

# Review of research – shrimp & turbot in waters off of Nunavut (2007-2011)



NWMB Board Meeting  
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# Focus

- Canadian Science Advisory Secretariat (CSAS) → research publications for Fisheries and Oceans Canada (DFO)
- Northwest Atlantic Fisheries Organization (NAFO)
- Summary of publications on shrimp and Greenland halibut (turbot)
  - Main commercial fisheries in Nunavut

# Shrimp

- Live on ocean floor, but migrate in water column
- Distributions overlap in North Atlantic
- Temperature affects distribution
- Important food for fish & marine mammals



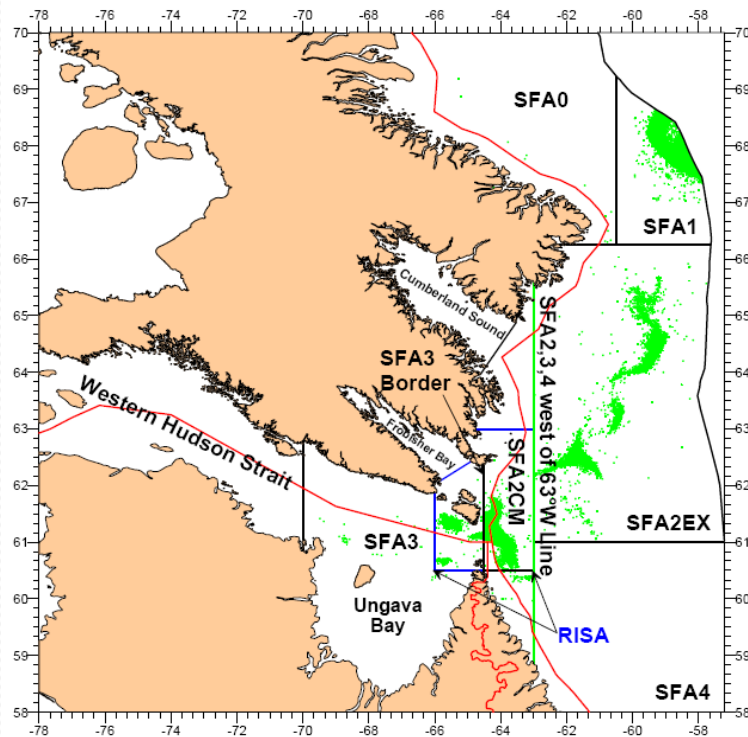
*Top: Northern Shrimp (Pandalus borealis)*  
*Bottom: Striped Shrimp (Pandalus montagui)*

# Shrimp fishery

- Trawl fishery mostly for northern shrimp, started in 1970s
- Complicated: (1) many management areas, (2) 3 land claims, (3) overlapping quotas, (4) high species intermixing
- Total Allowable Catch (TAC), offshore access limited, special quota allocations in NSA
- Allocations in various Shrimp Fishing Areas (SFAs)
- Exploratory & commercial licences

# Shrimp Fishing Areas (SFAs) & fishery independent surveys changes → need new reference points for judging fishery health

2008



2011

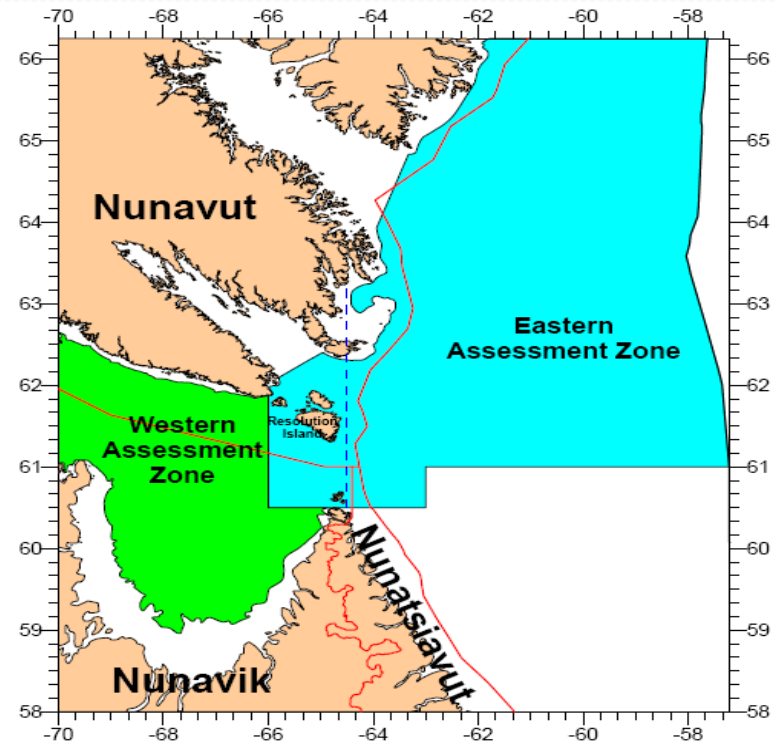


Figure 1. Map of Shrimp Fishing Areas and survey study areas in Hudson Strait and Ungava Bay, Davis Strait and Baffin Bay. Points are fishing locations from 1985-2009. Land claim boundaries are marked in red.

