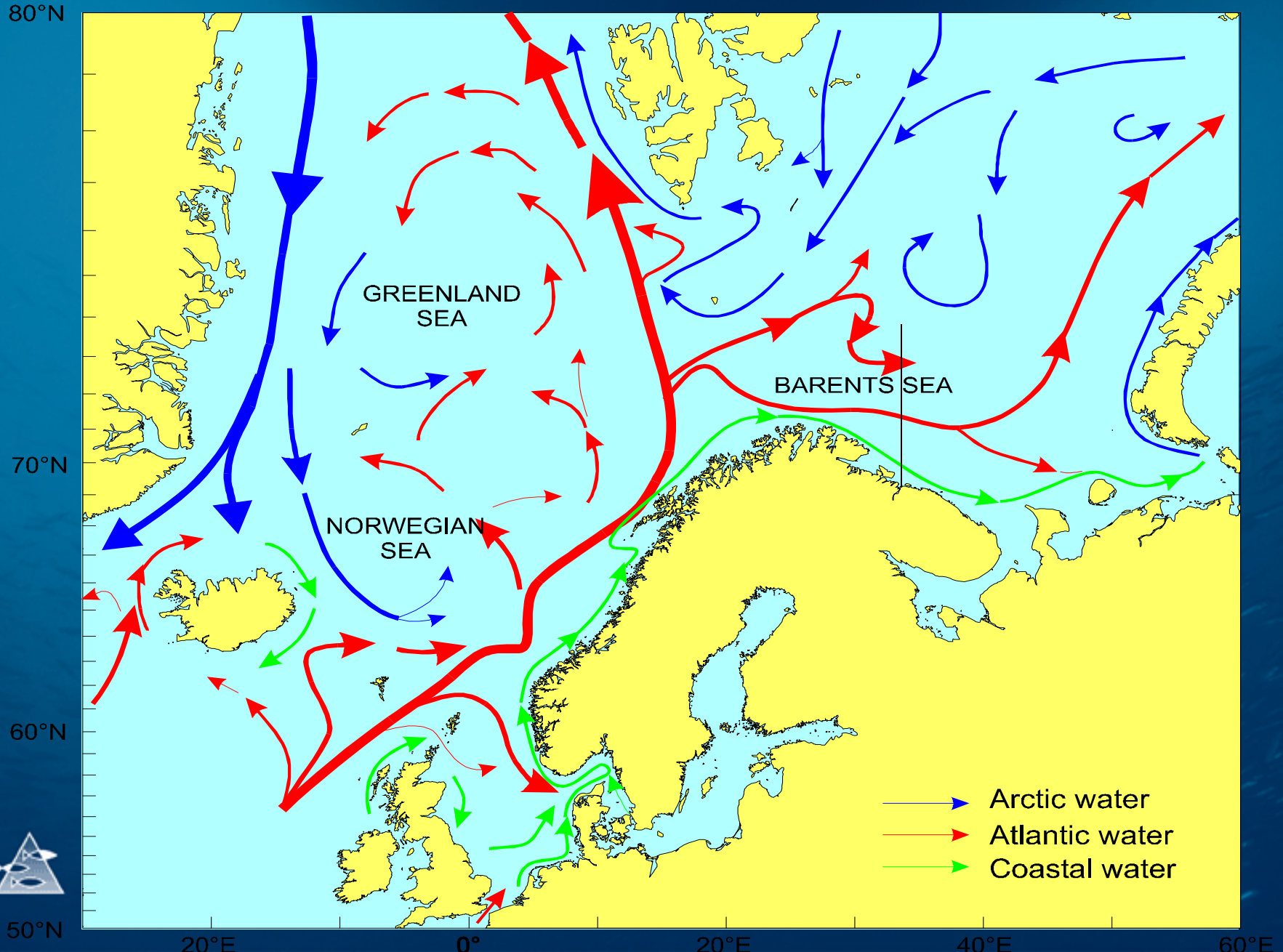
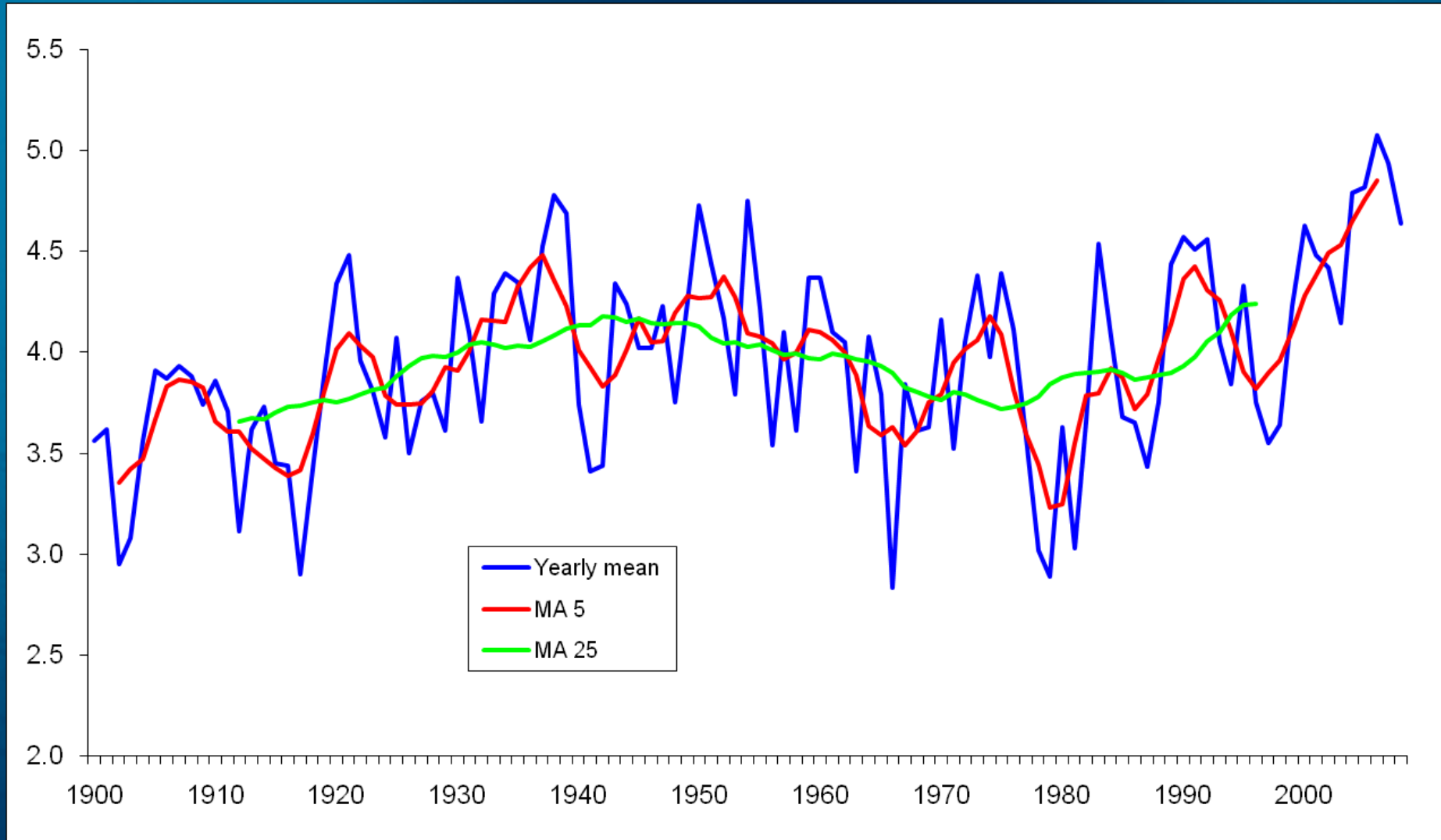


Climate and currents



Temperature in Kola section

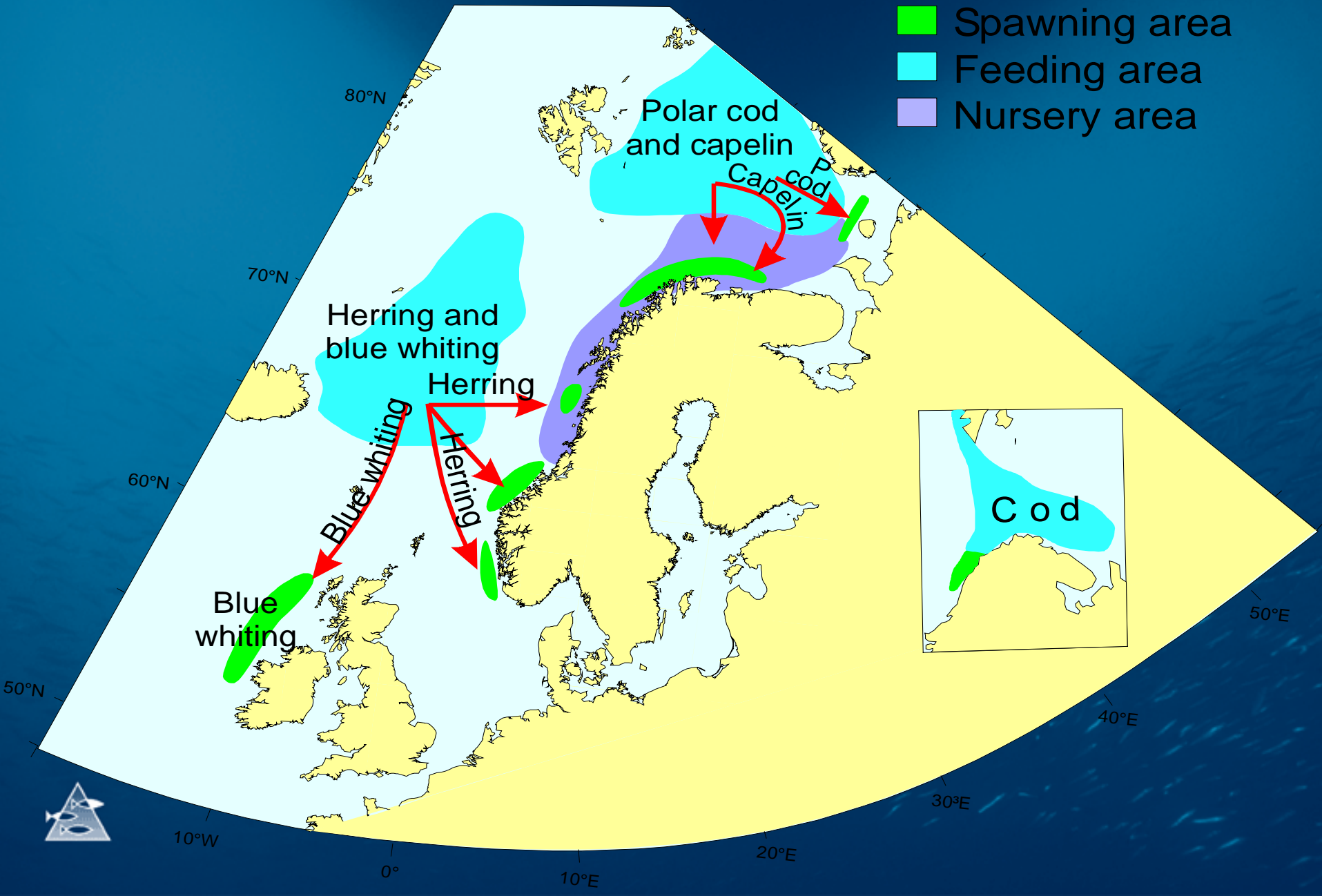


The main fish species in the Norwegian/ Barents Sea ecosystem

- Norwegian Sea
 - Herring
 - Blue whiting
 - Saithe
 - Mackerel
- Barents Sea
 - Cod
 - Capelin
 - Haddock
 - Saithe
 - Polar cod
 - Herring
 - Blue whiting?



