



# From a recovering stock to a choke species: the example of North Sea hake

Alan Baudron<sup>1</sup>, Doug Speirs<sup>2</sup>, Mike Heath<sup>2</sup>, Chris McCaig<sup>2</sup>, Paul Fernandes<sup>1</sup>

<sup>1</sup> University of Aberdeen

<sup>2</sup> Strathclyde University



# European hake



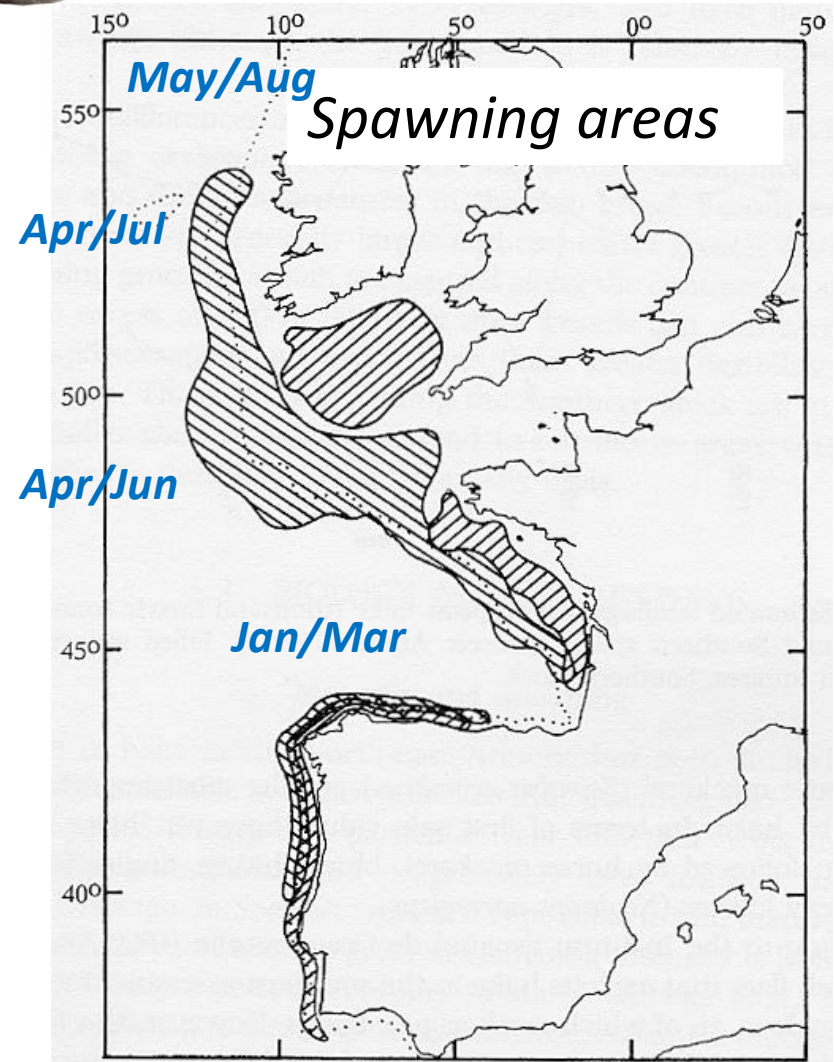
- *Merluccius merluccius*, Gadoid sp.
- Widely distributed: Mauritania to Norway
- Largest densities in Bay of Biscay and west of British Isles
- Piscivorous top predator: blue whiting, sardine, anchovy
- Lusitanian sp., mean thermal preference 13.8°C (5.8°C range)
- Depth ~ 100 m (70 – 200 m)



# European hake

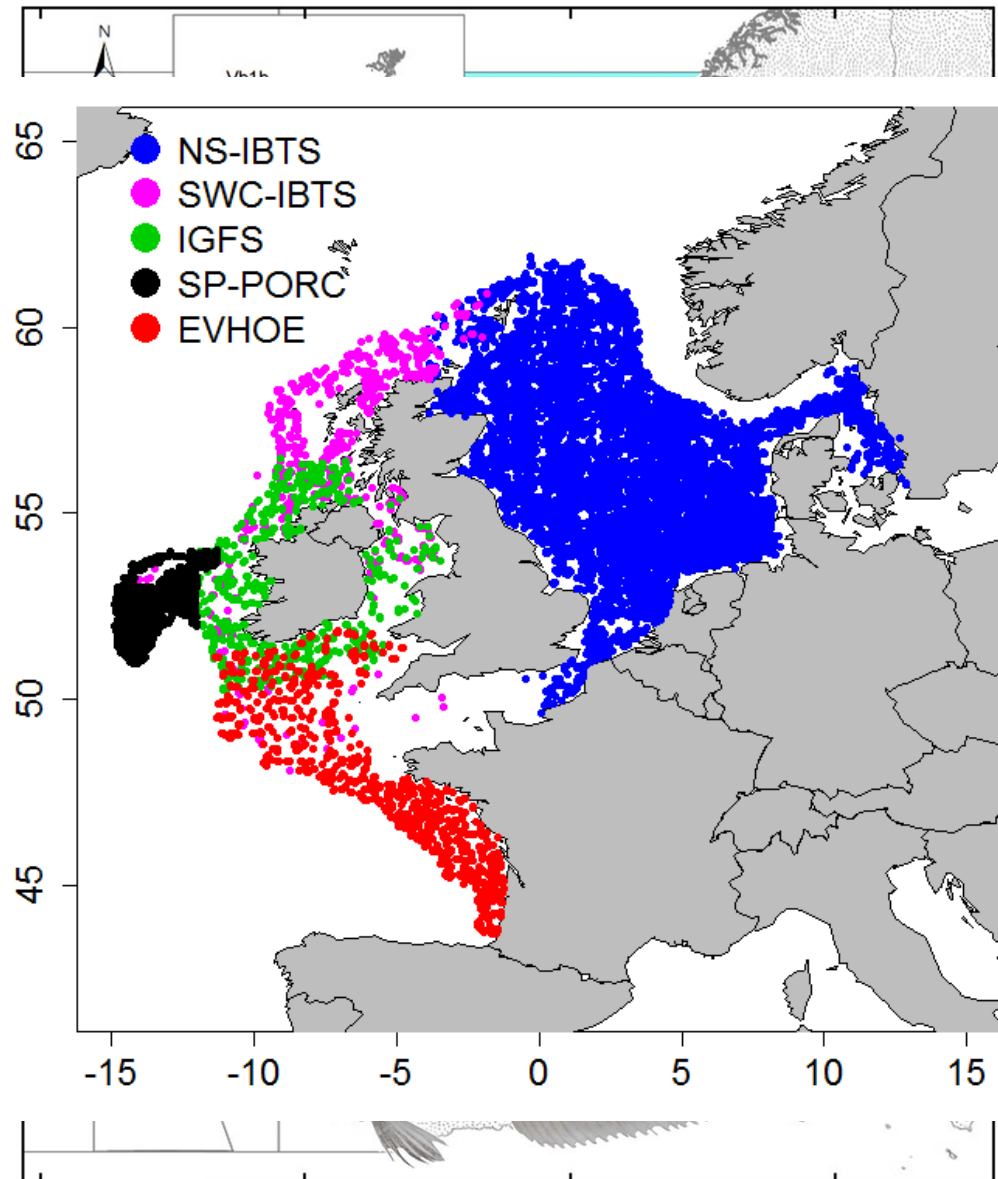


- Spawning from February to July
- Seasonal migrations: spawning in northern areas later in the year
- Ideal range for spawning: 10-12°C
- Larvae between 10 and 13.5°C
- Little knowledge in northern areas