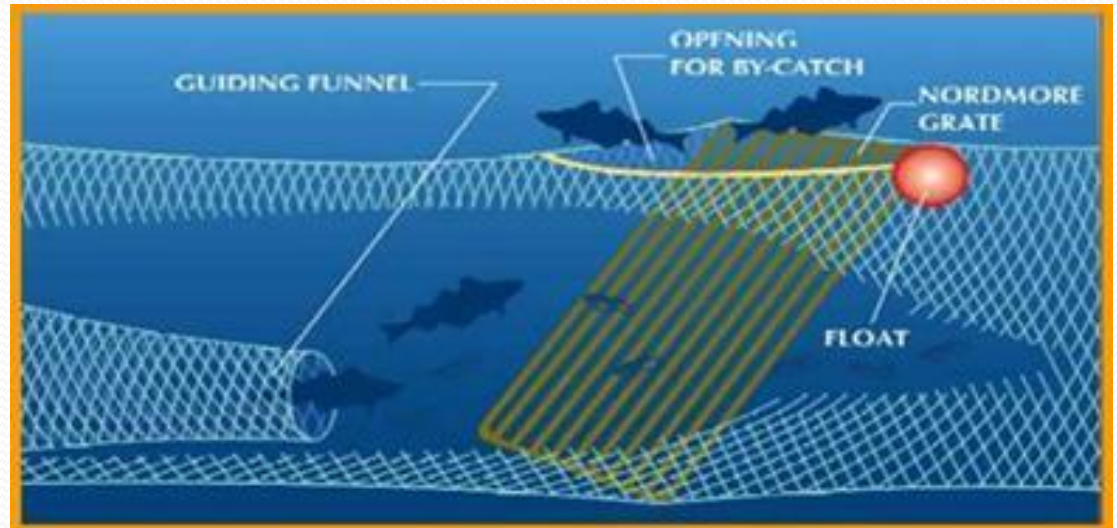
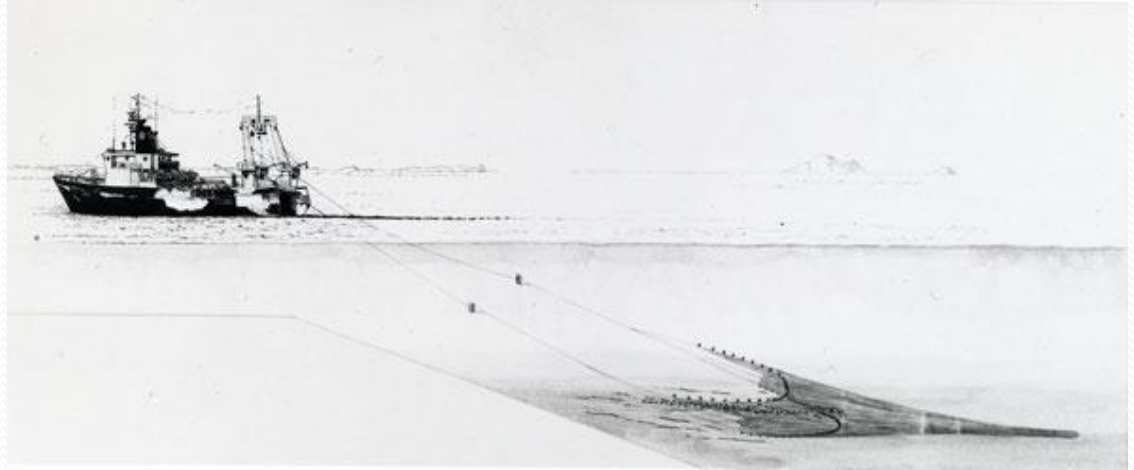
Figure 2 Eastern and Western assessment zones which underlay Shrimp Fishing Area 2 (east of blue dashed line) and 3 (west of blue dashed line). Boundaries of the Nunavut, Nunavik and Nunatsiavut land claims are shown in red.