Distribution and migration of the main stocks





Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin
- Herring
- Haddock
- Saithe
- Polar cod
- Blue whiting



Biology of the main Norwegian and Barents Sea stocks

- Cod (torsk)
- Capelin
- Herring
- Haddock
- Saithe
- Polar cod
- Blue whiting



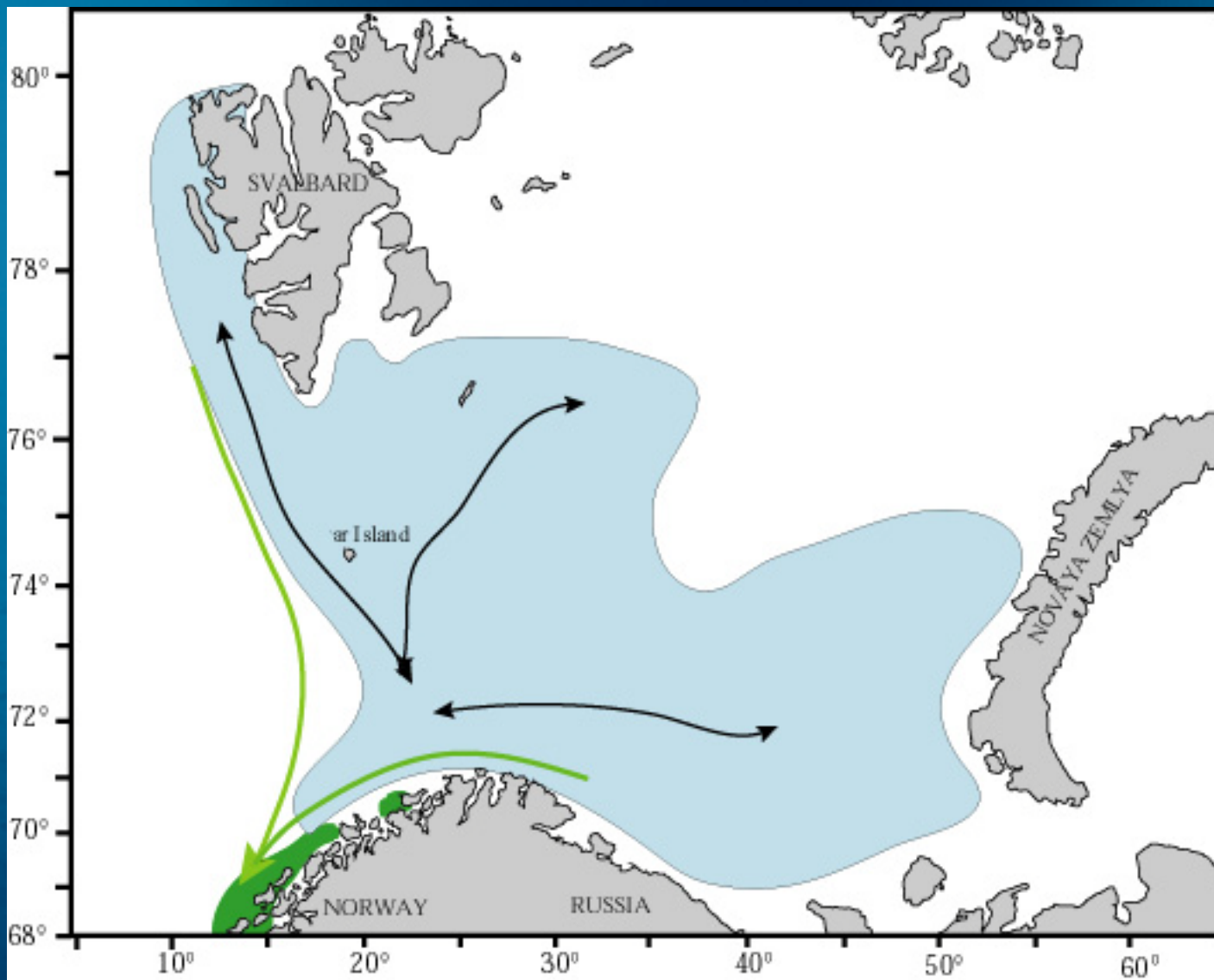
Biology cod

(Gadus morhua)

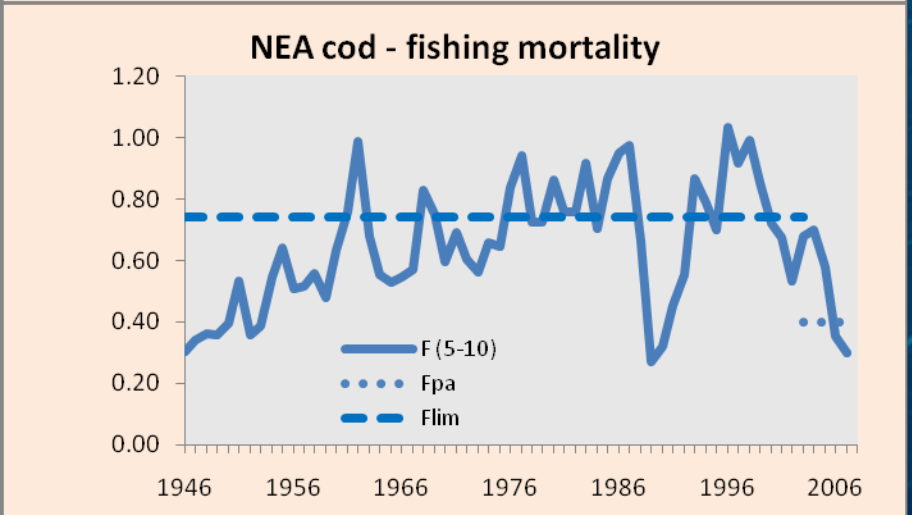
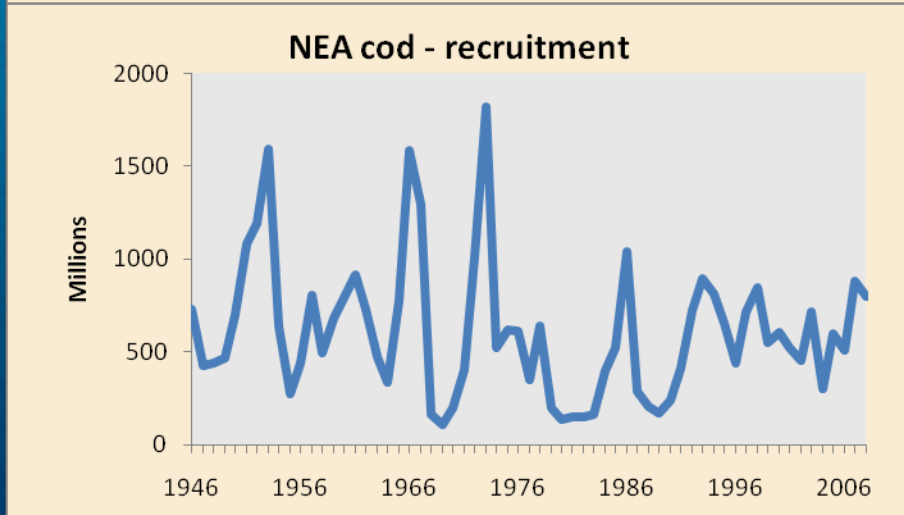
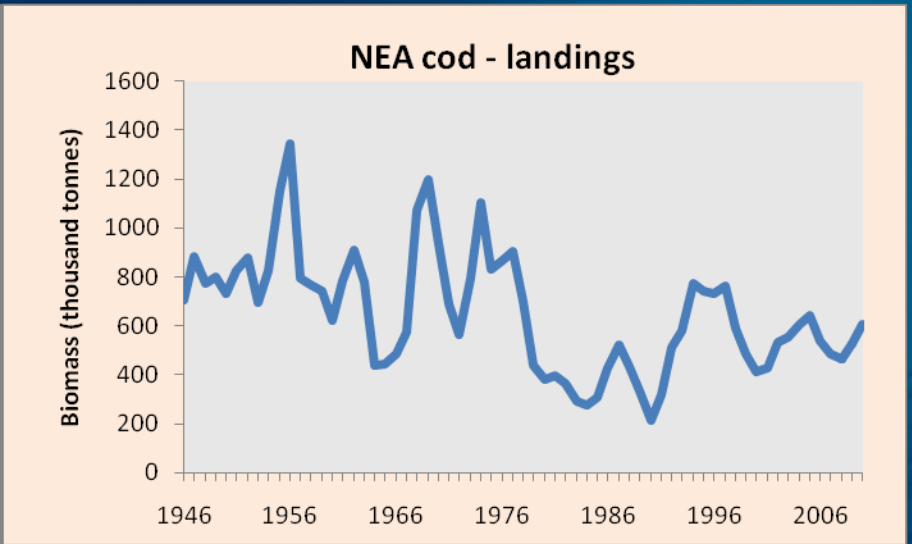
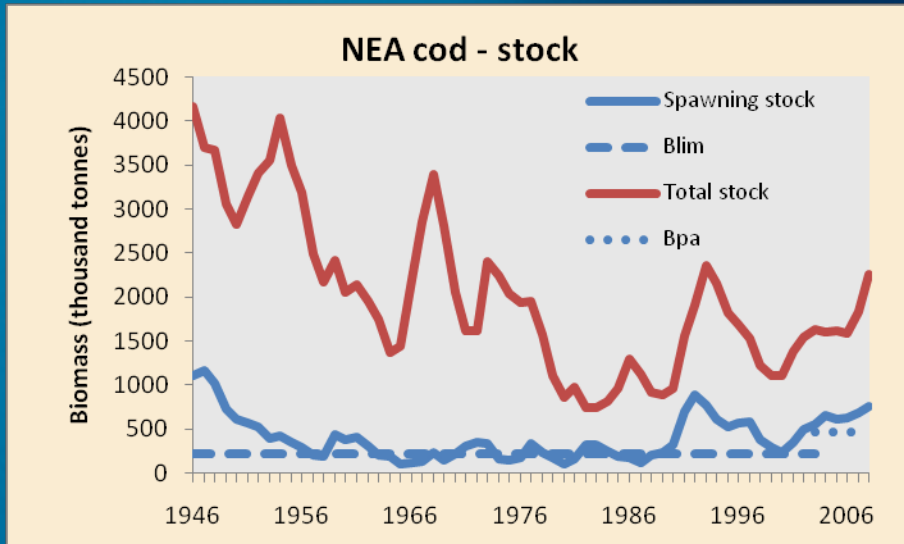
- A predator (fish eater)
 - At lengths above ~30 cm (3 years) fish is the main food item. Capelin, when present, is preferred
- Age and length at maturation: 6-8 years, 65- 75 cm
- Maximum length: 150 cm
- Good recruitment has been observed in periods of high inflow of Atlantic water to the Barents Sea, but...