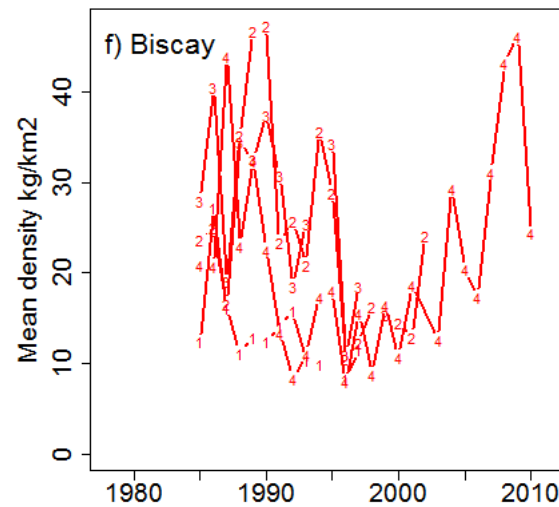
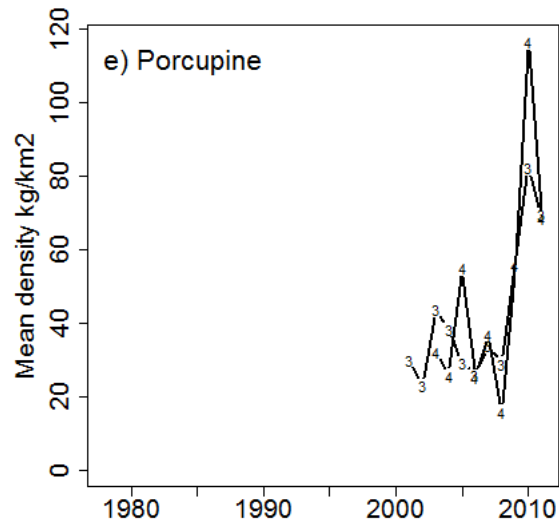
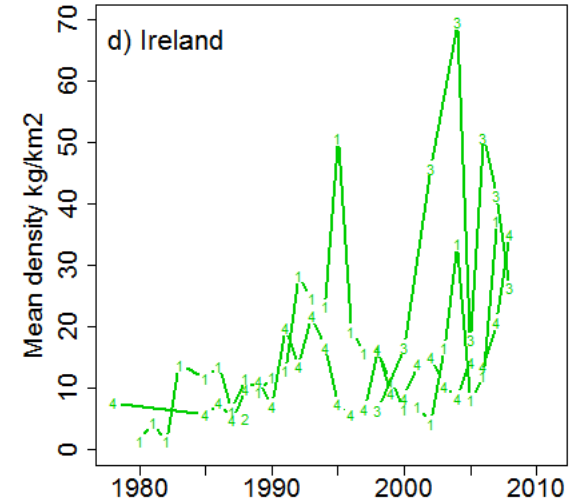
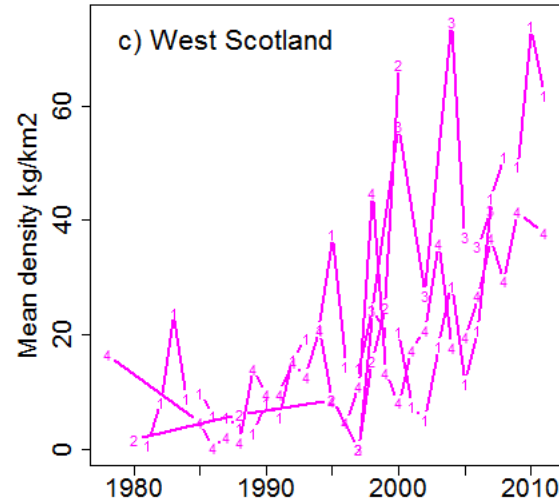
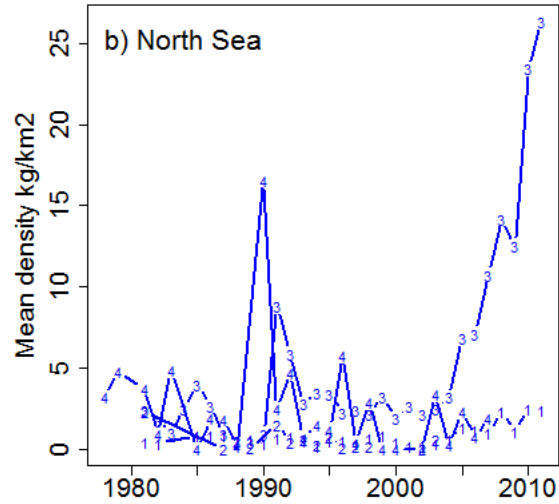


