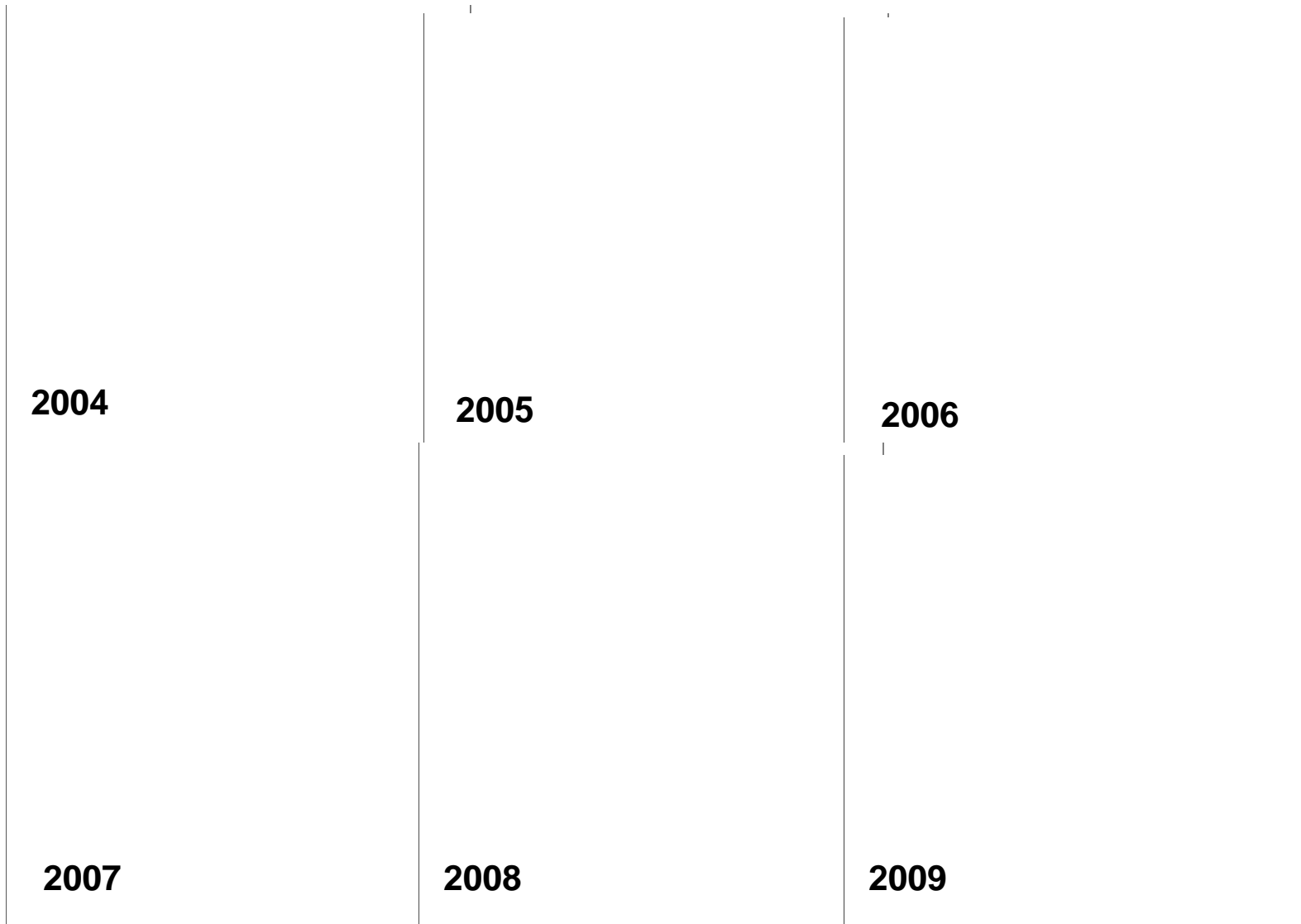
- For the first time conducted under the EU Data Collection Framework (DCF)