Cod, distribution and migrations



Cod, catch and stock history





Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin (Iodde)
- Herring
- Haddock
- Saithe
- Polar cod
- Blue whiting

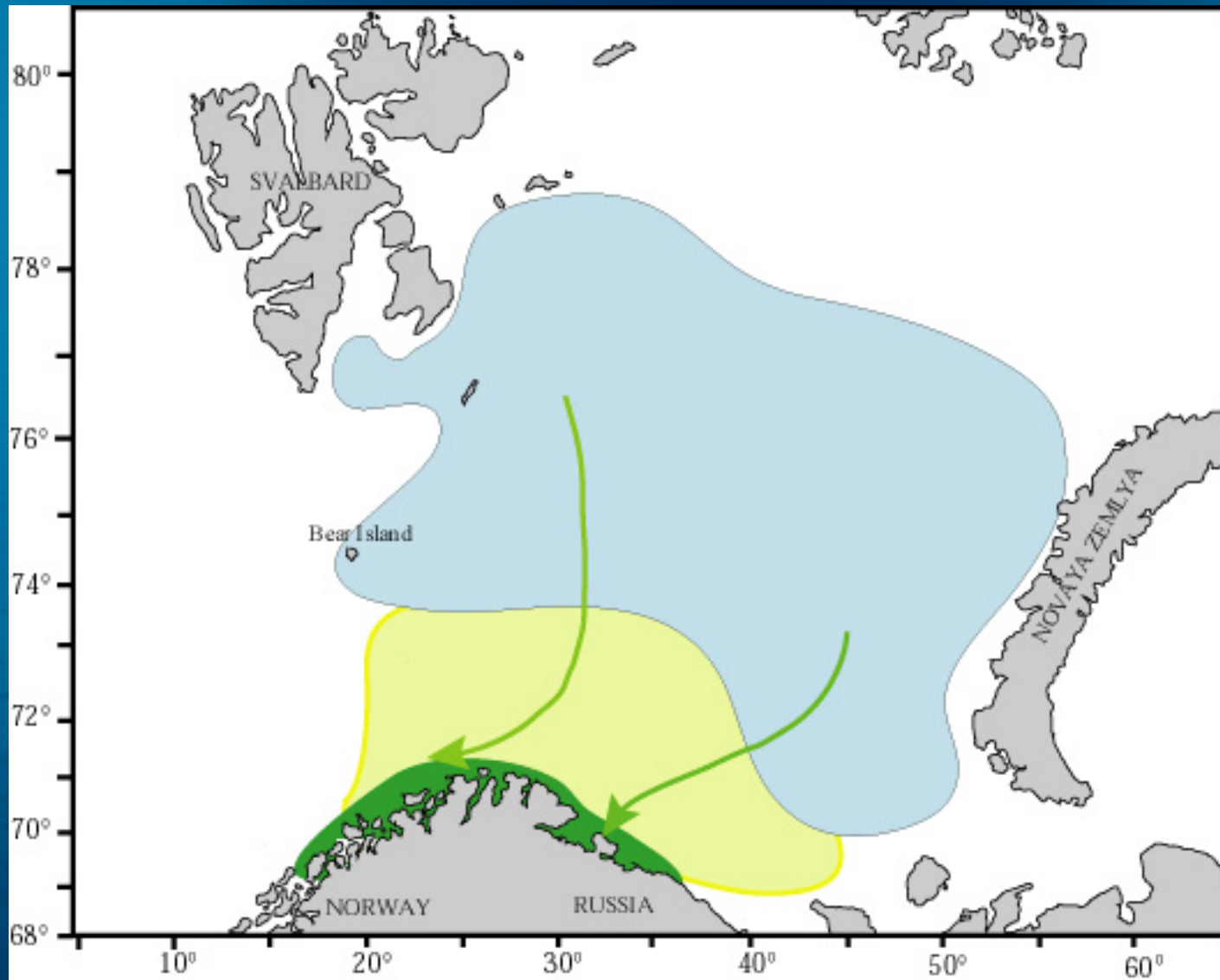


Biology capelin (*Mallotus villosus*)

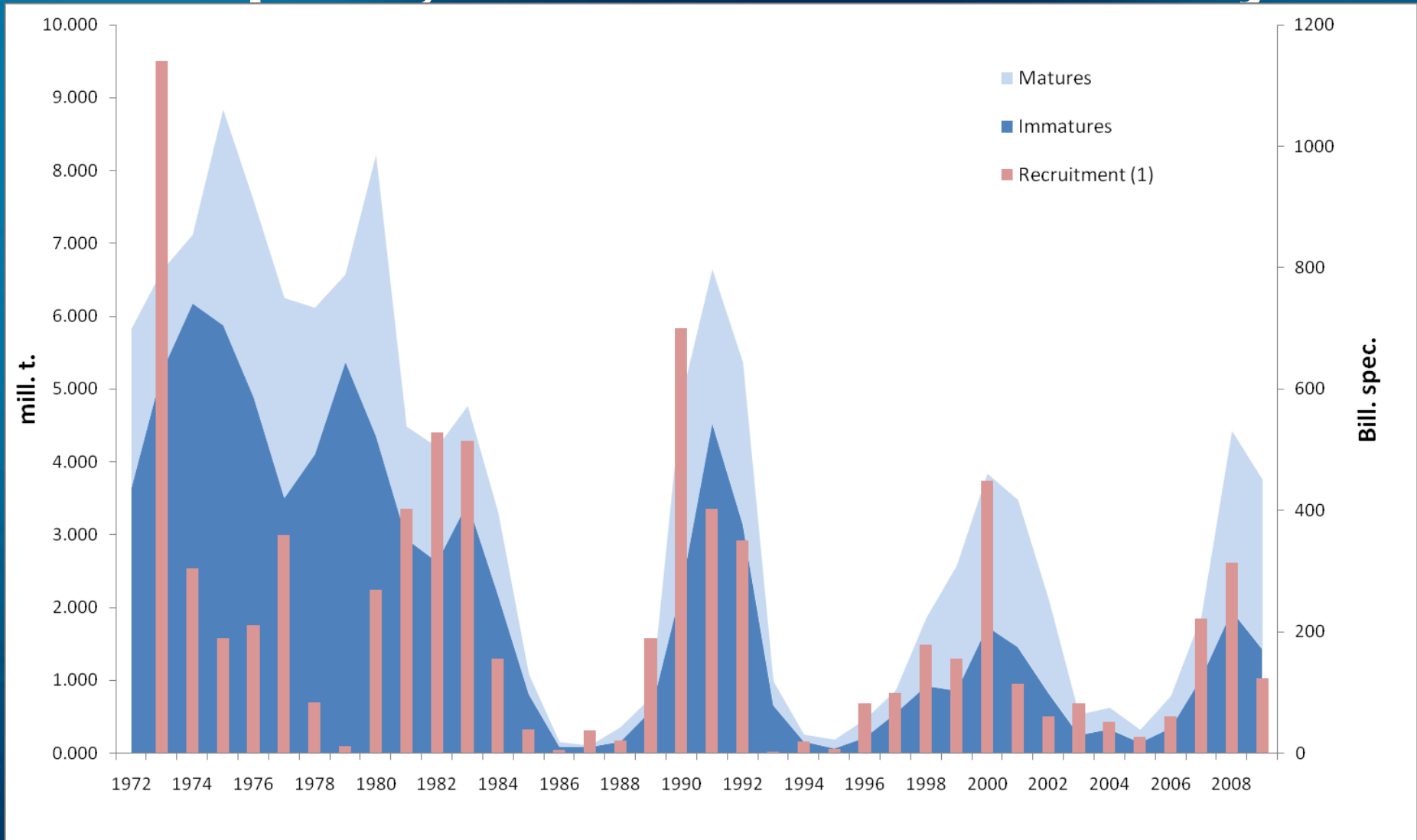
- A small, schooling, pelagic fish, specialised plankton feeder
- Age and length at maturation: 3-5 years, 13-15 cm
- Maximum length: 22-23 cm
- A functional "energy pump" – transports energy produced by primary and secondary producers from north to south and up through the food chain
- Is semelparous: Spawn once and then die



Capelin, distribution and migrations



Capelin, catch and stock history





Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin
- Herring (sild)
- Haddock
- Saithe
- Polar cod
- Blue whiting

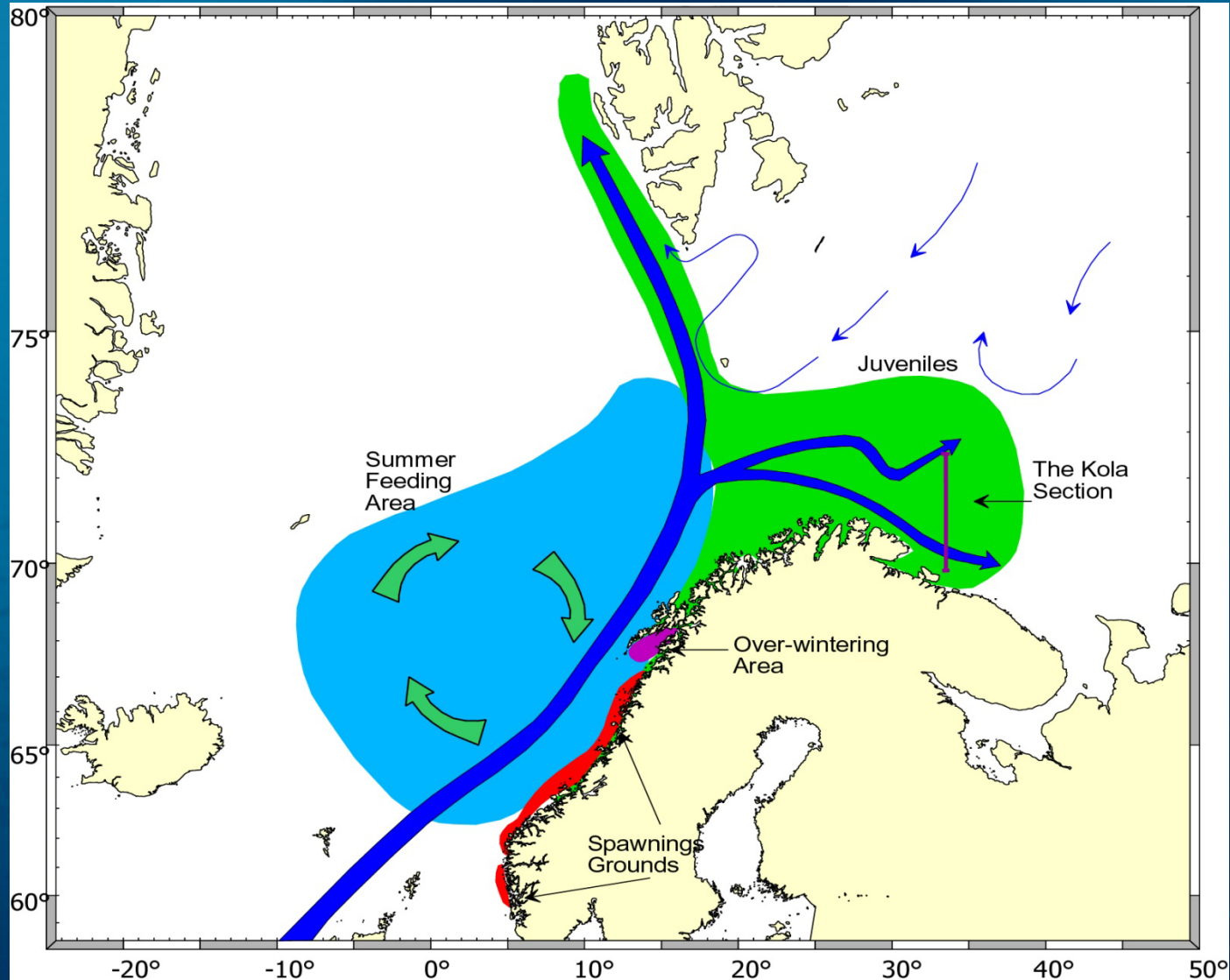


Biology herring (*Clupea harengus*)

- A pelagic, schooling fish, specialised plankton feeder
- Age and length at maturity: 4-5 years, 30-32 cm
- Good recruitment occurs in periods of high inflow of Atlantic water to the Barents Sea, simultaneously with the cod, but...