# Northern hake stock

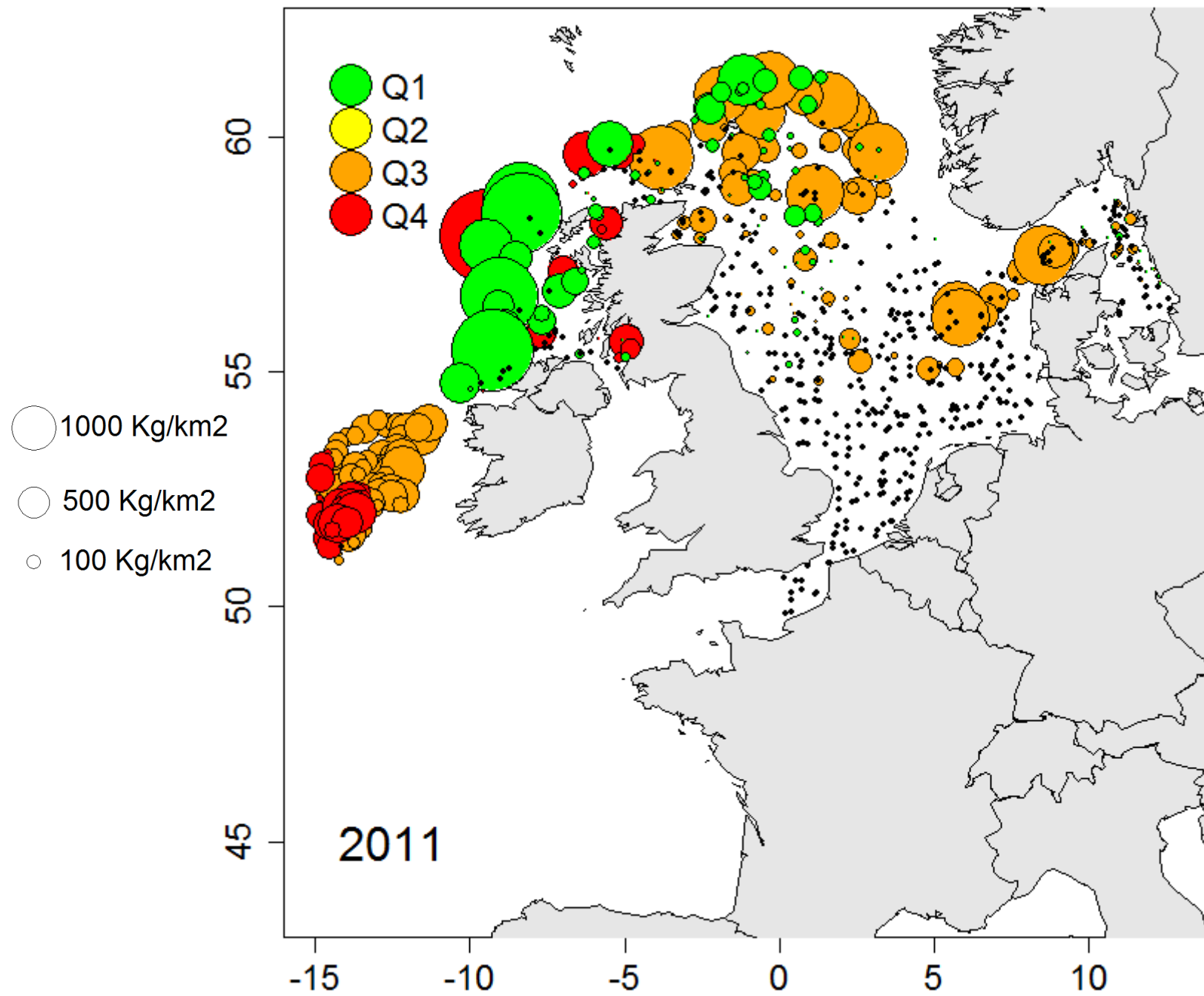
- **Northeast Atlantic: 2 large stock units**
- **Northern hake stock from Spain to Norway**
- **Assessment estimates for stock unit**
- **5 surveys:**
  - **North Sea (NS-IBTS)**
  - **West of Scotland (SWC-IBTS)**
  - **Ireland (IGFS)**
  - **Porcupine bank (SP-PORC)**
  - **Bay of Biscay (EVHOE)**



# Mean density estimates

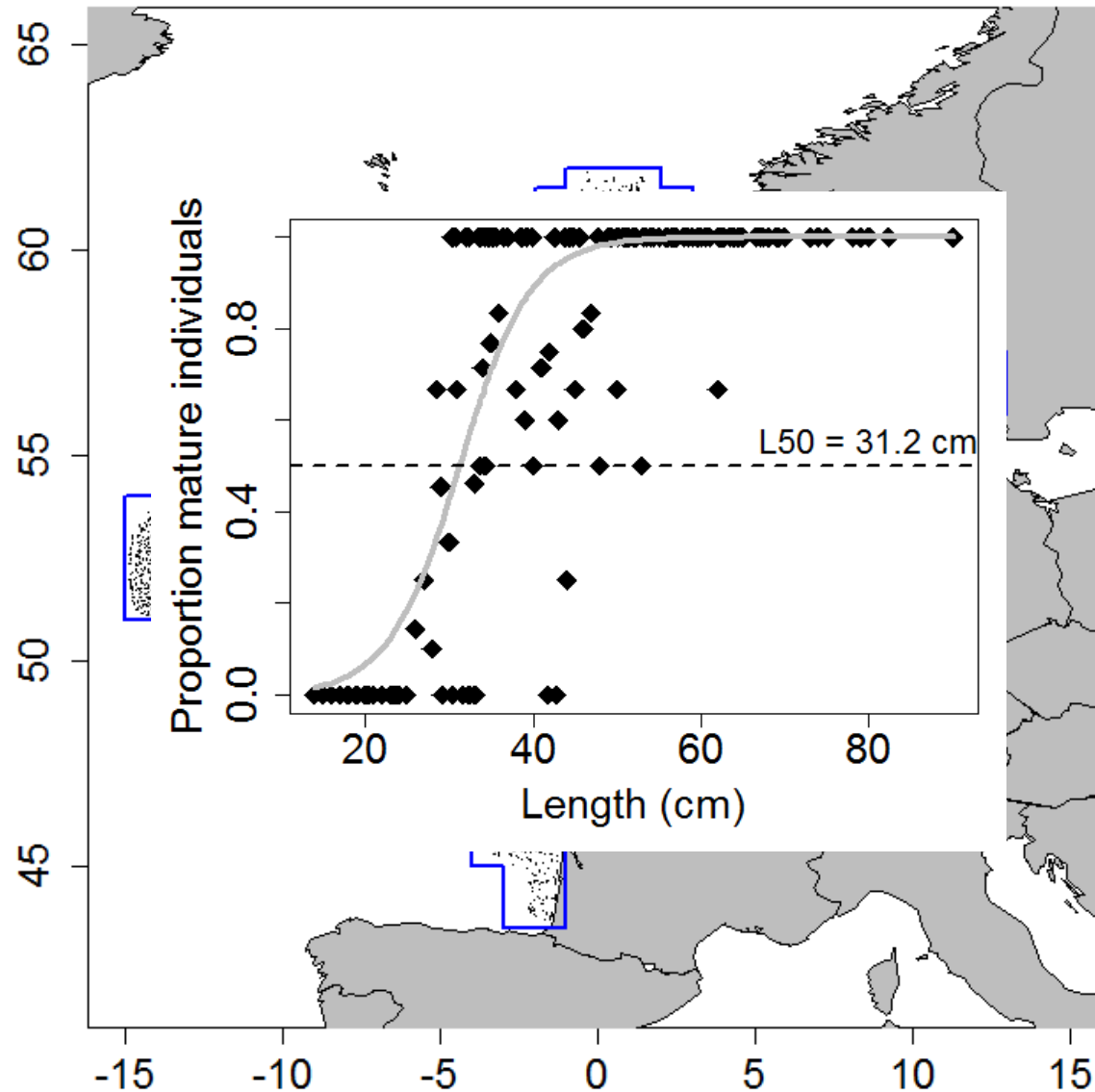


- Large increase in density (x 4) in recent years, x 5 in North Sea
- Huge difference between Q1 and Q3 in the North Sea



