

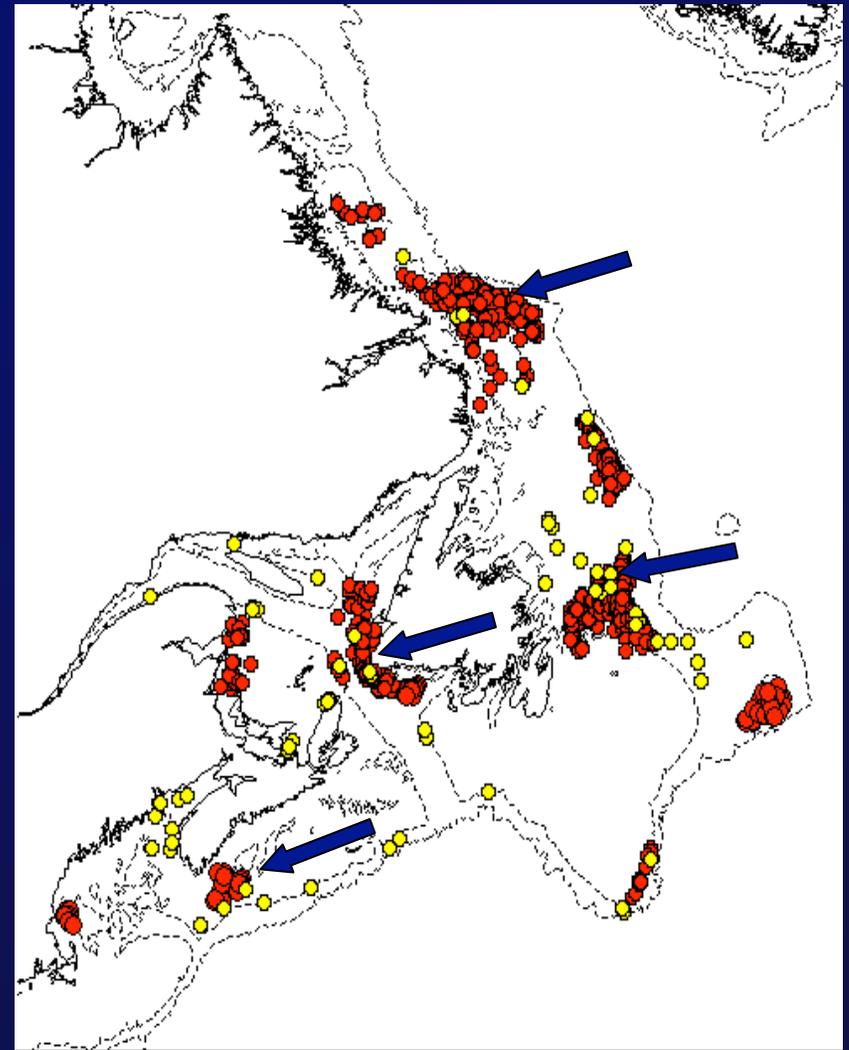
Fishery closures provide evidence concerning potential measures of MPA effectiveness

K.D. Baker, R.L. Haedrich and A. Williams

Memorial University of Newfoundland
St. John's, Newfoundland
A1B 5S7 Canada

MPA Goals

- Wide range of objectives
- Goals must be clearly defined
- Most goals are not easily measured



MPA Effectiveness

- Often need measures of effectiveness over short time period
- Few studies demonstrate MPA effectiveness
- Current studies examine reef and coastal environments

Offshore MPAs

- Few have been established
 - The Endeavor Hydrothermal Vents
 - The Gully
 - 12 “areas of interest”

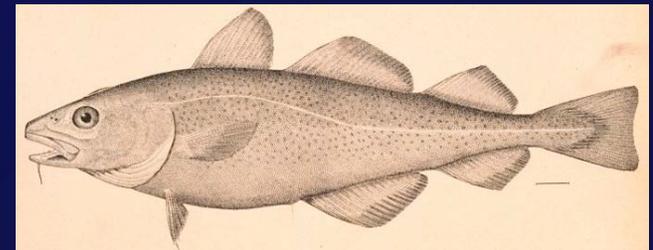
- Limited time series data



- Proxies are needed to evaluate measures of effectiveness

Canada's Cod Moratorium

- 1992 - Fisheries Minister announced 2-year moratorium
- 1993 - Moratorium extended indefinitely
- Fishery is still closed today