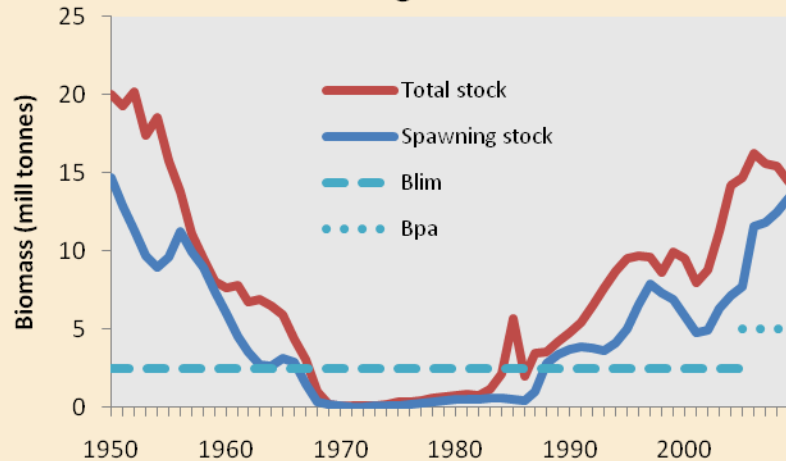


Herring, distribution in the 1990s

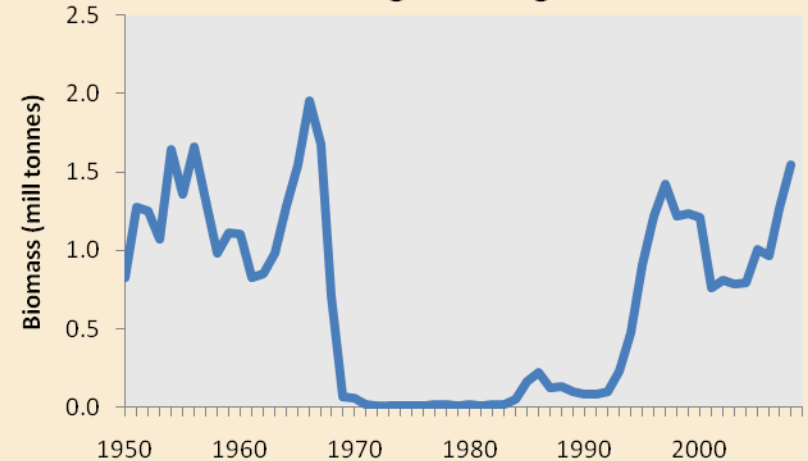


Herring, catch and stock history

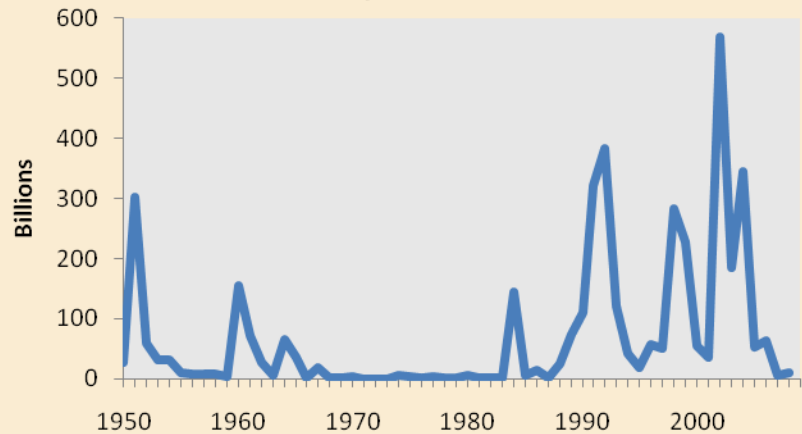
NSS Herring - stock



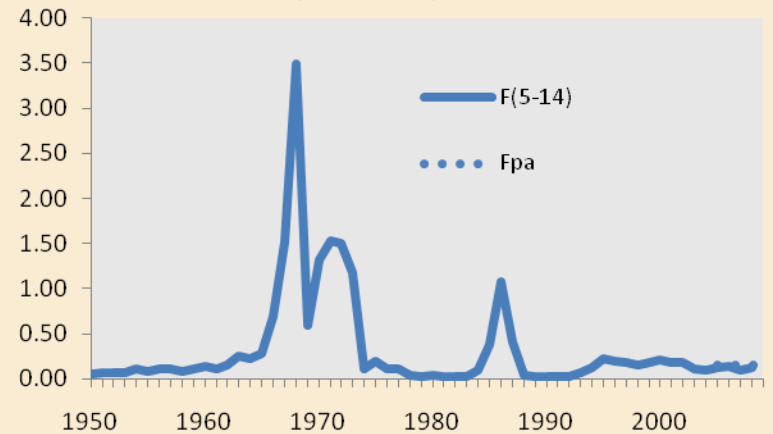
NSS Herring - landings



NSS Herring - recruitment



NSS Herring - fishing mortality



Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin
- Herring
- Haddock (hyse)
- Saithe
- Polar cod
- Blue whiting

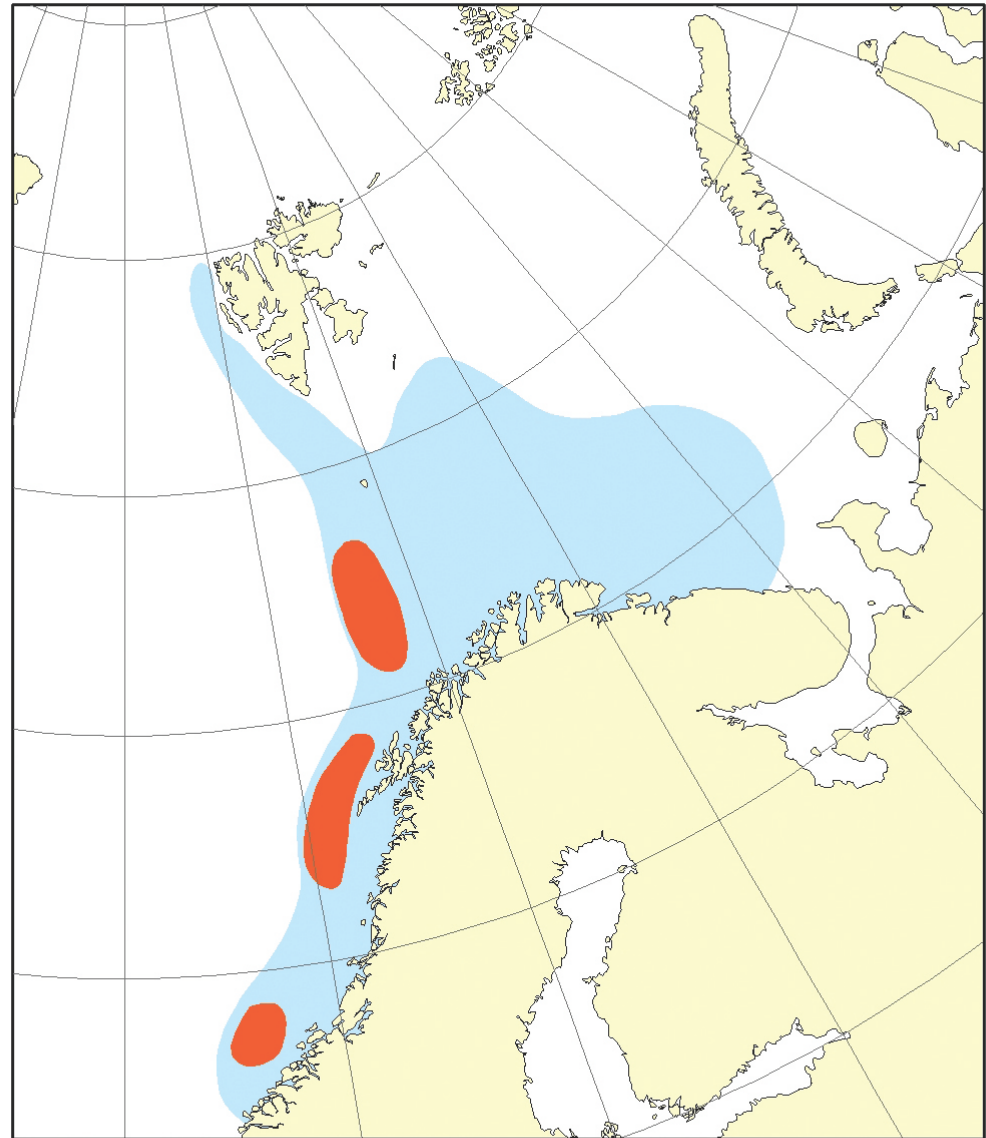


Biology haddock (*Melanogrammus aeglefinus*)