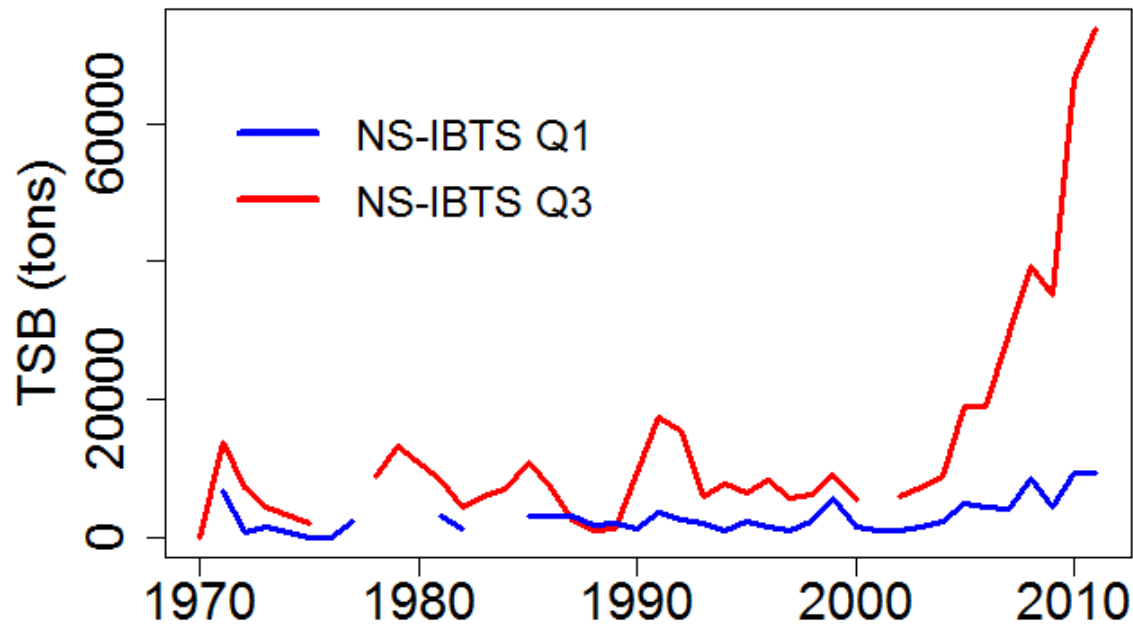
# Estimates for North Sea hake

- Northern hake
- $q_{\text{survey}} = \text{Nor}$   
biomass
- North Sea T
- Length at 50%
- North Sea S

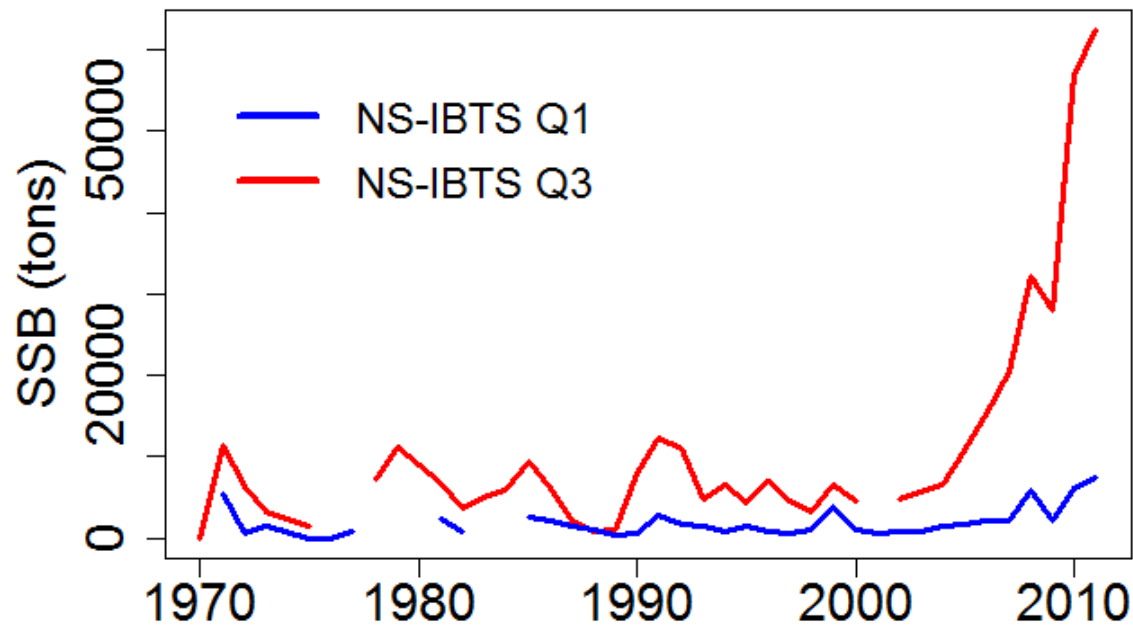


assessment

survey)