Databases

ECNASAP database (1970 – 1995)

DFO fishery surveys (1995 – 2002)



- Random stratified design (since 1978)
- Gear change mid-1995, therefore databases must be analyzed separately
- Appropriate information for studying changes in abundance and mean size

Area Examined

- Grand Banks
- Inside EEZ
- NAFO divisions – 3KLNO



Species Examined

- 4 species-at-risk (COSEWIC)
- 3 species being considered by COSEWIC
- 7 indicator species (Hamilton *et al* 2003)
- 7 special interest species

Total = 21 species



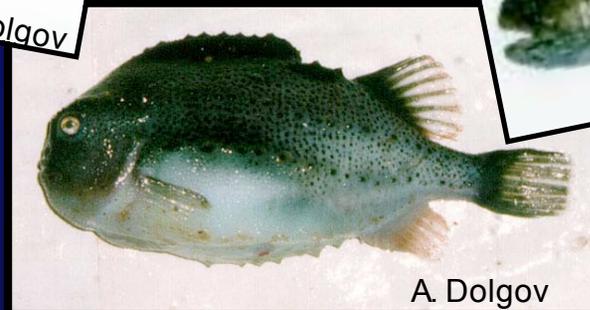
A. Dolgov



A. Dolgov



A. Dolgov



A. Dolgov



A. Dolgov

Trends

- **CPUE** = total number caught / number of stations that were sampled that year (at appropriate depths for that species)
- **Size** = total weight / total number caught that year
- Plotted against time and analyzed by linear regression

Results

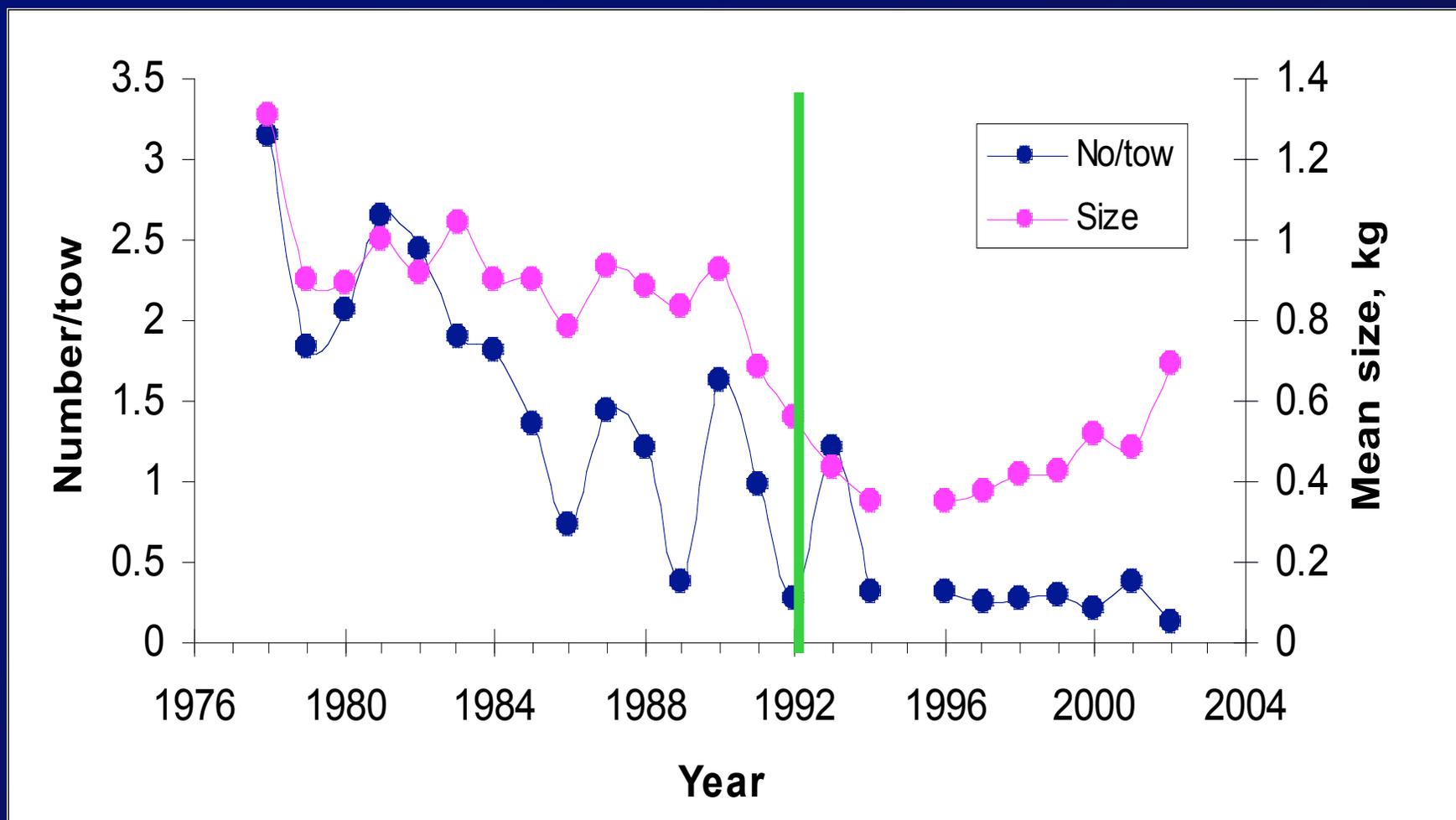
- Prior to the moratorium
 - 11 species showed declines in CPUE
 - 10 showed declines in size
 - 0 species showed increases in CPUE
 - 1 species showed an increase in size
- After the moratorium
 - 1 species showed an increase in abundance
 - 4 species exhibited increases in size