- A specialized benthic feeder
- Max size/age 110 cm, 19 kg, 20 years



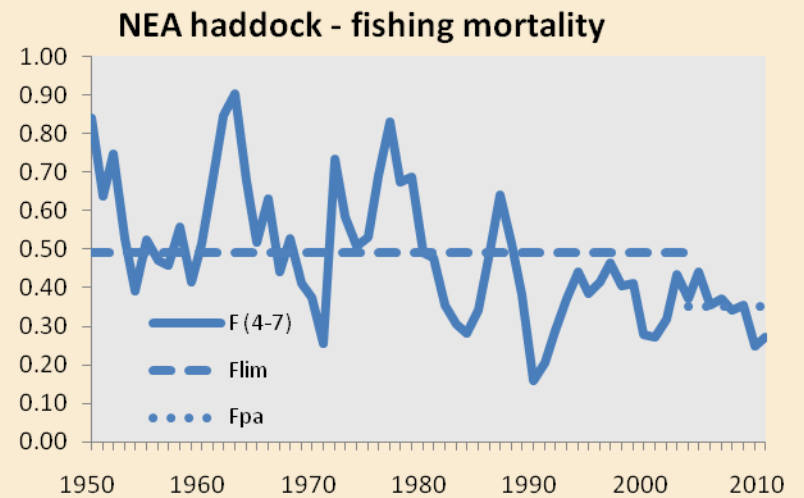
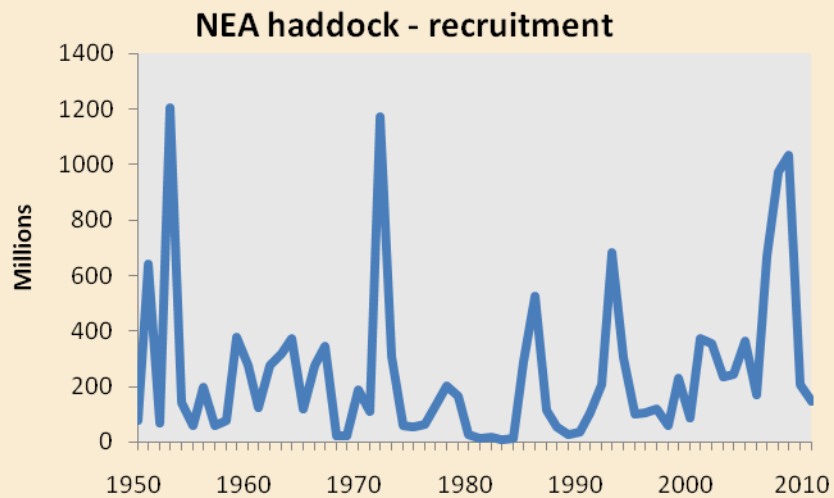
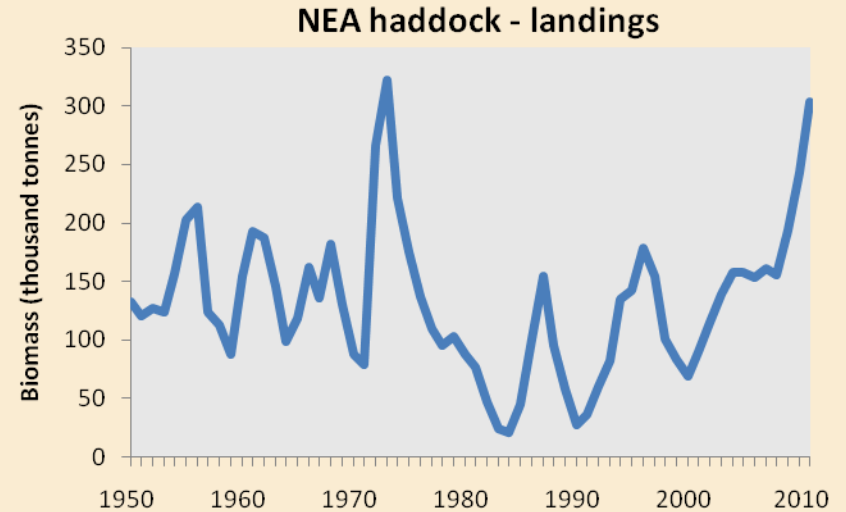
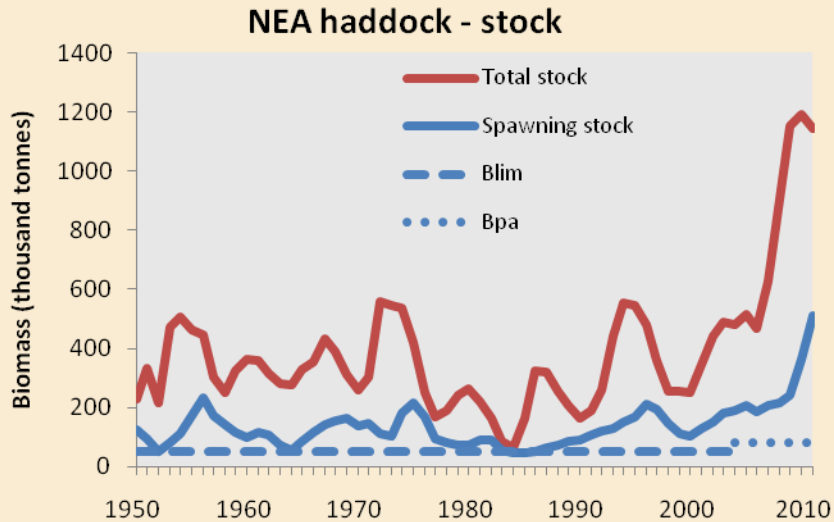
Haddock, distribution and migrations



Utbredelsesområde Gyteområde



Haddock, catch and stock history



Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin
- Herring
- Haddock
- Saithe (sei)
- Polar cod
- Blue whiting

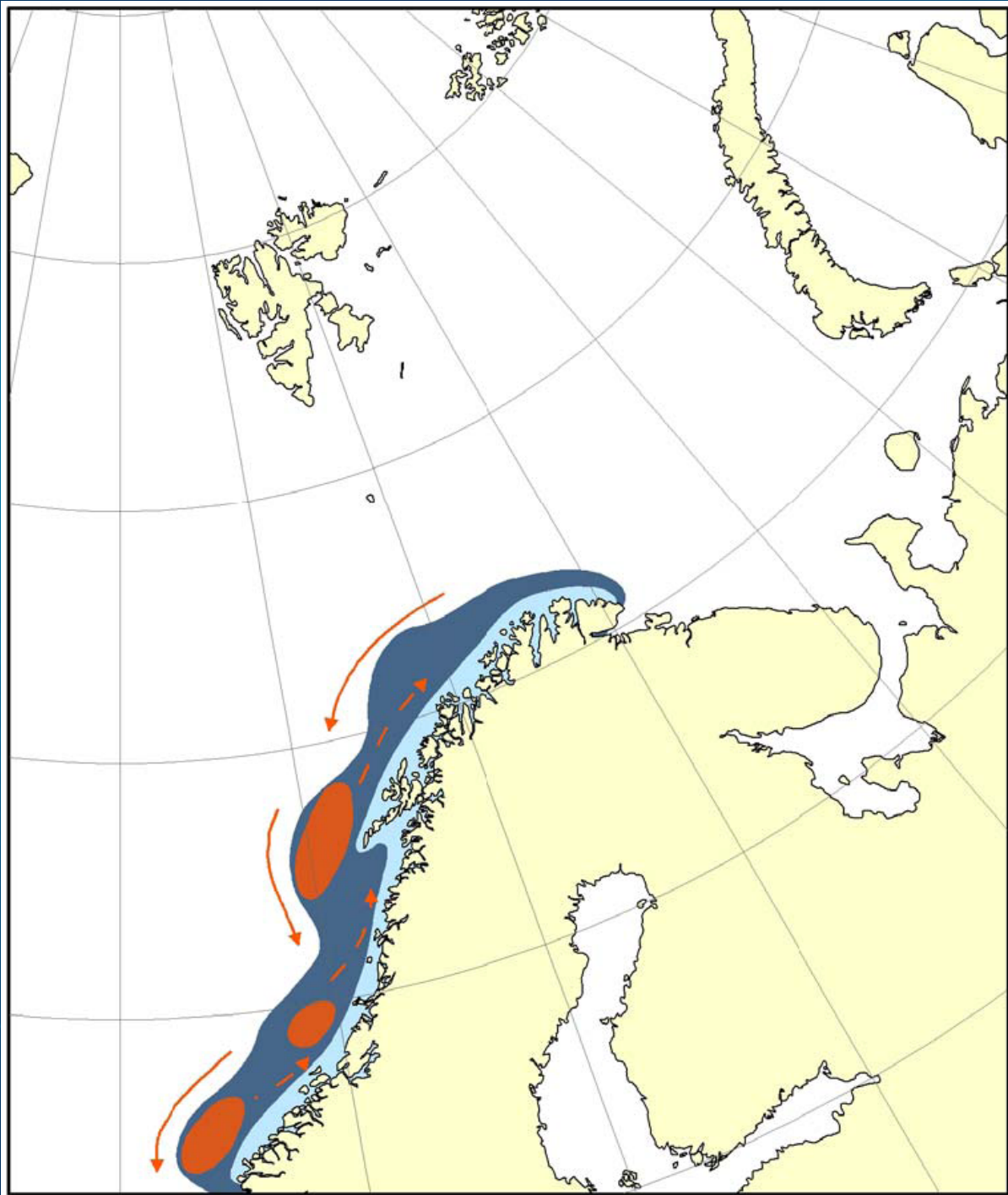


Saithe (*Pollachius virens*), biology

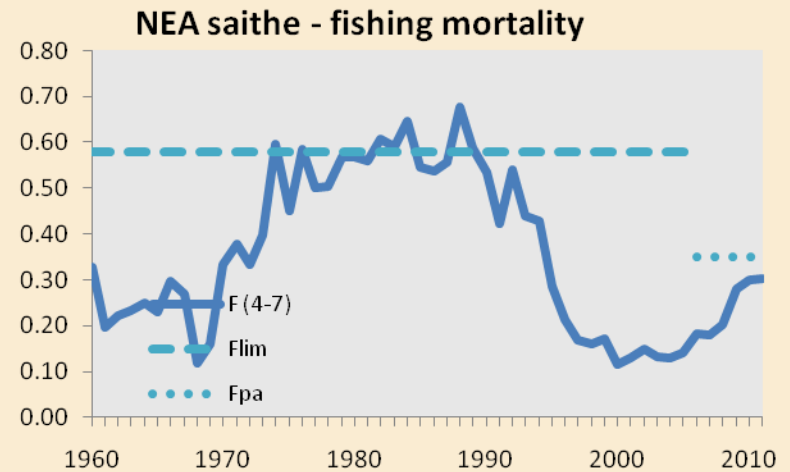
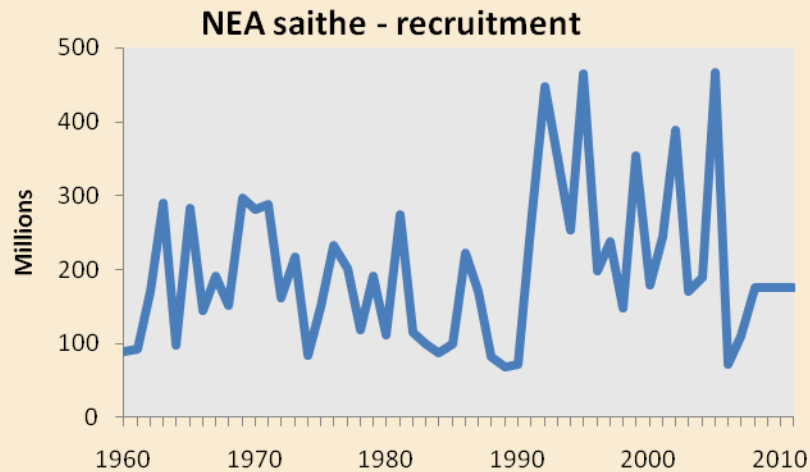
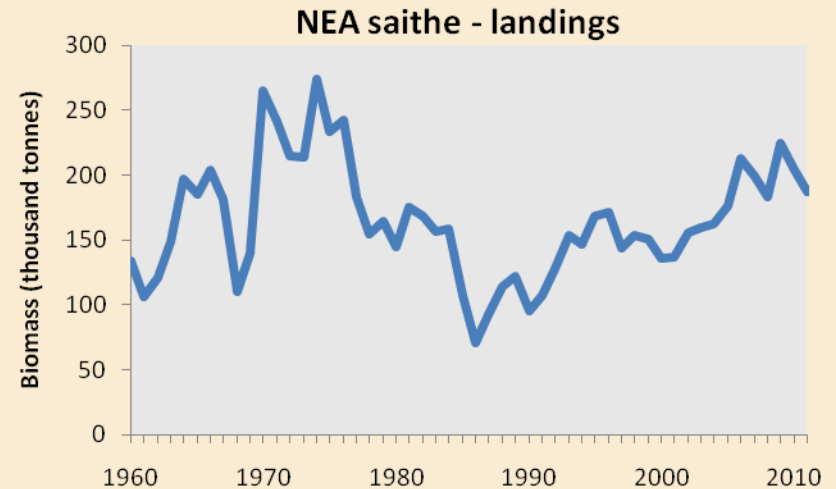
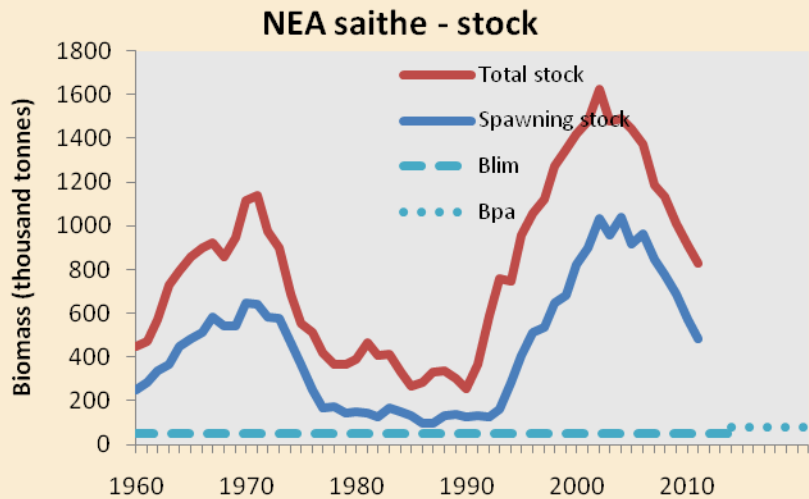
- Mainly pelagic, cod-like fish
- Are fish-eaters as adults
- Max size/age: 130 cm, 20 kg, 30 years