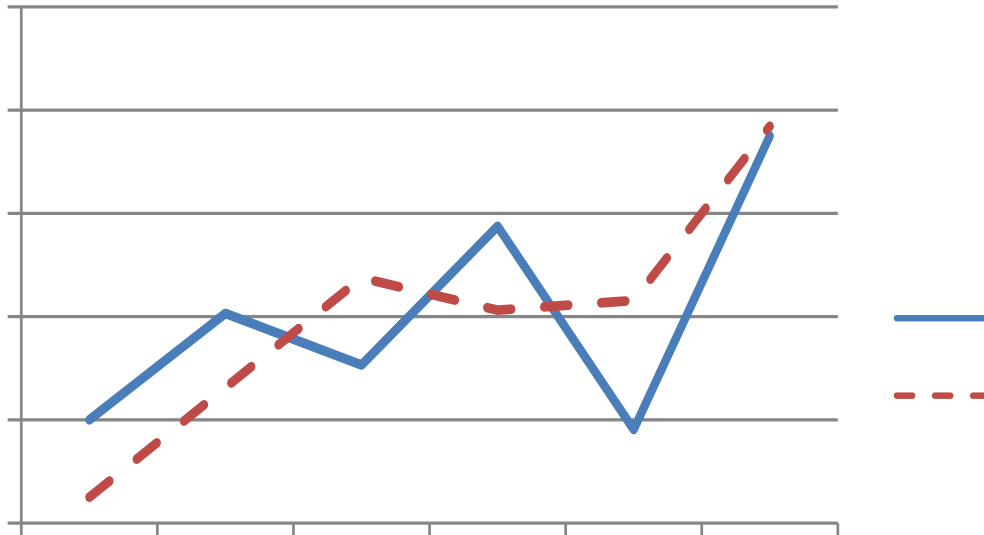
# Dredge survey November – December 2009

For the first time conducted  
under the EU Data Collection  
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# CPUE in dredge survey by year in suggested areas