Six Focus Species

- Long-lived, low productivity
 - Roughhead grenadier
 - Roundnose grenadier
- More resilient to change
 - Smooth skate
 - Spotted wolffish
- Target of directed fishery
 - Deepwater redfish
 - Yellowtail flounder

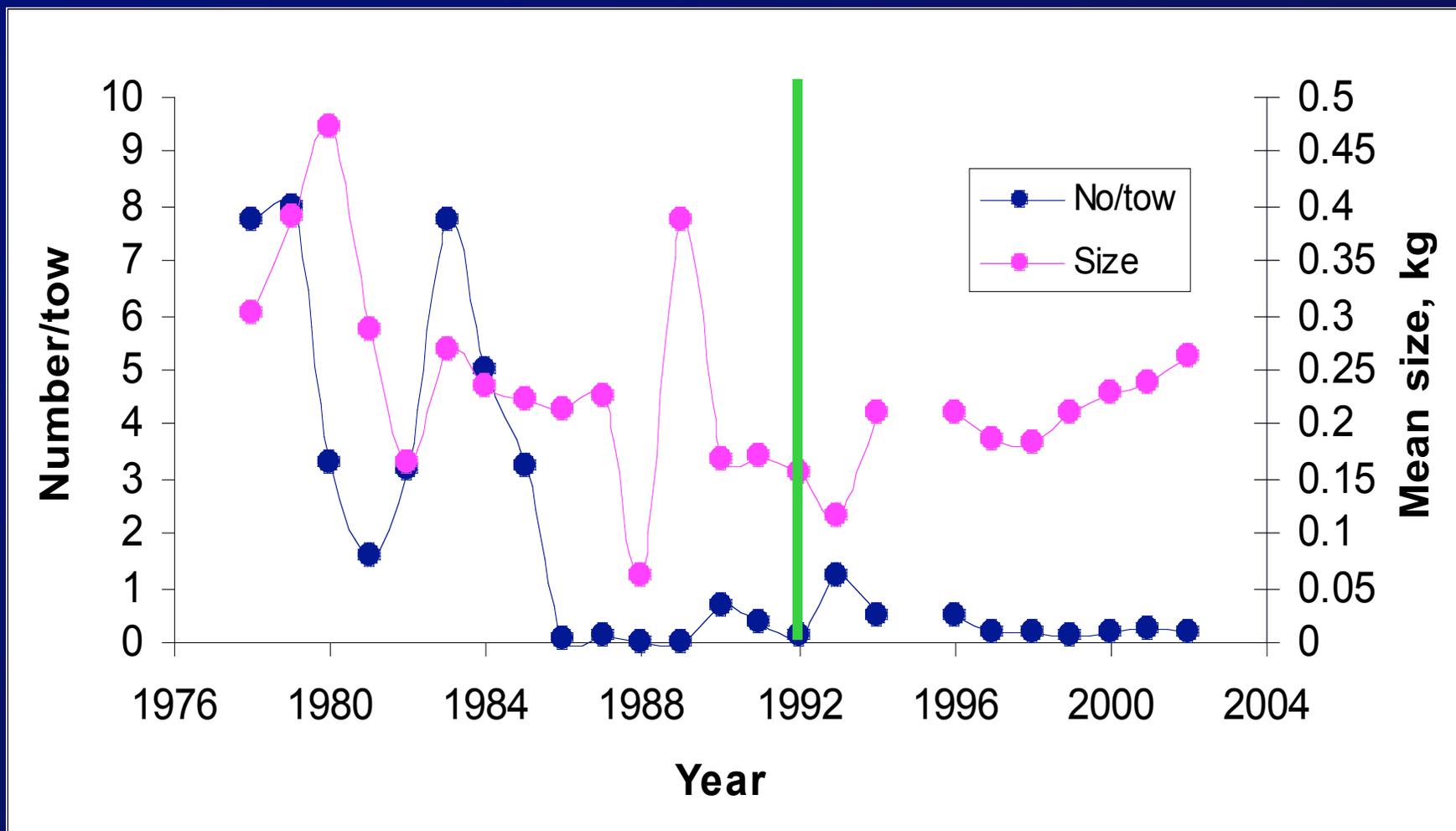


Roughhead Grenadier



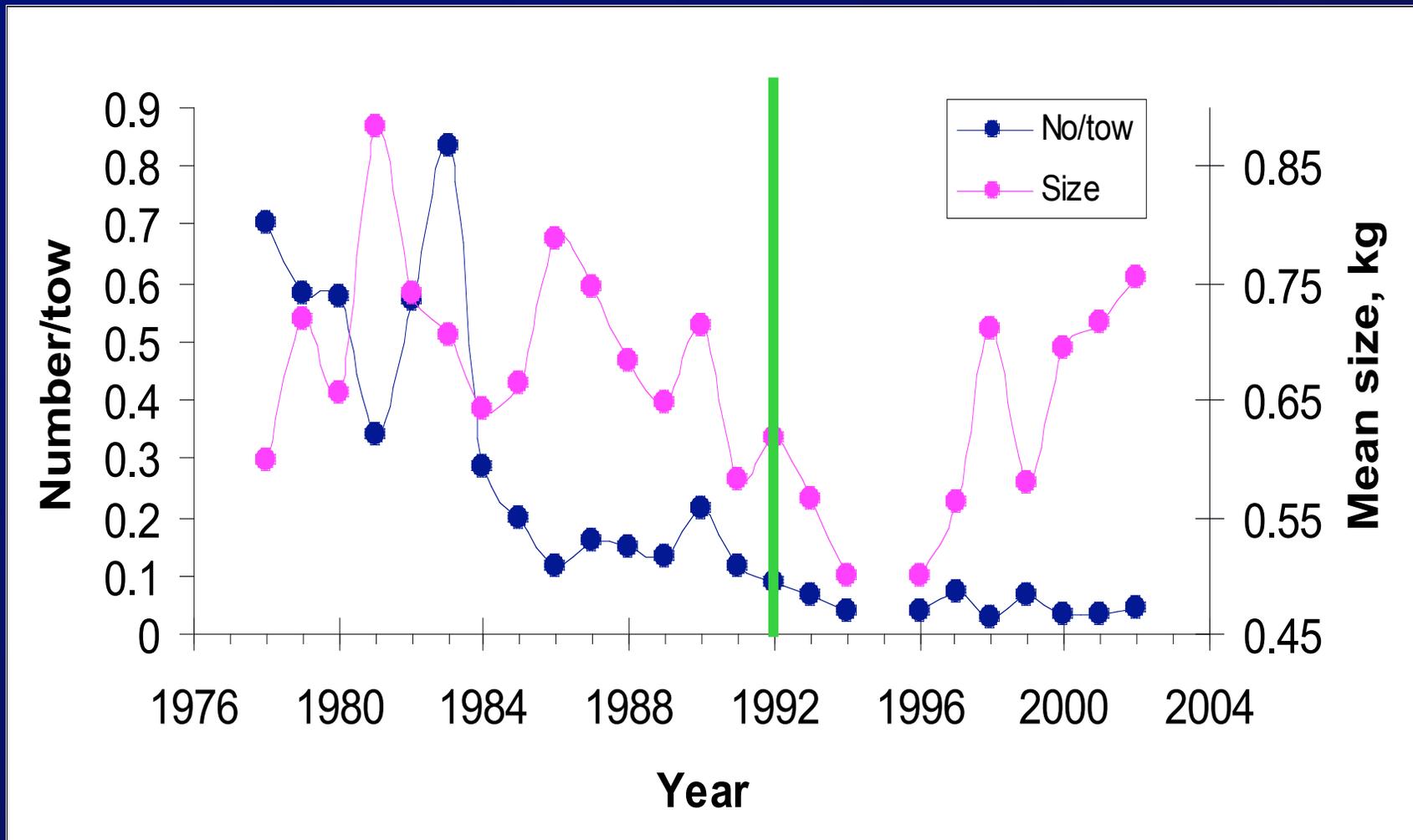


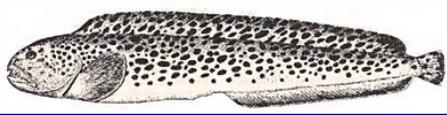
Roundnose Grenadier



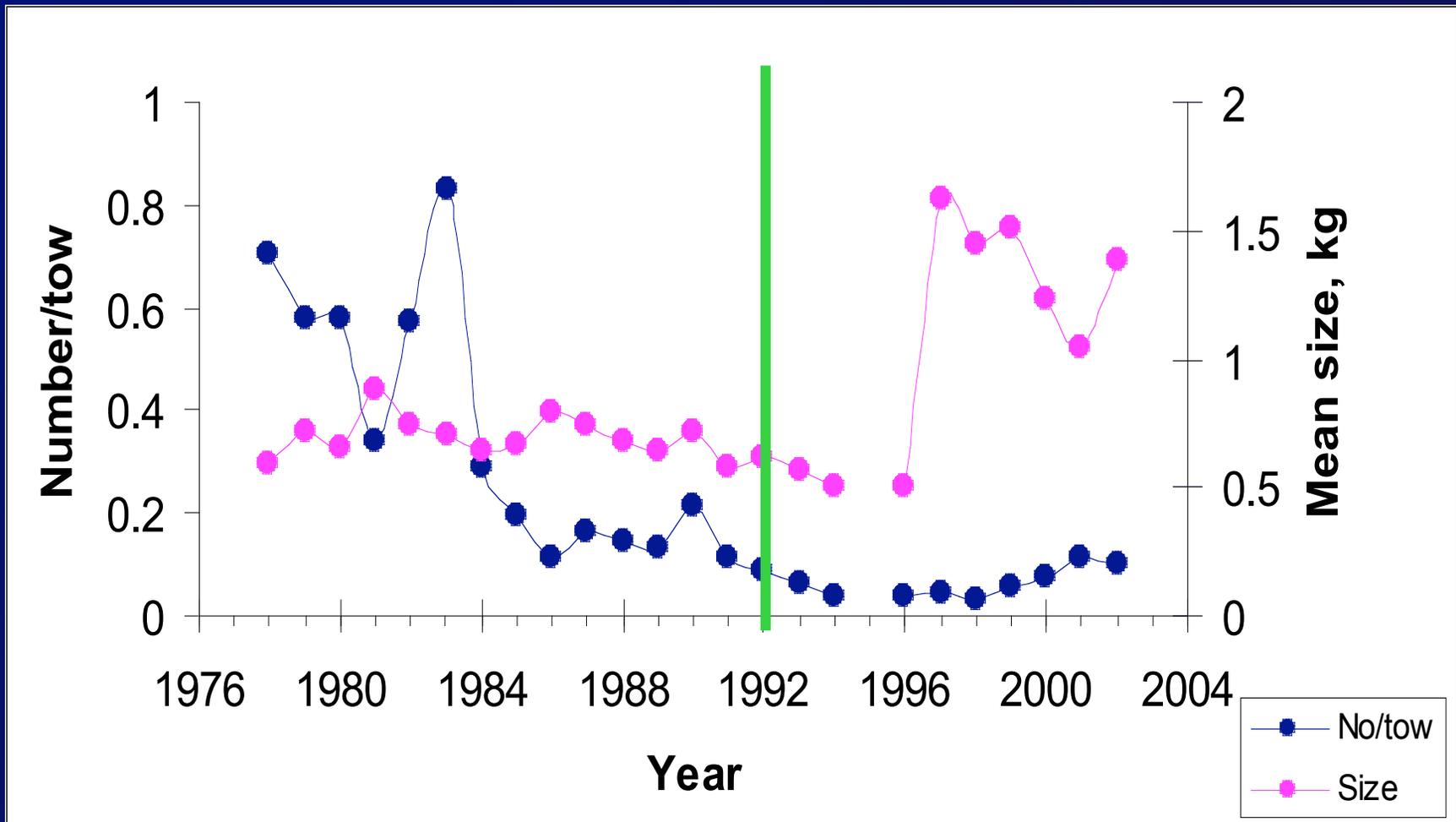