Saithe, distribution and migration



Saithe, catch and stock history



Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin
- Herring
- Haddock
- Saithe
- Polar cod (polartorsk)
- Blue whiting

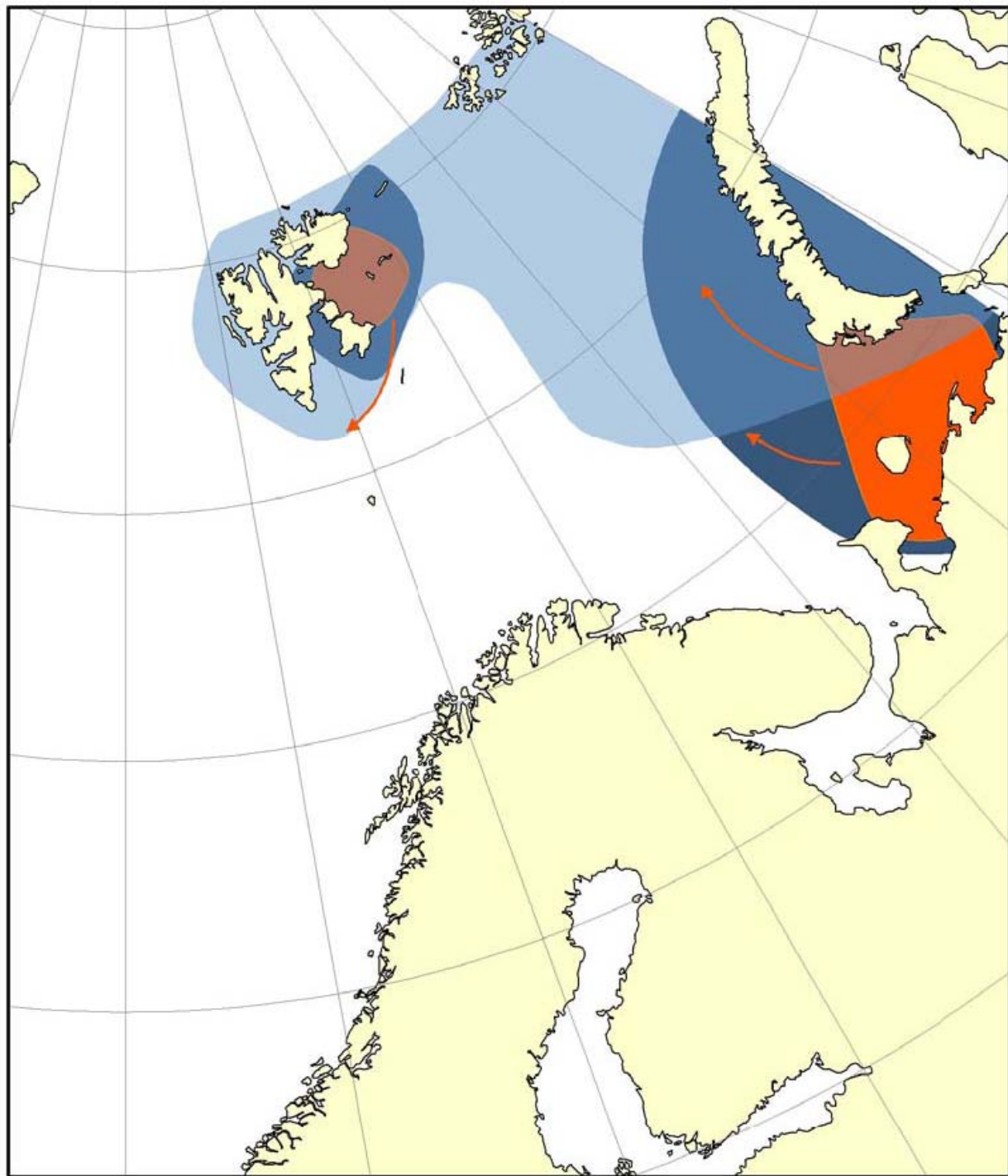


Polar cod (*Boreogadus saida*), biology

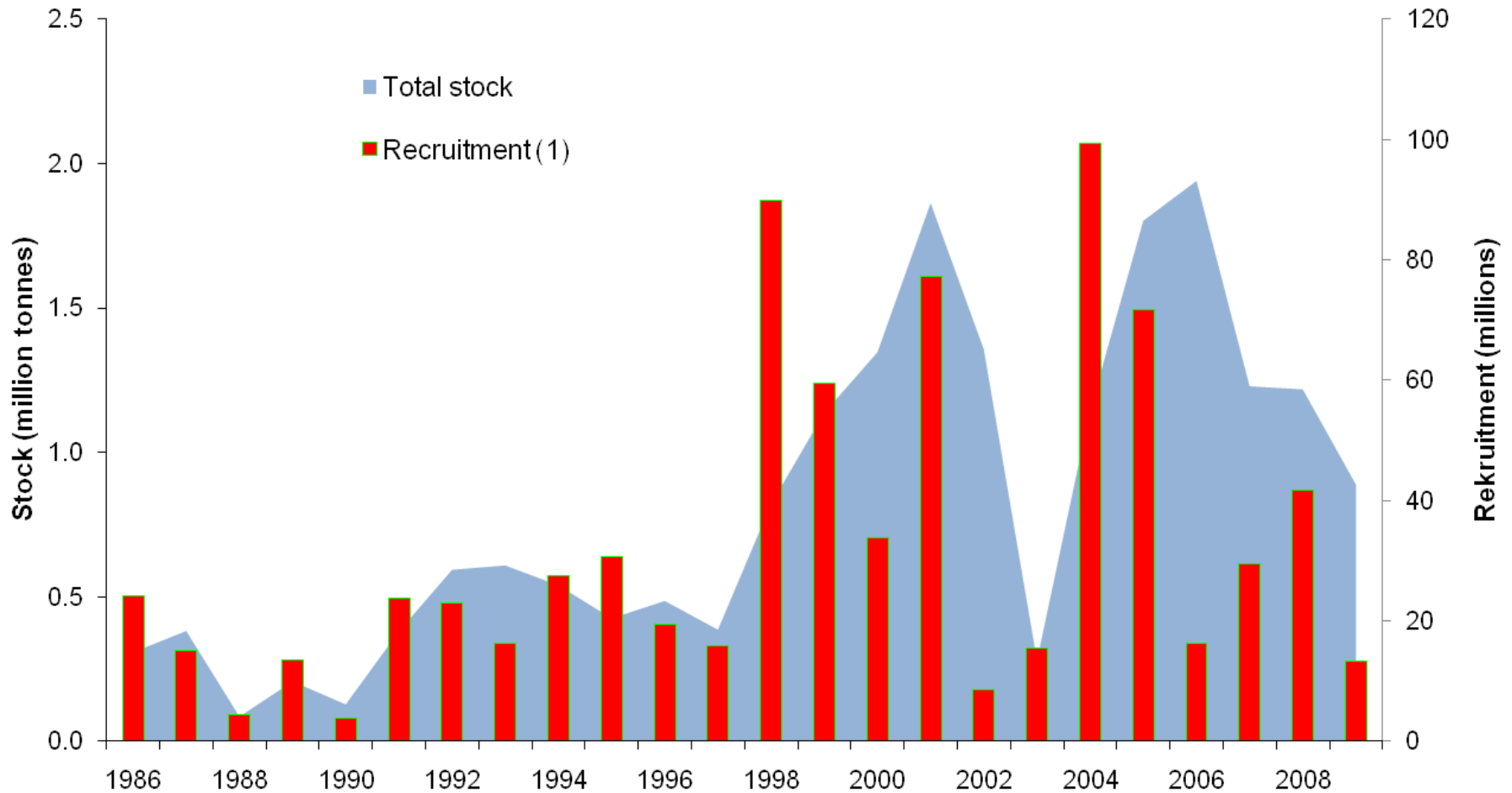
- A semipelagic, schooling cod-like fish
- A true arctic species, capable of living in temperatures well below zero
- Feed on zooplankton
- Max size/age: 25cm, 100g, ~5 years



Polar cod, distribution and migrations



Polar cod, catch and stock history



Biology of the main Norwegian and Barents Sea stocks

- Cod
- Capelin
- Herring
- Haddock
- Saithe
- Polar cod
- Blue whiting (kolmule)

