



INSTITUTE OF MARINE RESEARCH



Strategies for Commercial Marine Species in Northern Ecosystems

Capelin in the Barents Sea

H. Gjørseter, IMR and N.G. Ushakov, PINRO

Species characteristics

- Spawning array
- Male larger than female
- Salmonoid fish – high fat content
- Mostly semelparous – low spawning survival
- Demersal eggs
- Specialized plankton feeder
- Max age about 5-6 years



Stock

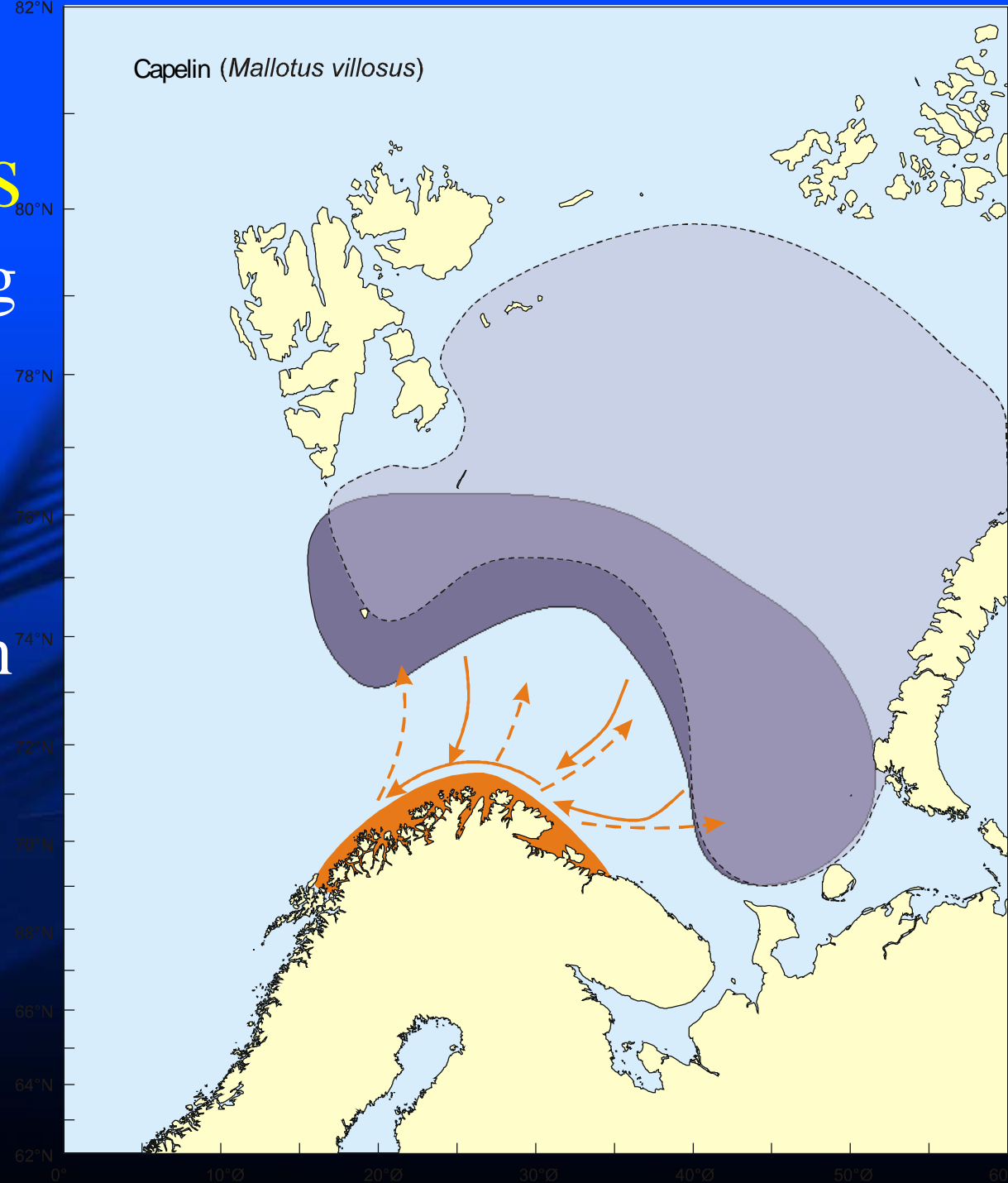
characteristics

- Coastal spawning

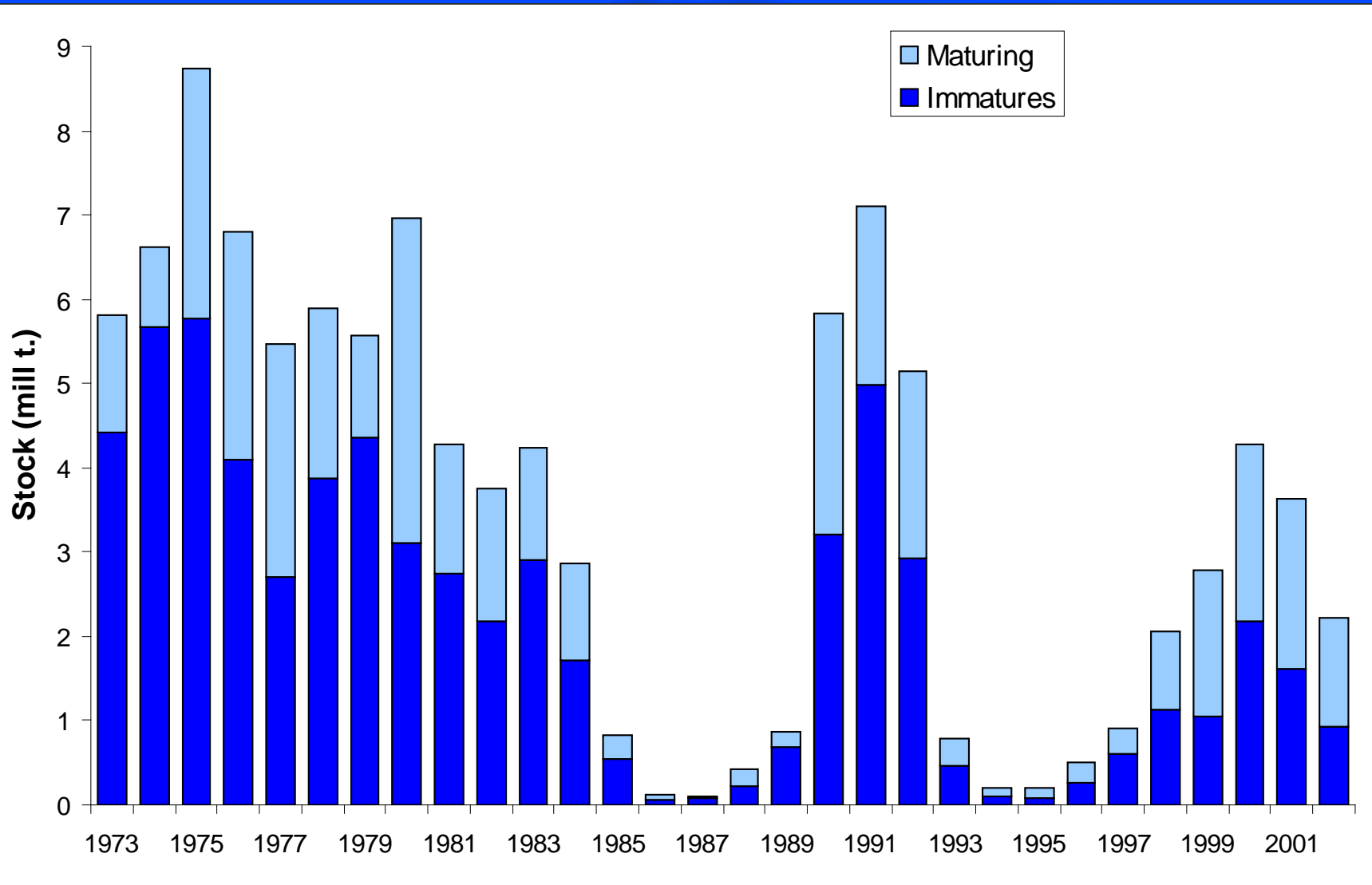
- Extensive seasonal migrations

- Wide distribution during feeding season