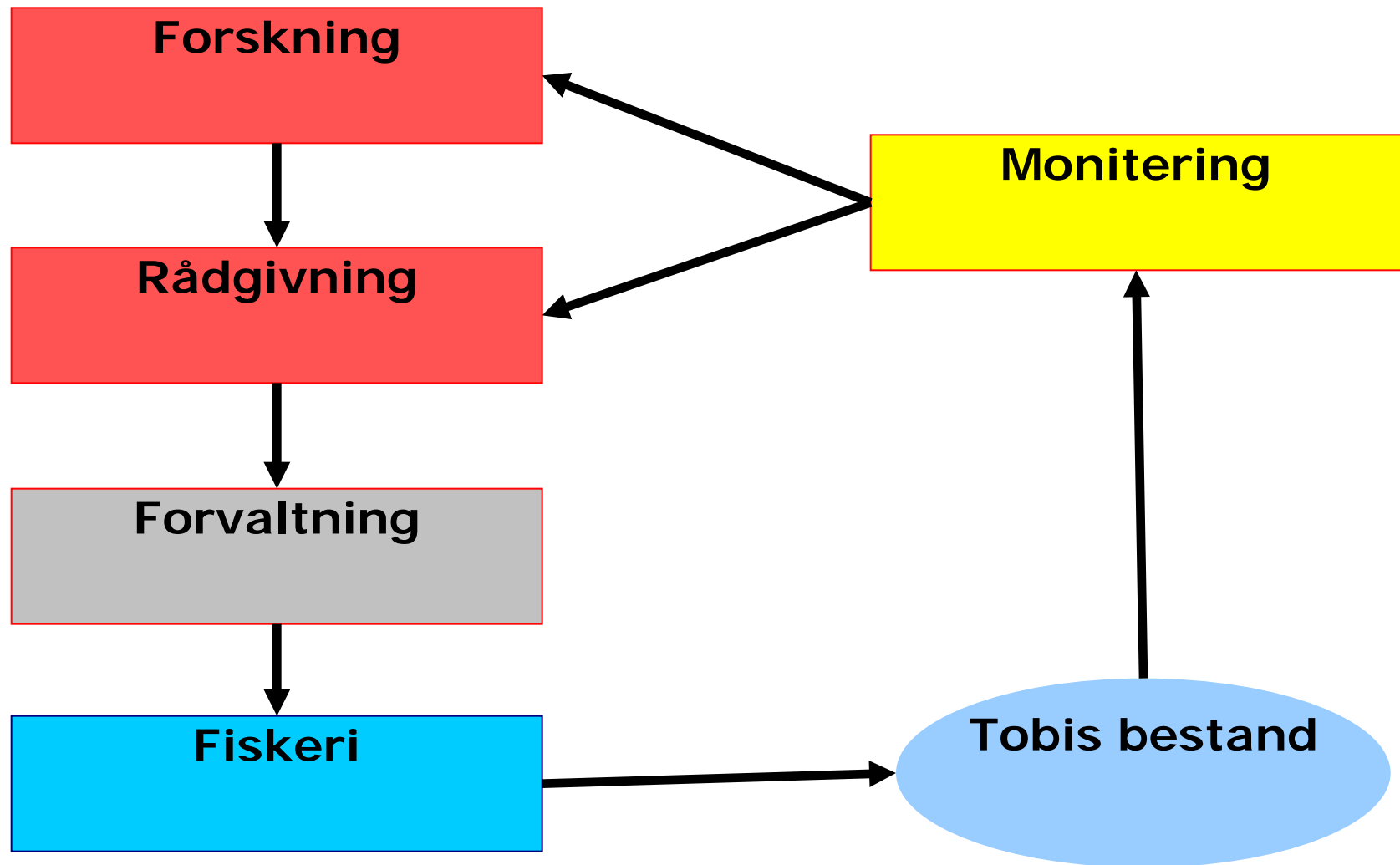




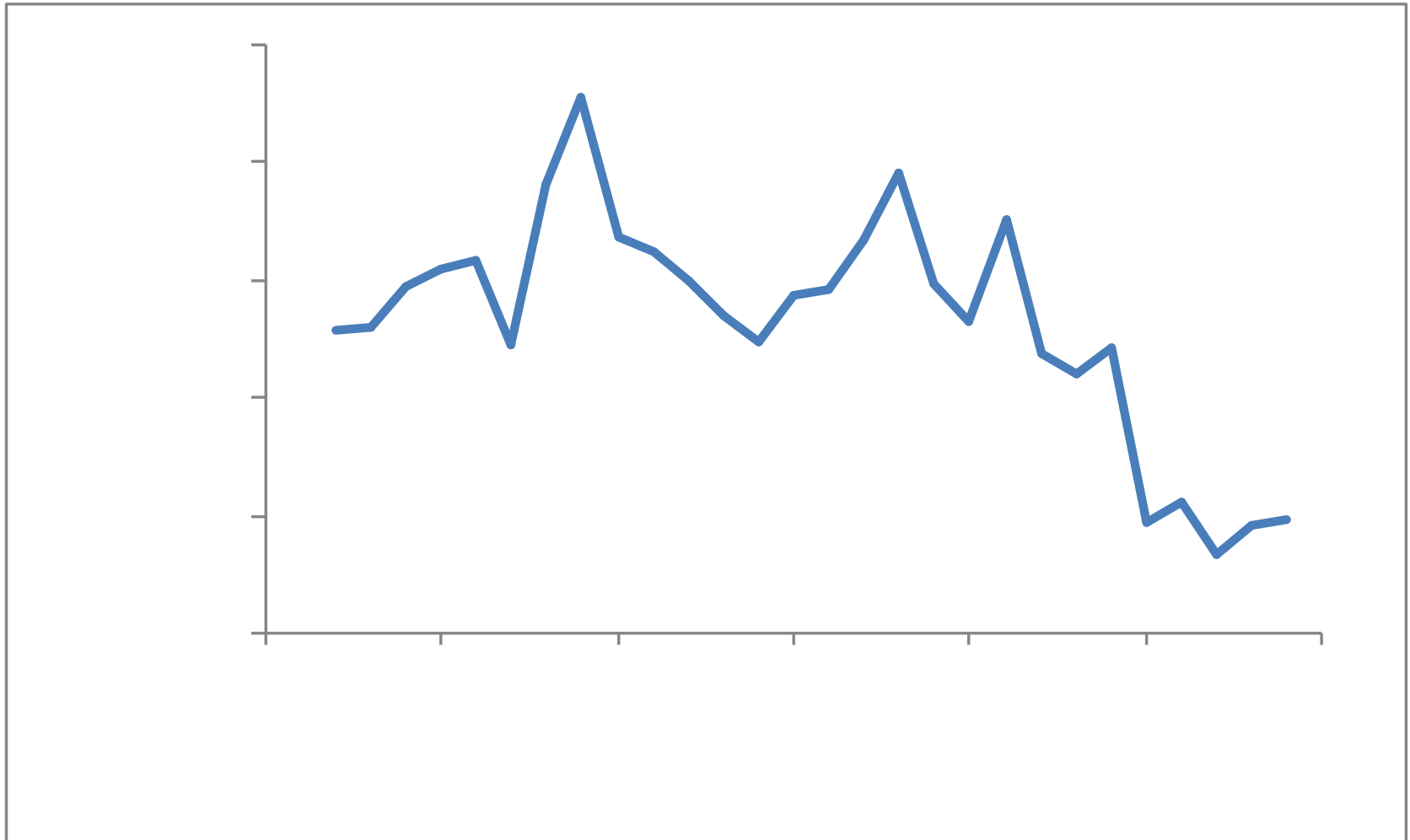


**Reasonable internal and external consistence**

# rådgivningsaktiviteter omkring tobis



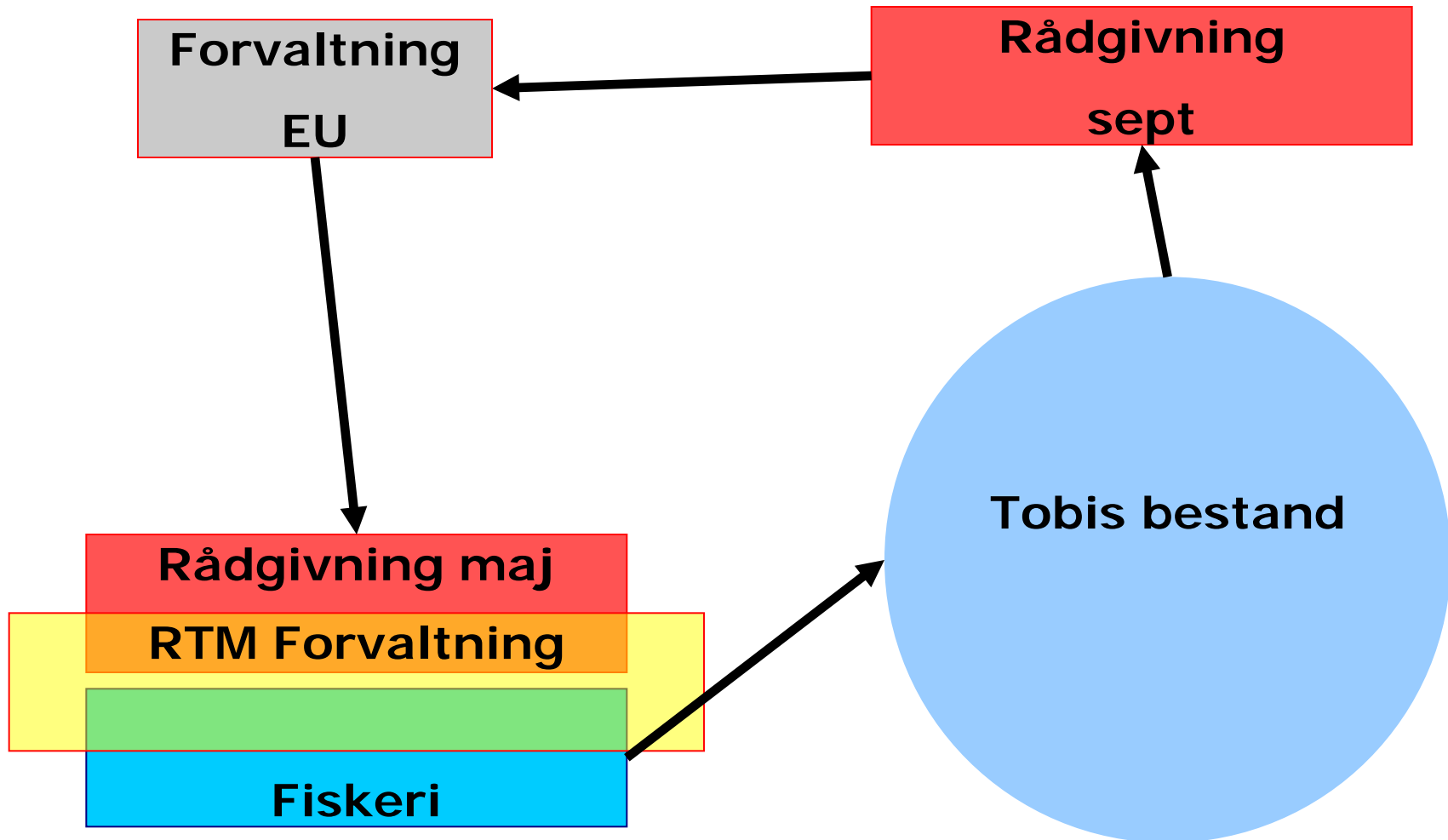
# Future prospects



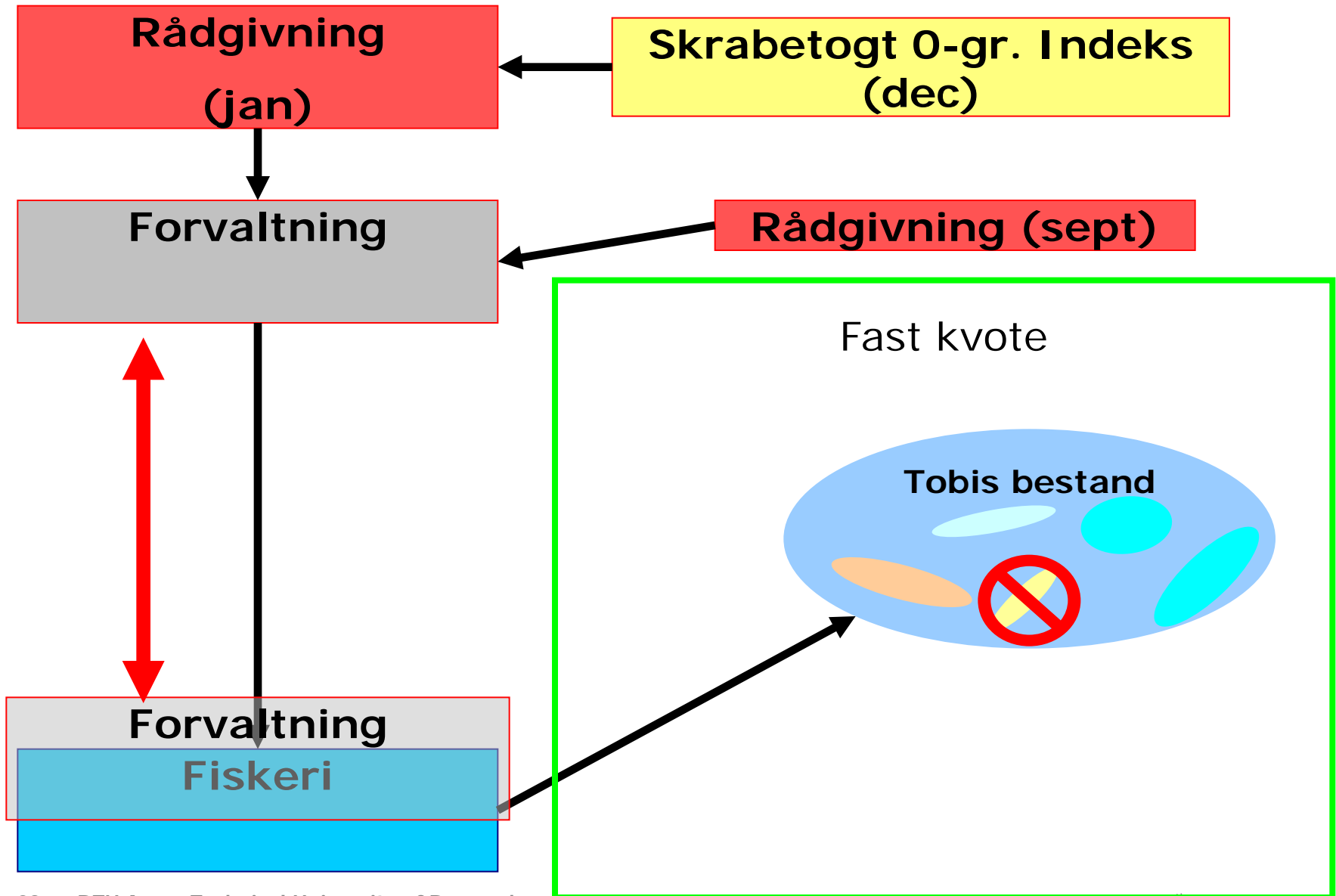
## Fremtidige udsigter

- **Langsigtet forvaltningsstrategi der sørger for:**
  - **Bæredygtigt fiskeri**
  - **Tillader at nå MSY (maksimal bæredygtig udbytte)**
  - **Forhindrer lokal udtynding af tobisbestanden**
  - **Tager hensyn til tobisens rolle i økosystemet**
  
- **ICES nuværende model ikke giver et retvisende indtryk af udviklingen i tobisbestanden,**
- **skrabetogtet giver et retvisende billede at rekrutteringen,**
- **der er en sammenhæng mellem fiskeriindsats og fiskeridødelighed**
- **en områdeopdeling styrker tobisassessmentet.**

# Nuværende rådgivning- forvaltningscyklus for tobis



# Forvaltningscyklus for tobis





Tak for opmærksomheden !

Thank you!