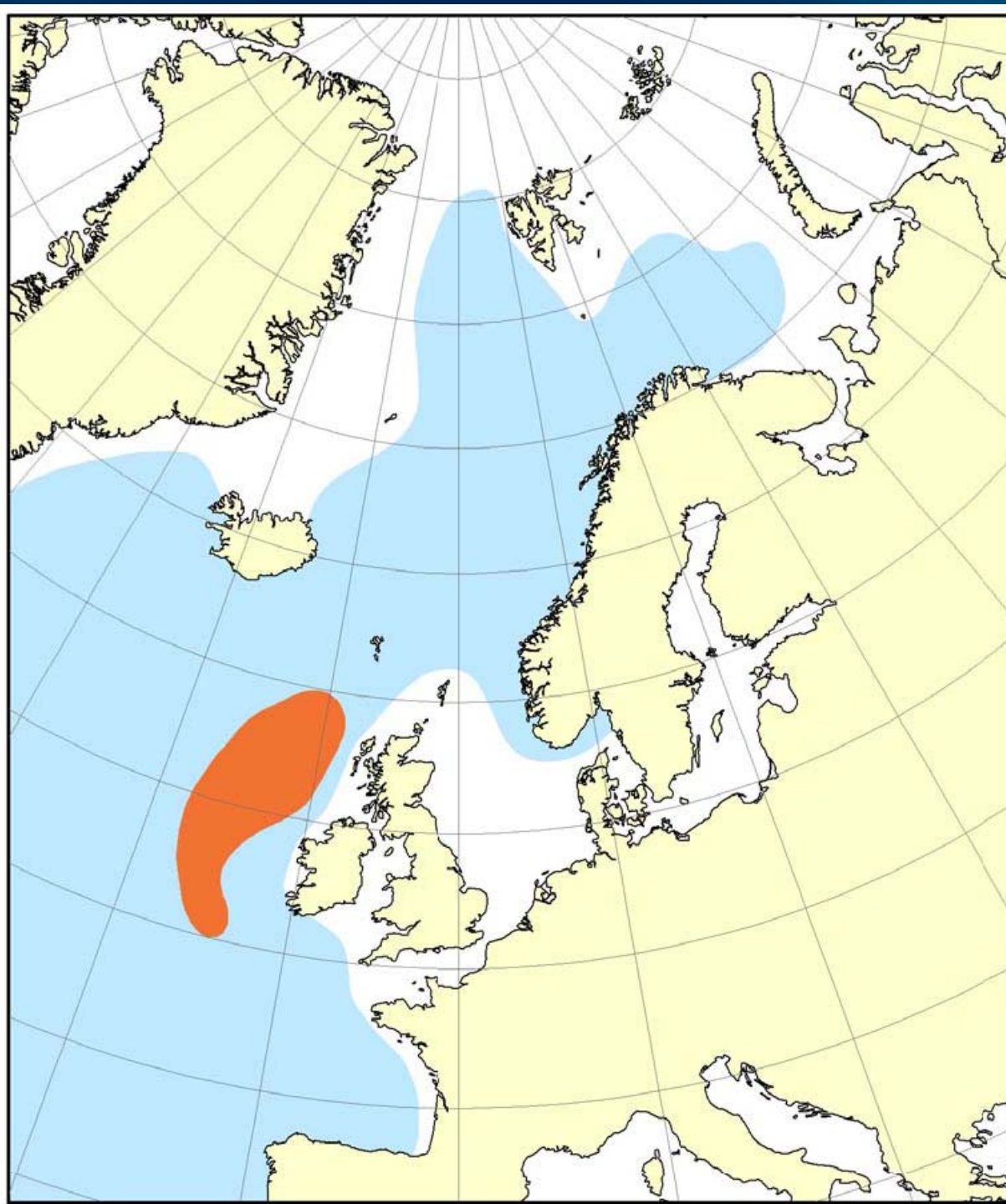


Blue whiting (*Micromesistius poutassou*), biology

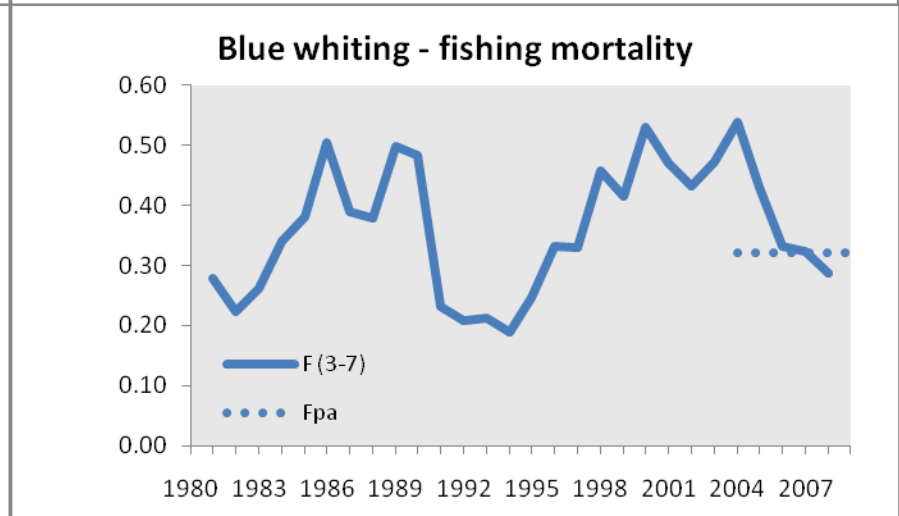
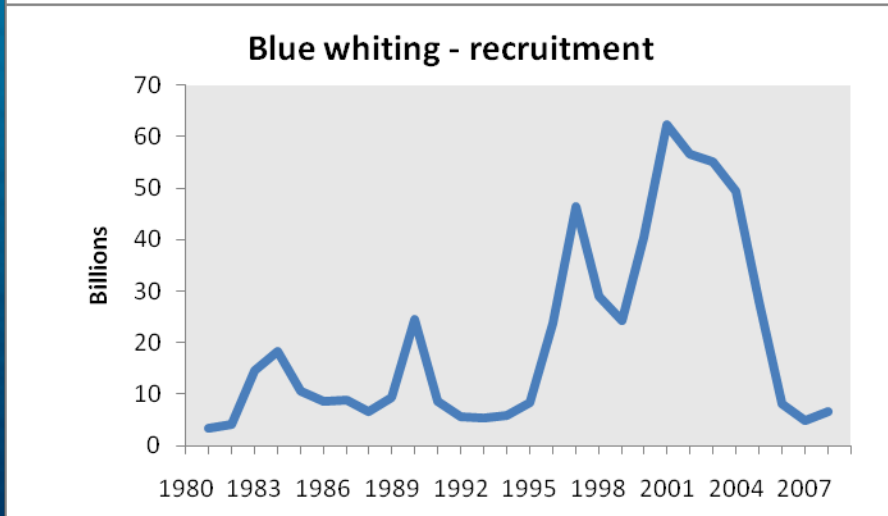
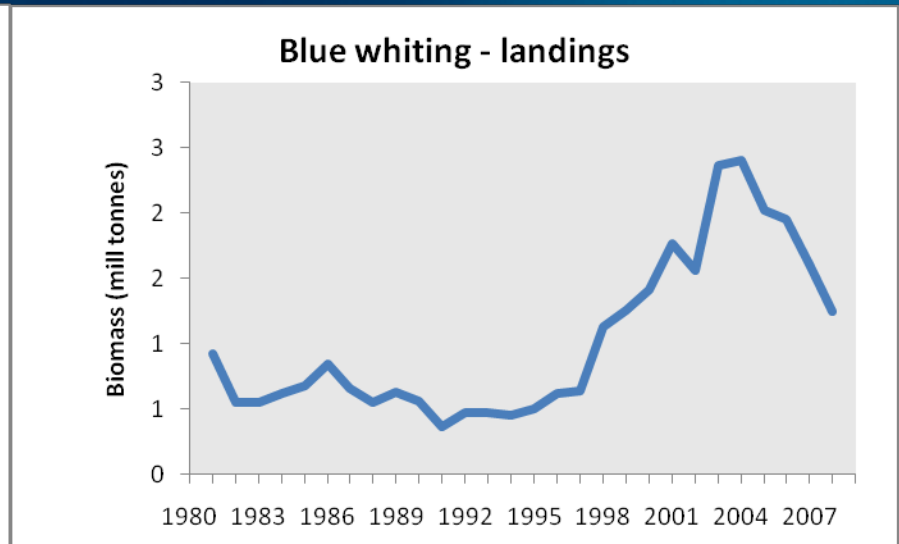
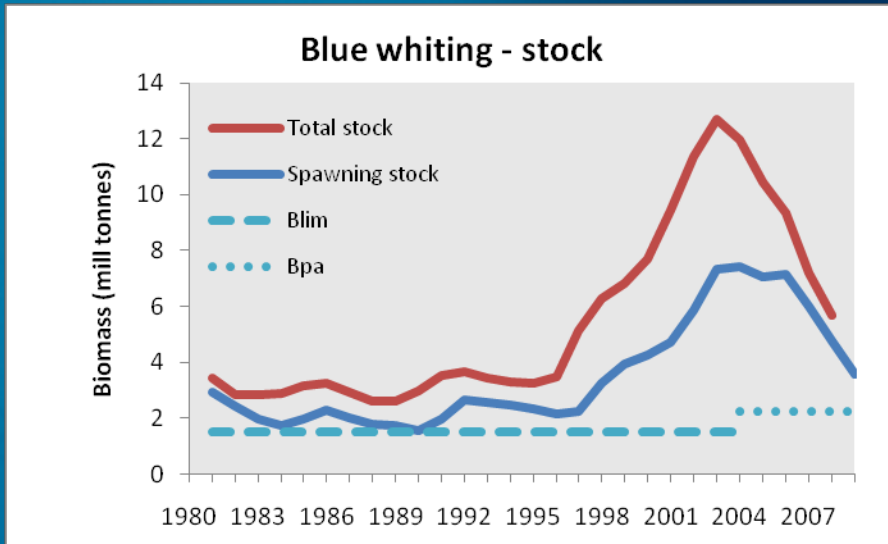
- A deep pelagic fish in the cod family
- Feed on plankton, fish larvae etc.
- Max size/age: 50 cm, ½ kg, 10-20 years



Blue whiting, distribution and migrations



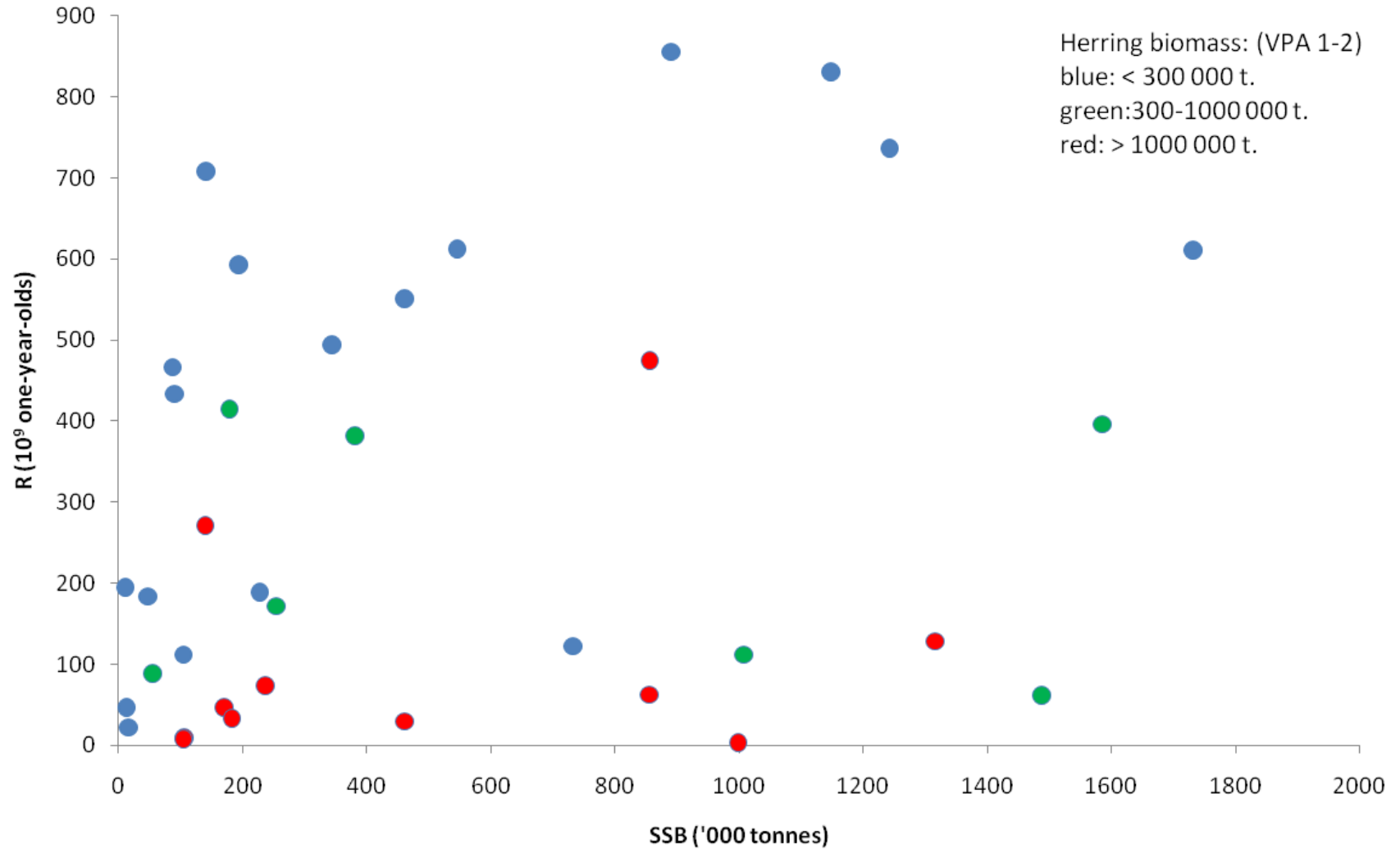
Blue whiting, catch and stock history



Fish population interactions as observed in the Barents Sea during the last ~30 years