- Wintering south of polar front



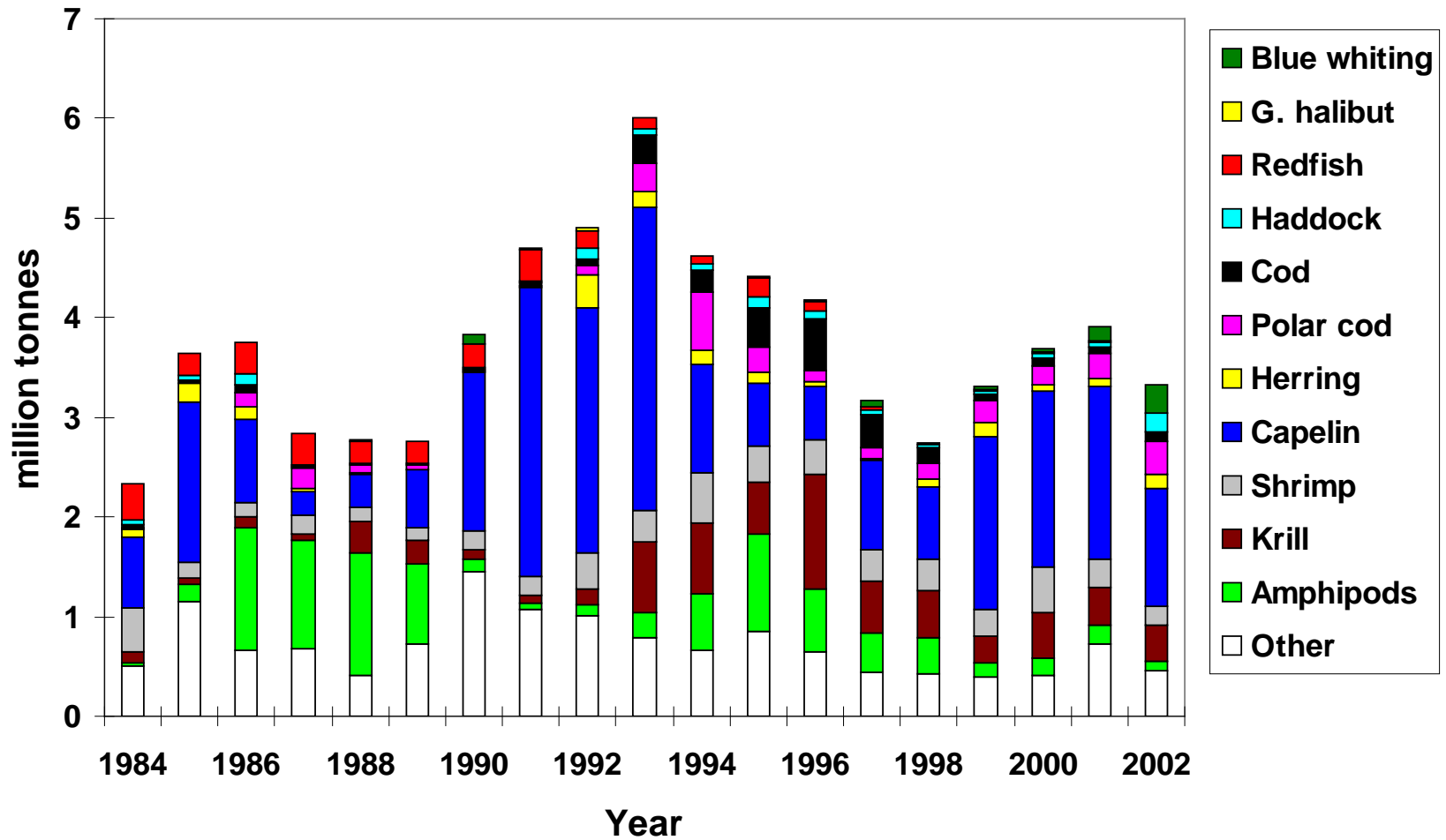
Stock history



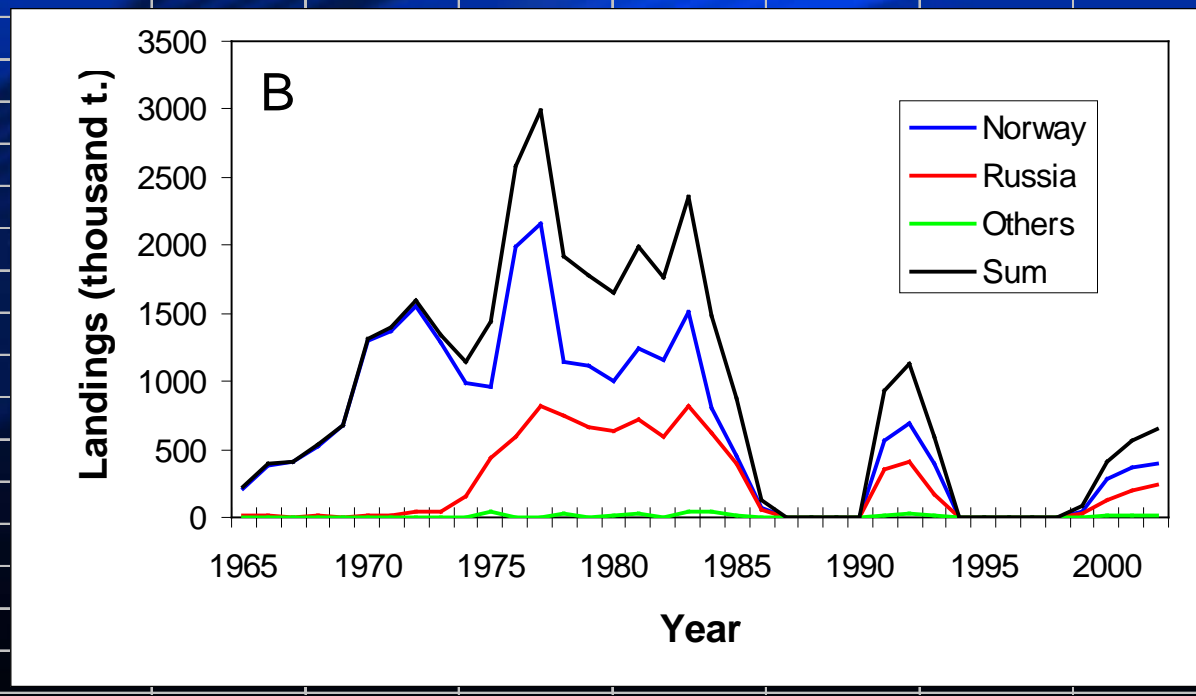
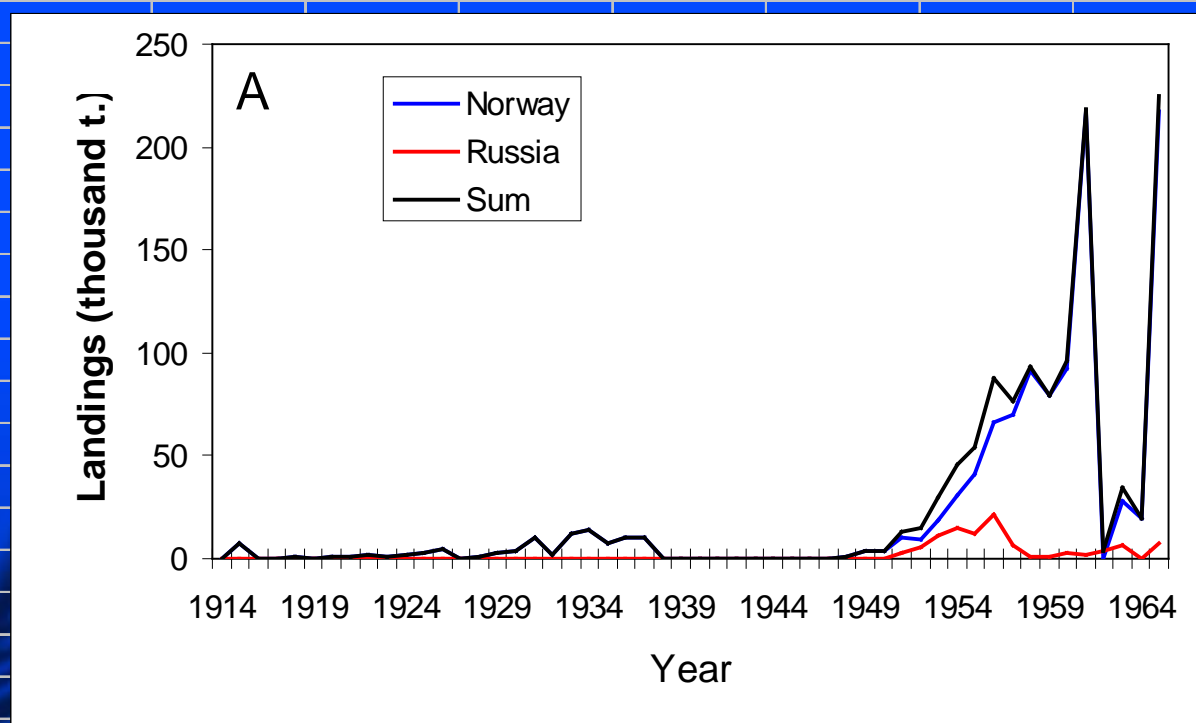
Capelin is a forage fish