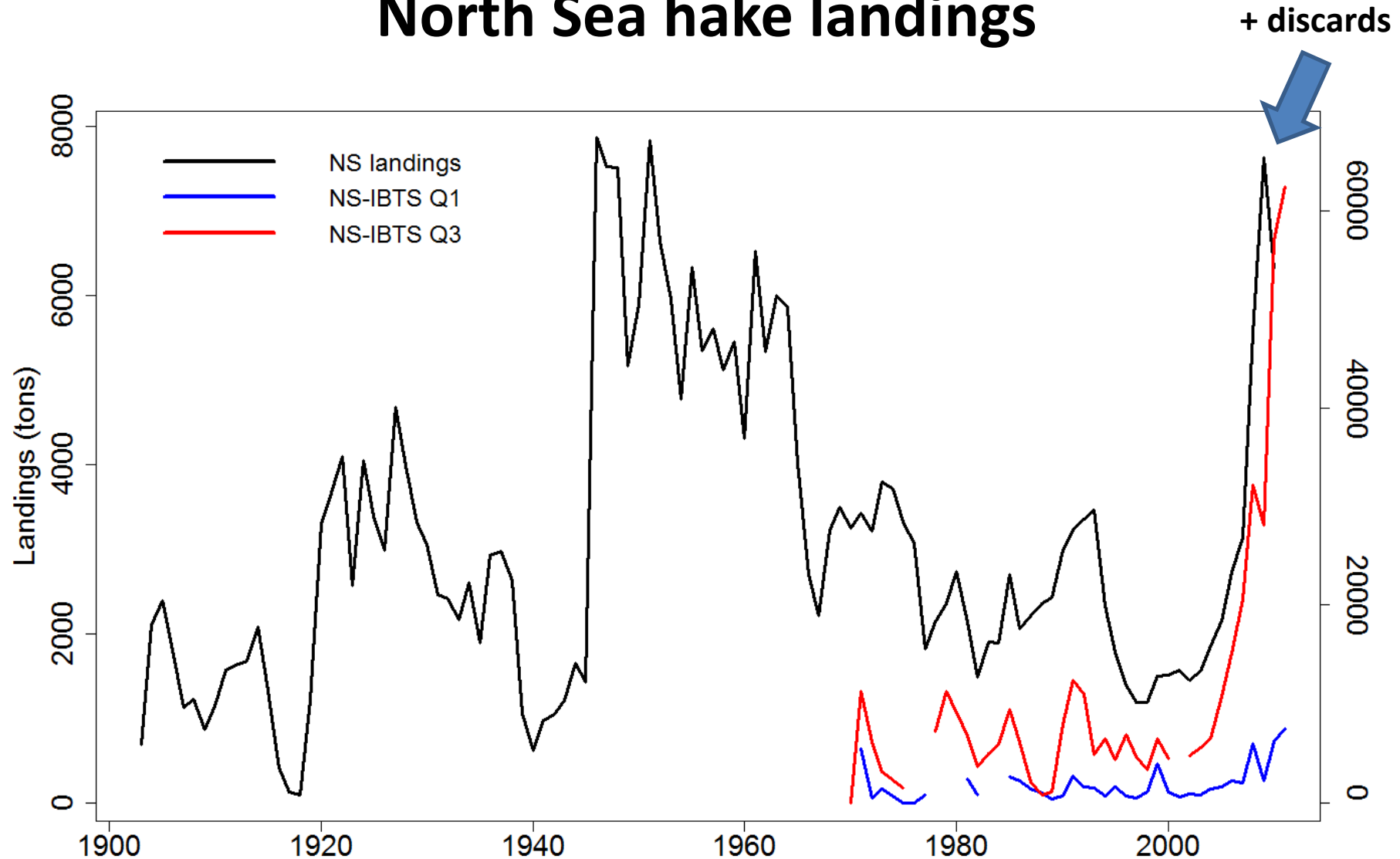
▪ Increase by a factor 4 in quarter 1



▪ By a factor 8 in quarter 3



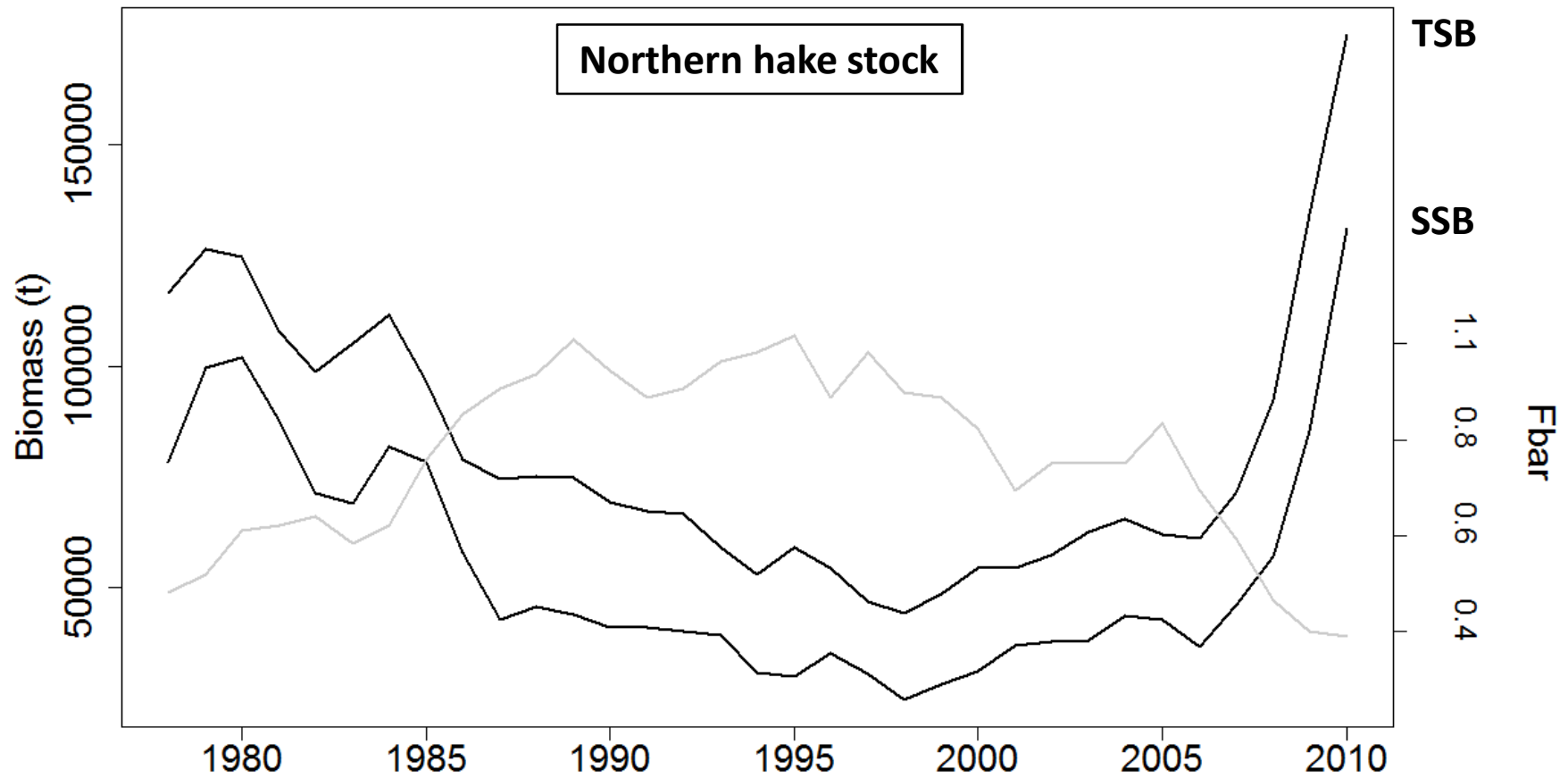
# North Sea hake landings



- Large landings of North Sea hake in the 1950s
- Sudden increase previously occurred in North Sea: fishing?