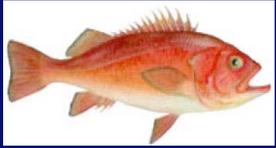
Smooth Skate



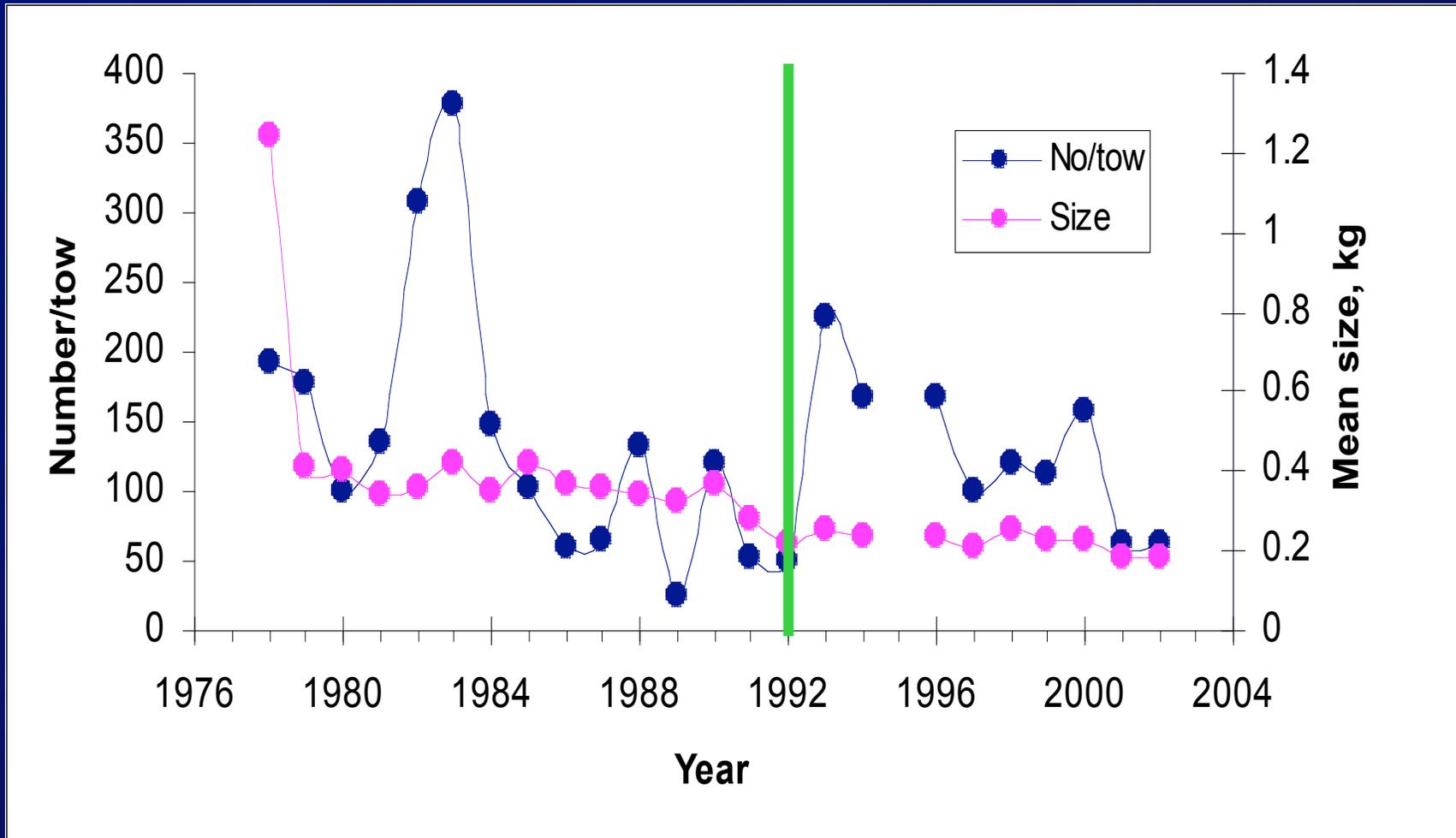


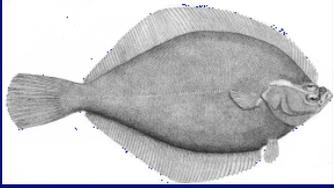
Spotted Wolffish



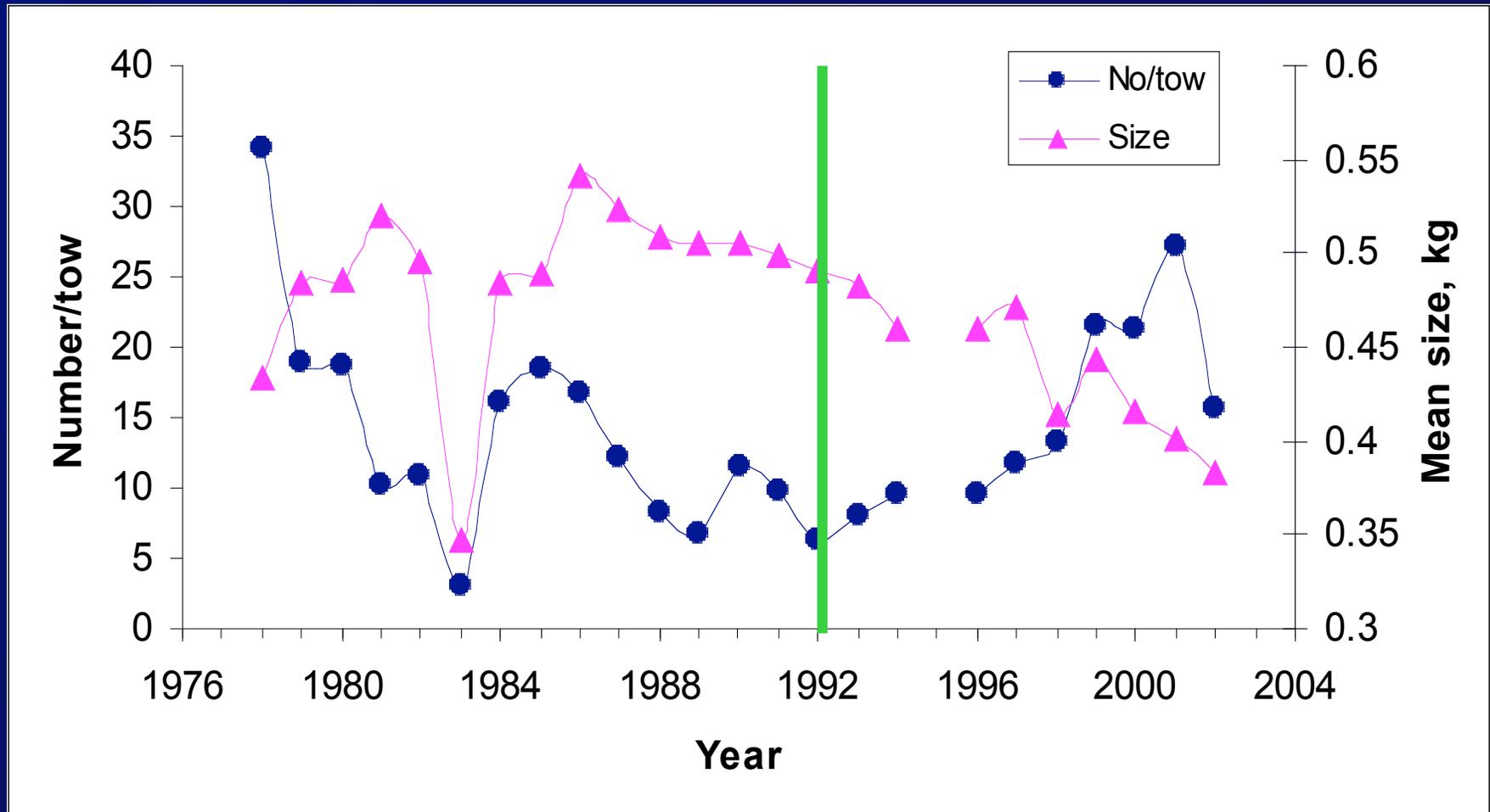


Deepwater Redfish





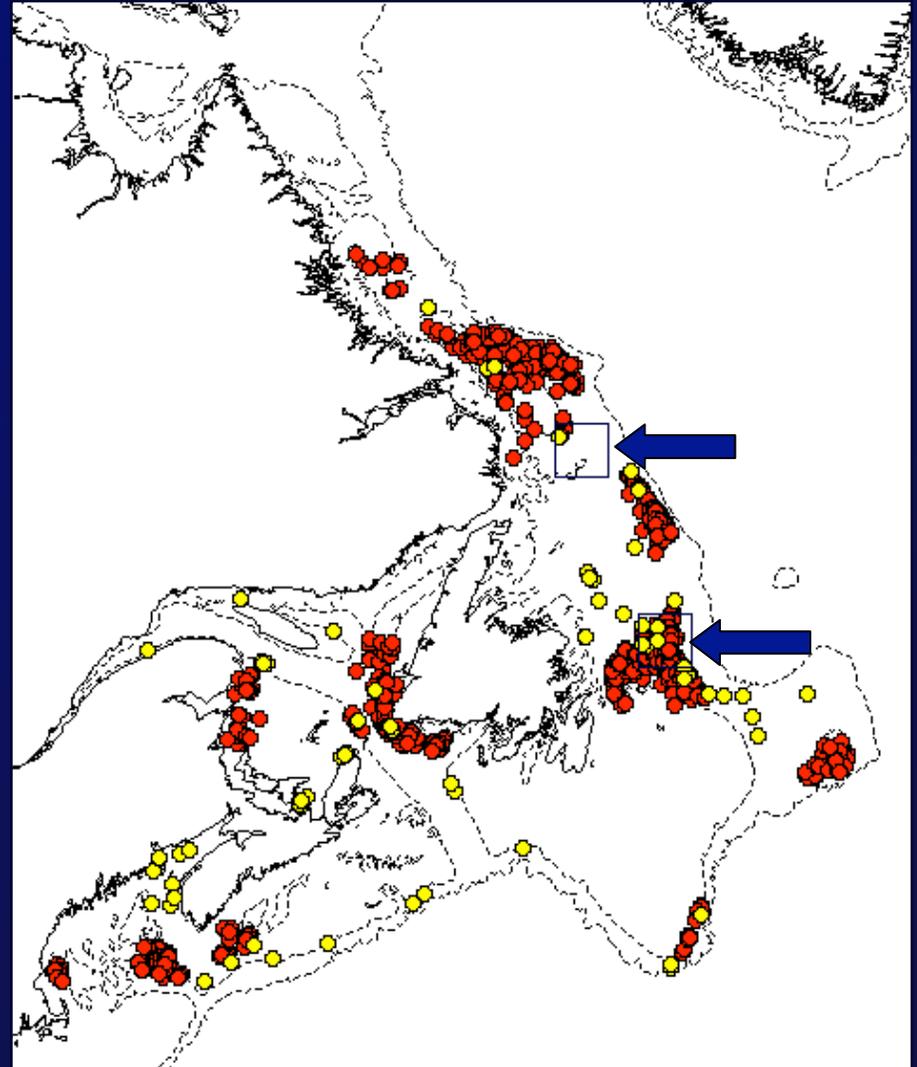
Yellowtail Flounder



Potential Future Research

- Hawke Channel Box
- Bonavista Box

May be used to study direct comparisons and appropriate measures of effectiveness



Conclusions

- The combination of CPUE and mean size can possibly be used to indicate the effectiveness of offshore MPAs on time frames required by managers and planners.
- This information, however, must be used in conjunction with knowledge of the individual biology of species involved.

Acknowledgements

- Memorial University of Newfoundland
- Coasts Under Stress (NSERC)
- North Atlantic Arc project (NSF)
- North American Commission for Environmental Cooperation – North American Marine Protected Areas Network