- Main predator is cod
- Other fish predators include:
 - Haddock, Greenland shark, Greenland halibut, Esmarks eelpout, Thorny skate, Long rough dab, Deep sea redfish and others
- Other major predators:
 - Seals (mainly Harp seal)
 - Whales (mainly Minke and Humpback)
 - Sea birds (mainly Common guillemot and puffin)

Consumption by NEA cod



History of capelin fishery



History of management

- Prior to 1978
 - National catch quotas based on evaluation of acoustic surveys. No underlying strategy
- 1978
 - Two meetings between Norwegian and Soviet scientists. Proposed joint management actions. The fishery commission established the following management scheme:
 - TAC based on joint investigations in autumn
 - Escapement strategy leaving 500 000 t SSB
 - Various technical regulation measures

History of management

- The minimum SSB of 500 000 t was based on visual inspection of a stock-recruitment curve
- Later, Hamre and Tjelmeland carried out analyses that concluded that maximum sustainable yield was reached for a SSB of 400 000 t.
- However, to increase the availability of capelin to cod and other ecosystem components, the SSB level was kept at 500 000 t for several years
- 1986-1990:
 - Fishing ban during the collapse period

History of management

- After the stock collapse with its effects on the whole ecosystem, it was realised that the singlespecies assessment used so far was inadequate for proper management
- Multispecies modelling was initiated
- A common database for stomach analysis of cod and other capelin predators was established

History of management

● 1991-1993

- Various ad hoc management taking into consideration cod's consumption of capelin

● 1994-1998

- A new stock collapse with a total fishing ban

● After the collapse

- Effects from young herring on capelin recruitment included
- Deterministic assessment by singlespecies model abandoned in favour of probabilistic assessment based on Bifrost/CapTool. Still singlespecies assessment.

Current management strategy

- In November 2002 the Joint Norwegian-Russian Fisheries Commission agreed on the following strategy for the management of capelin:
 - "The Parties agreed on an exploitation strategy for capelin where the TAC is not set higher than that, with 95% probability, at least 200 000 tonnes of capelin are allowed to spawn"
- Since ACFM finds this strategy to be in accordance with the precautionary approach, ACFM will probably continue to give advice according to this strategy

Future strategy enhancements

- Include effects from herring on capelin recruitment. Different B_{lim} with and without herring?
- Target reference point
- Quality and quantity of spawned eggs in stead of spawning stock biomass
- Ultimate goal: To manage the stock complex of capelin, cod, shrimp, seals, whales etc. together