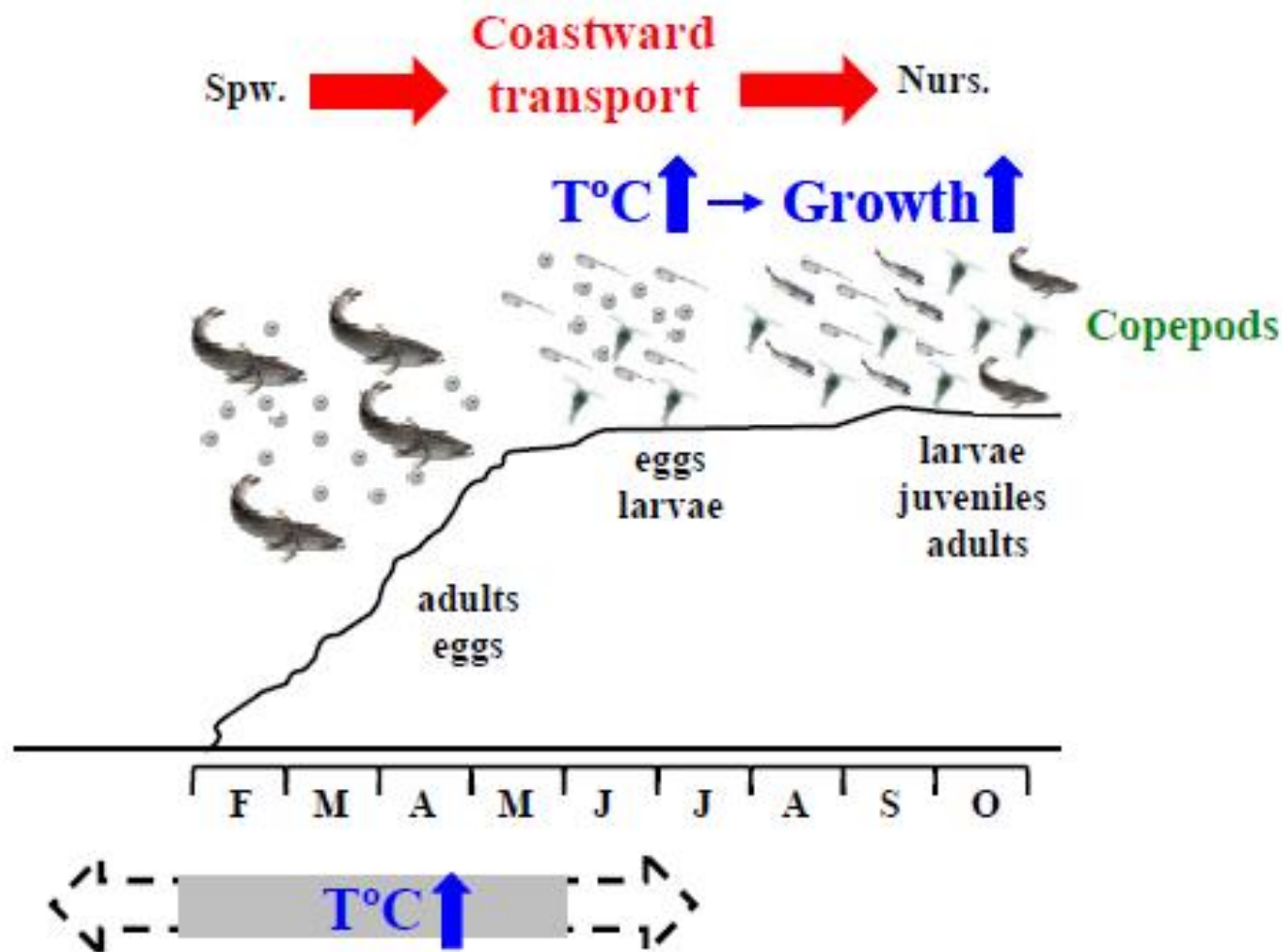
# Increasing hake abundance: why?

- Fishing? Northern hake recovery plan since 2004

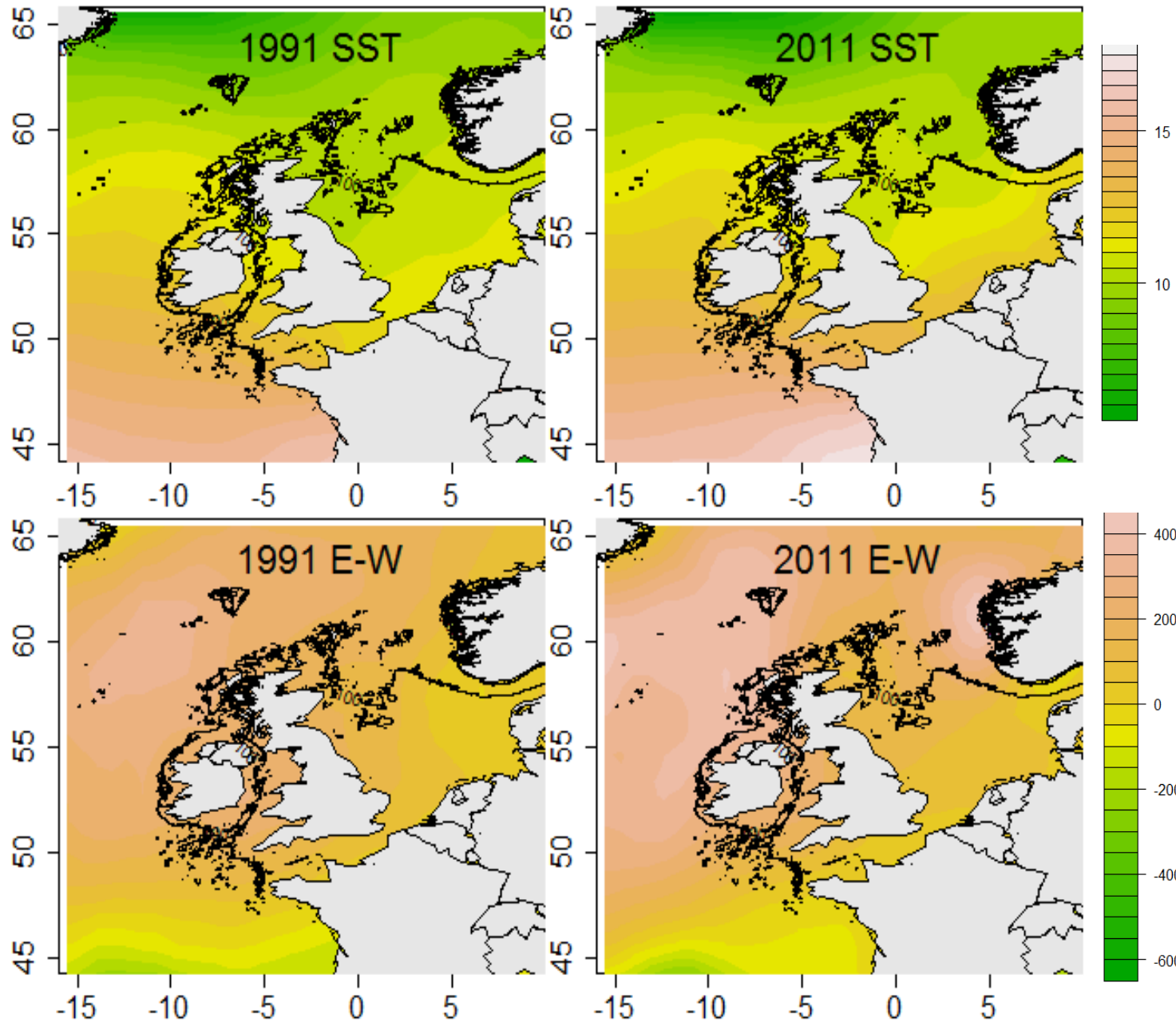


# Increasing hake abundance: why?

- Environment? Hake recruitment variability highly impacted by environmental conditions



▪ Average across spawning season:

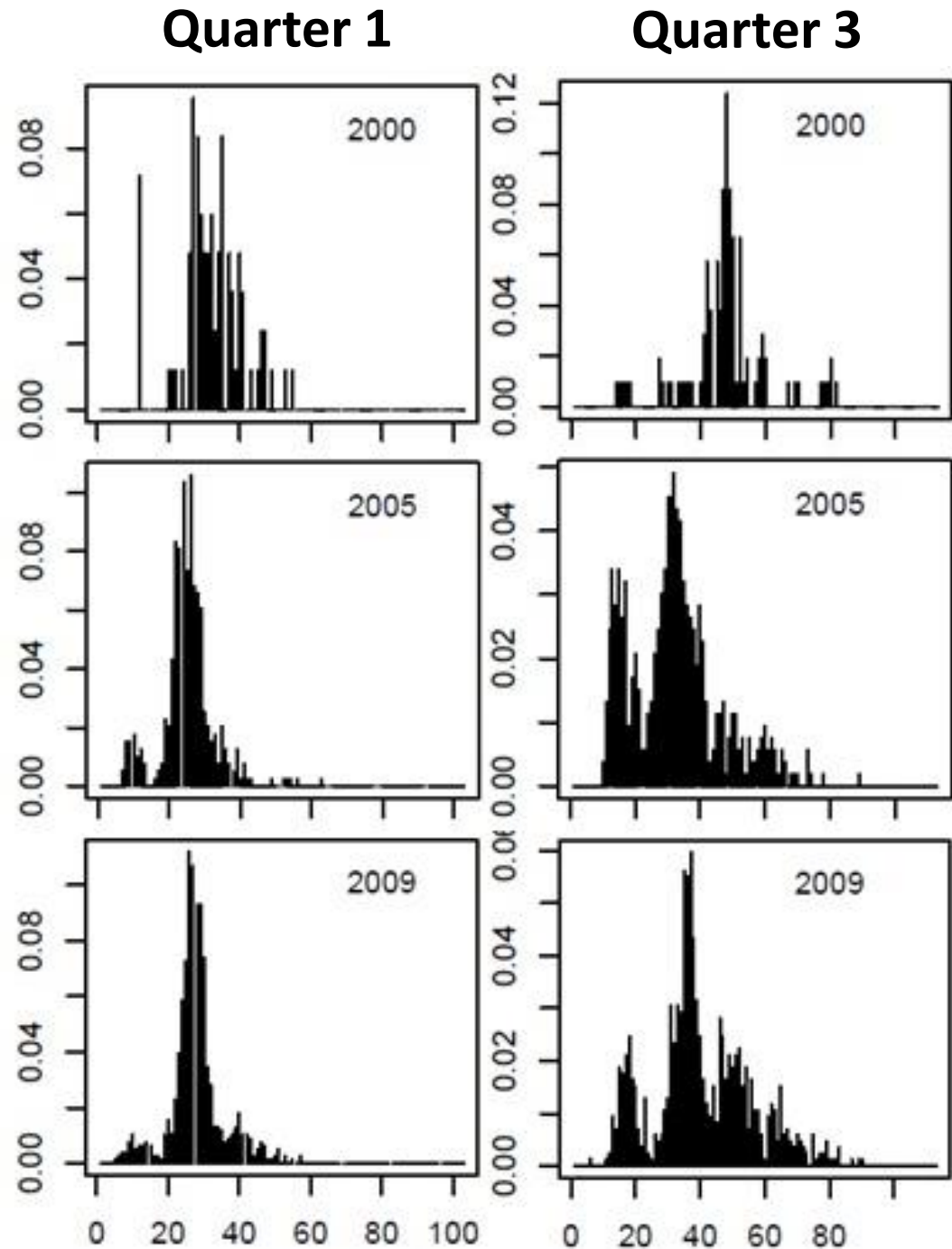


➤ Sea surface temperature (°C)

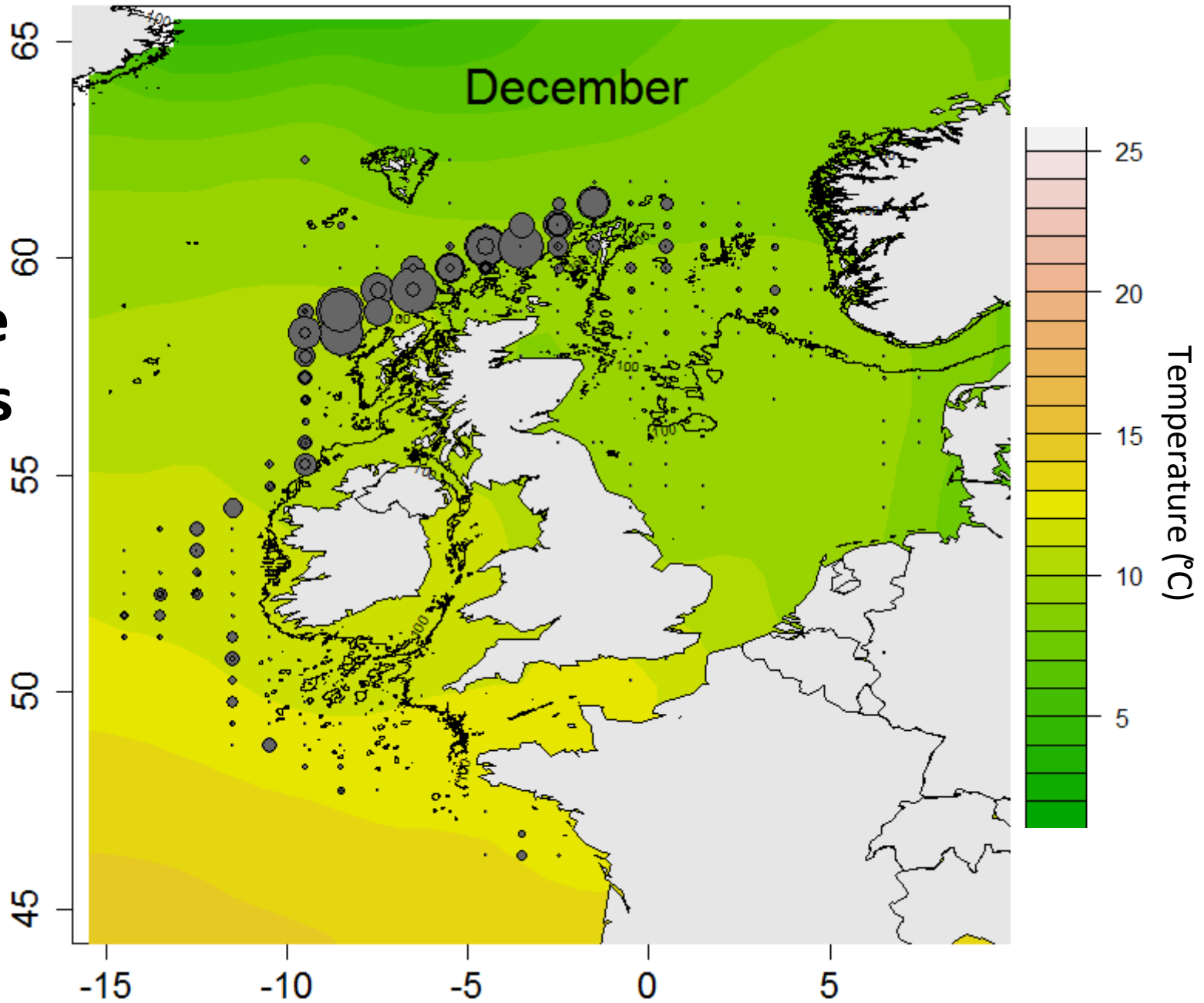
➤ Westward wind transport ( $\text{Kg.m}^{-1}.\text{s}^{-1}$ )