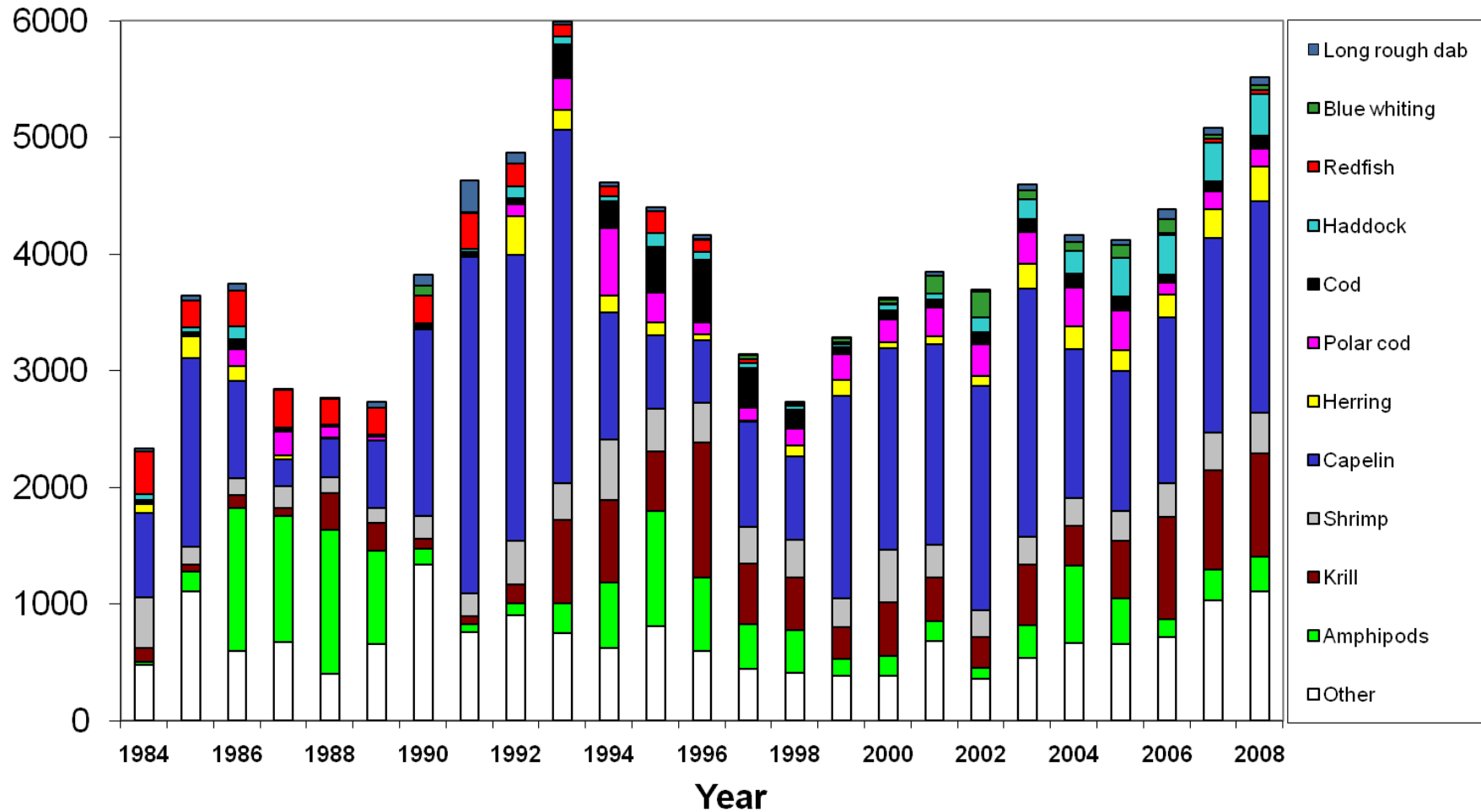


Capelin recruitment

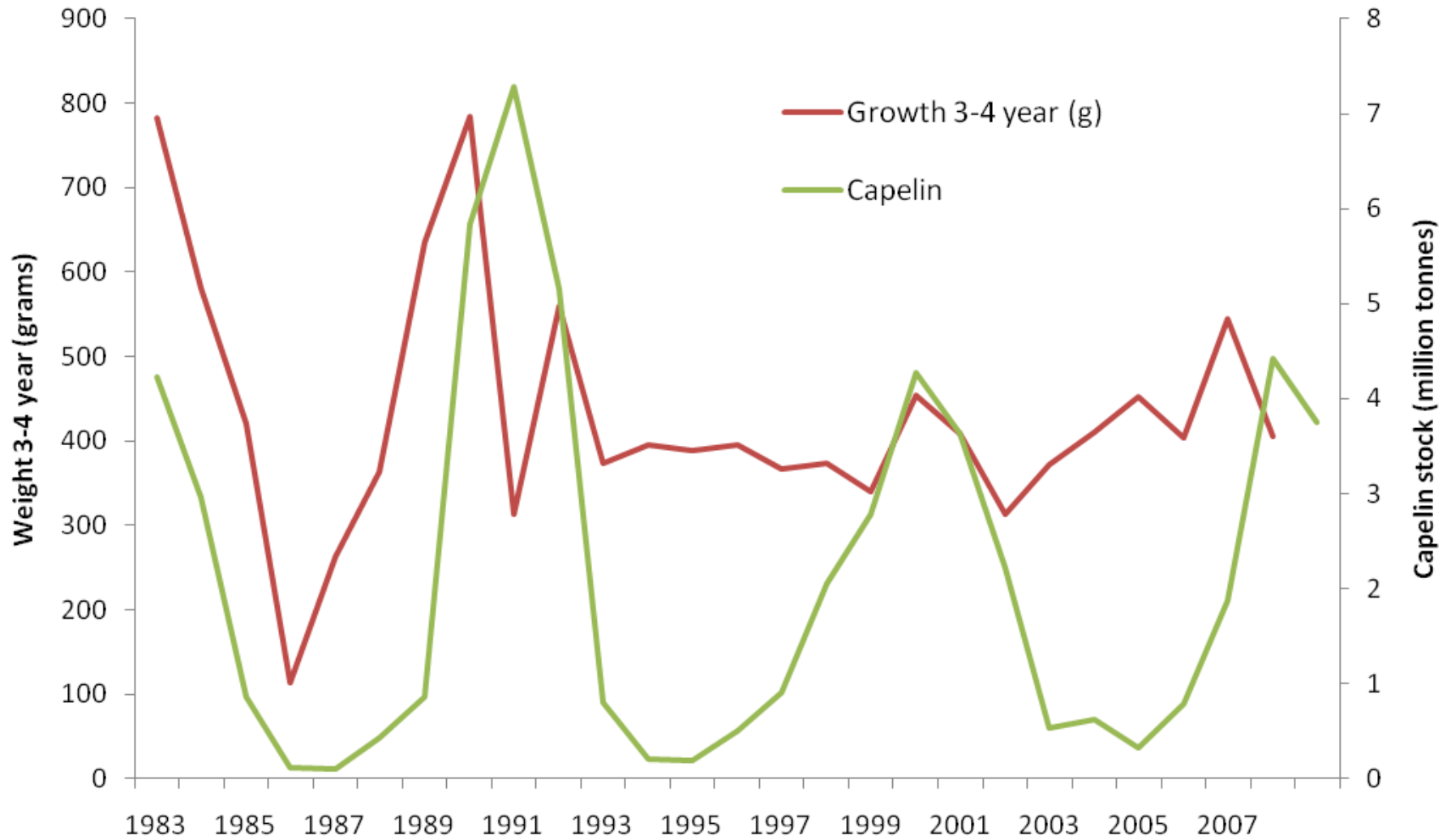


Cod consumption

Consumption by NEA cod (1000 tonnes)

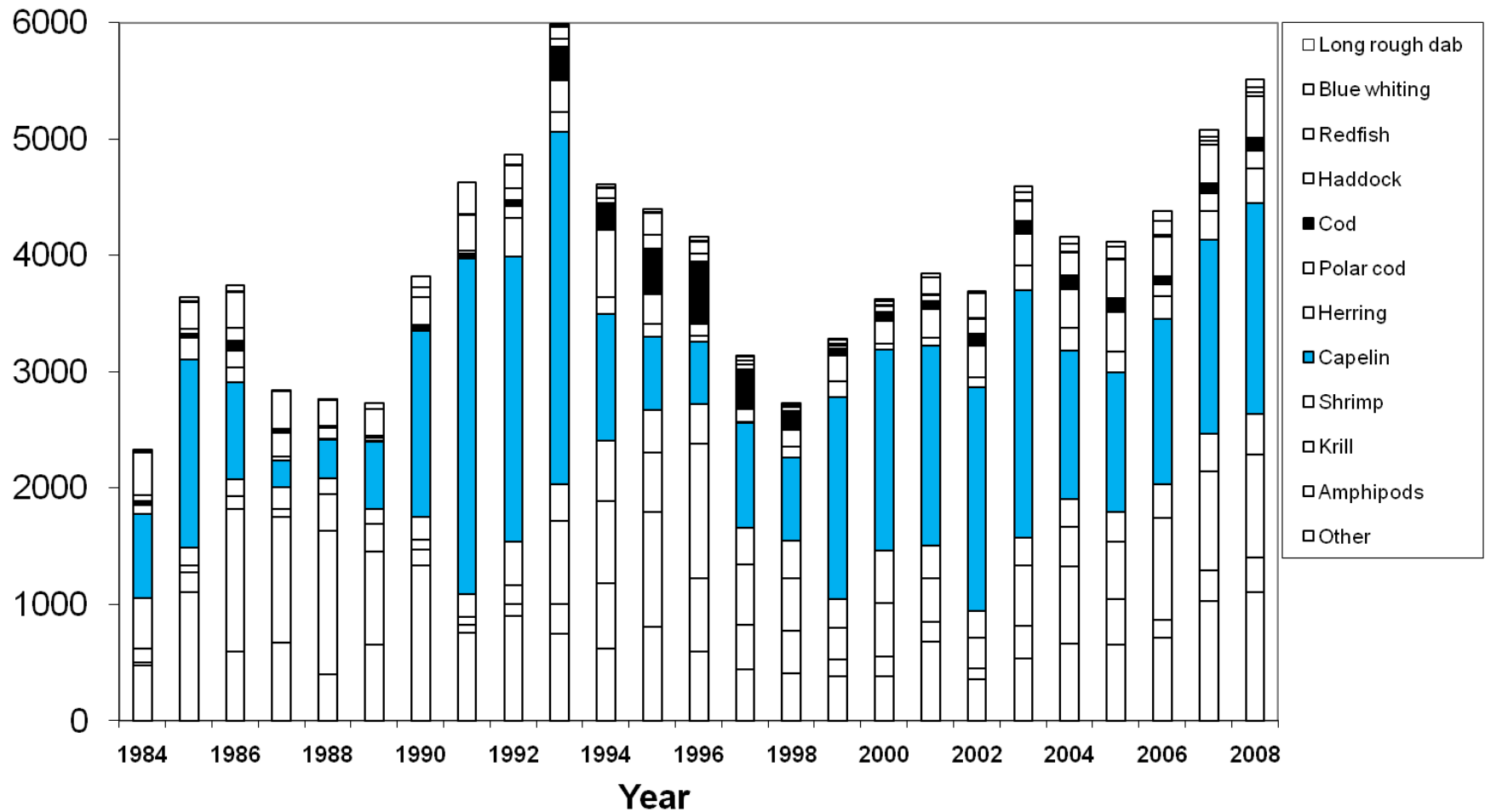


Cod growth



Cod cannibalism

Consumption by NEA cod (1000 tonnes)



Precautionary reference points

WORLDWIDE FISHING CENTER

