By-catch criteria in the Barents Sea shrimp fishery

Bio-economic views from Norwegian industry
Åge Remøy, shipowner
Norwegian northern shrimp fishery

Catches Barents Sea and Svalbard:
- 2001: 44,100 tons
- 2002: 50,800 tons
- 2003: 34,405 tons
- 2004: 32,649 tons

- 20-40 Norwegian vessels fishing for shrimp, of which 10 all year round, and rest for 3-6 months per year. Part of activity in Greenland, Jan Mayen, Flemish Cap
Shrimp fishery regulations

- Sorting grids with 19 mm. bar space, removes fish >17-18 cm (fish age 1-1.5 year)
- Minimum shrimp size
- Svalbard: National effort regulation (fishing days)
- Ship license scheme, including license reduction programme (fleet structuring)
- Nature! (ice-conditions and catches)
Shrimp fishery regulations

- Maximum bycatch limits of:
  - 800 juveniles of cod and haddock combined per ton of shrimp
  - 300 juveniles of Greenland halibut per ton of shrimp
  - 1,000 juveniles of redfish per ton of shrimp

- Fishery prohibited and area closed if above any one of these. Very many and large areas closed recent years, causing big problems for the shrimp fishery.
Current biological situation

0-group abundance index 1965 - 2004

0-group abundance situation for haddock 2004 best since measurements started in 1965

Cod only 7 better years since 1965
Result 0-group abundance + juvenile bycatch limits

Roughly distribution area

Closed February 2005
Endangered pleasures?

Norwegian Prawn Party
What is meant by bio-economic considerations?

- Management of fish and shrimp resources is not only a question of biology
- Must consider human activity, including economical aspects
- We feel that too much emphasis has been put on juvenile protection, without due consideration to other biological and certainly economic factors
The bio-economic model for calculating juvenile by-catch criteria

- Developed in early 1990s
- Attempts to assess the connection between losses of shrimp catches and gains in juvenile protection
- Method: comparing present value of shrimp catches lost, compared to future value of fish catches gained
The bio-economic model for calculating juvenile by-catch criteria

- Considers factors such as:
  - Prices cod, haddock, shrimp
  - Expected future catch volume pr. “saved” juvenile (including natural mortality expectations)
- Developed for cod and haddock.
- Now also have redfish and Greenland halibut criteria. Model less useful for stocks outside safe biological limits (shrimp will always “win” as future value of little is little…
Using bio-economic model

- Calculations based on average cod, haddock and shrimp prices 2004 and using varying future catch expectancies from “saved” juveniles, indicates following by-catch criteria:
  - Cod 1.100-1.600 pr ton shrimp
  - Haddock 2.500-4.400 pr ton shrimp
    (model calculates species by species)
  - Future yield per recruit/saved juvenile optimistically estimated...
  - Relative price-moves in 2005 may alter above conclusions, but clear result towards more liberal juvenile by-catch criteria
Conclusions

• **Juvenile by-catch criteria is not a strictly biological issue, economic factors must be considered**
• **Support biological decision-making factors with economic by use of, or inspired by ideas of the bio-economic model**
• **Take current 0-group stock assessments into consideration**
• **Need for annual juvenile by-catch criteria adjustments?**
Conclusions

- Need to consider more liberal criteria the further north you go? (assuming less juvenile survival further north)
- Need a system of automatic reopening of fishing areas after some time, unless new measurements indicates continued closure