# North Sea hake length frequencies

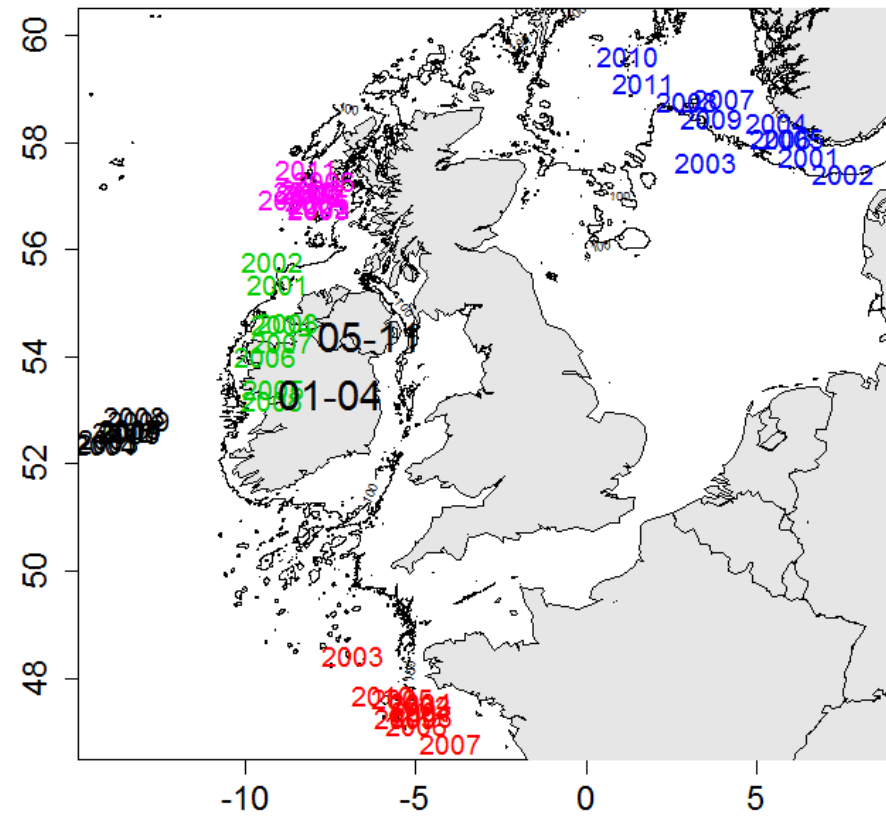
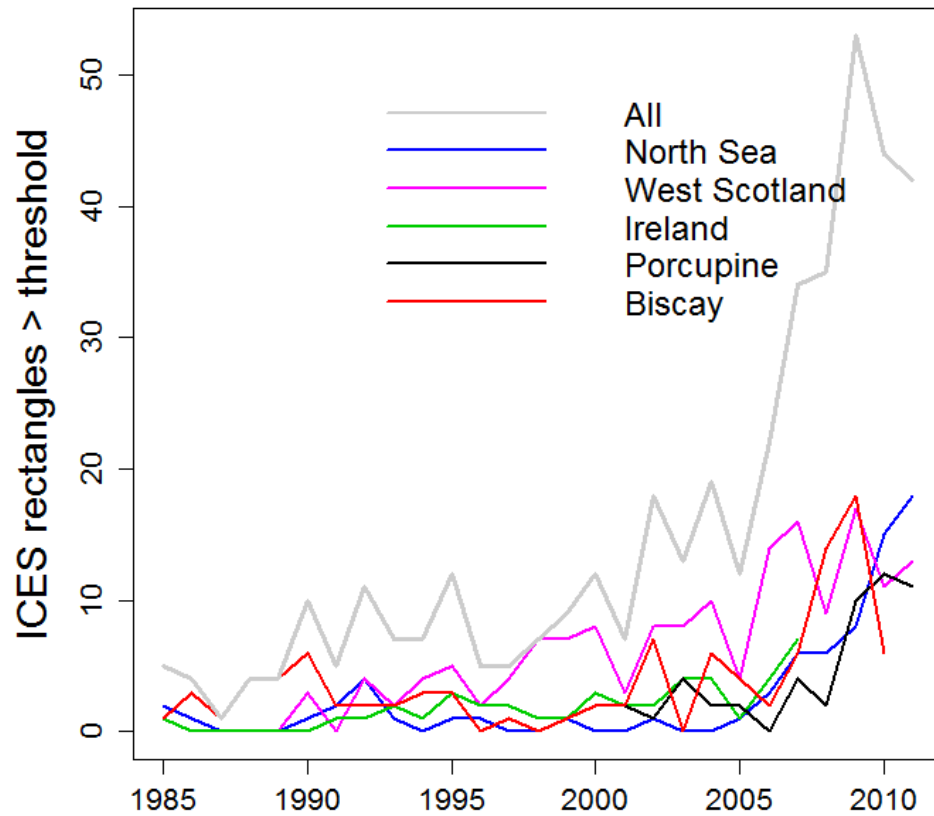
- Difference between quarter 1 and quarter 3
- More large individuals at quarter 3
- Observation consistent through time



**UK hake  
landings  
(kg)  
2005-  
2011**



# Expansion of northern hake stock



- **Threshold: maximum density observed in North Sea in 2004**
- **Expansion in stock area**
- **Shift in distribution in North Sea**

# Increase in North Sea hake: the consequences



- **CFP: relative stability**
- **2011, North Sea hake in Scotland:**
  - Landings: 3035 tons
  - Discards: 4993 tons
  - Catches = 8028 tons
- **CFP reform: discard ban**
- **Hake “choke” species for North Sea demersal fisheries**

*2011 North Sea quota share (tons)*

TAC North Sea hake	1935
Belgium	28
Denmark	1119
Germany	128
France	248
Netherlands	64
UK	348





# Conclusions

- **Increase in North Sea hake: WHY?**
  - Fishing? Northern hake recovery plan since 2004
  - Environment? Hake recruitment variability impacted by environmental conditions
  
- **Hake seasonal migrations in the North Sea**
  - Expansion to suitable habitat: temperature and depth limited
  - Little knowledge about hake in North Sea: feeding/spawning grounds?
  
- **Are hake here to stay?**
  - Situation different from the 1950s
  - North Sea temperature increase
  - Low cod biomass
  
- **Implications for fisheries management**
  - Relative stability
  - Quotas do not reflect the regional stock abundance



**Funding:**