# Shrimp - current stock health

- SFA 0 & Western Hudson Strait
  - No fishery & poor prospects
- SFA 2 & Resolution Island Study Area (RISA)
  - Northern shrimp
    - No catch trend
    - Biomass = Healthy
    - CPUE increased
    - Observed exploitation rate = 9% (potential = 14%)
  - Striped shrimp
    - Declining catch & biomass (Cautious Zone)
      - Temperature & distribution shift? Fishing patterns? Market?
    - Observed exploitation rate = 5% (potential = 56 - 89%)
- SFA 3
  - No fishery & limited data → prospects uncertain

# Bycatch SFAs 0-3 (1979-2009)

- Nordmore grate (1993) reduced large bycatch
- Concern: commercial & SARA-listed species
- Highest: SFA 0 (69%) (exploratory)
- Lowest: SFA 2 (1.7%)
- Moderate: SFAs 1 & 3 (3.5%, 4.2%)



# Greenland halibut (turbot)



*Bonnie Ross, Ross Illustrations*

- Flatfish, effective predator
- Food for narwhal, Greenland sharks, seals (harp & hooded)
- Bycatch in other fisheries low
- Canadian-Greenland fishery began in 1981

# Greenland halibut (turbot) – Cumberland Sound Fishery

- Winter – highly dependent on ice
- Convert to full commercial fishery
- Decline in catch
  - Poor ice conditions
- Decline in length
  - Start of fishery, depth changes, growth overfishing
- CPUE recently high
- Information needed: recruitment & maturation
- Bycatch
  - Greenland shark, skate species, grenadier species, wolffish, eelpout
  - Marine mammals also a concern

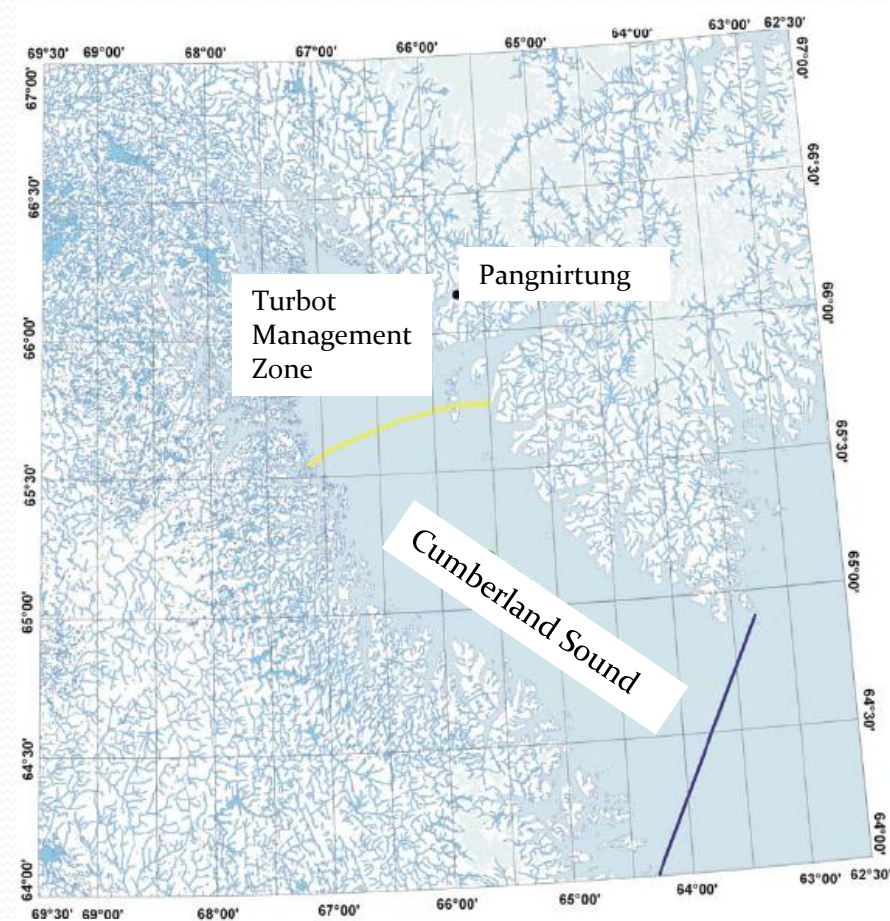
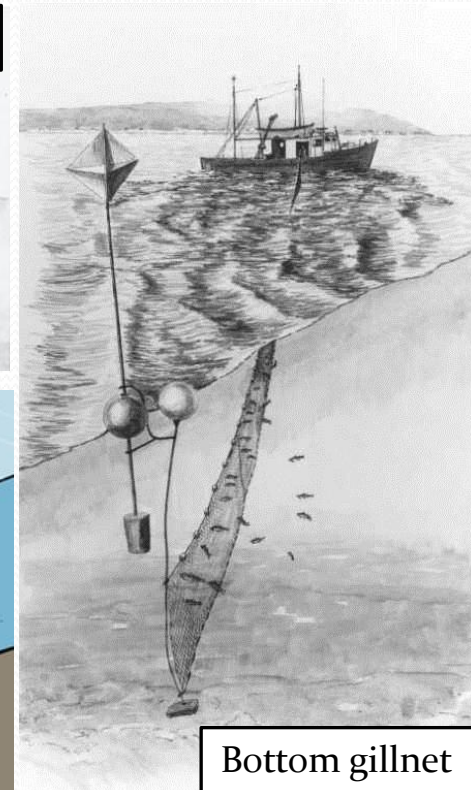
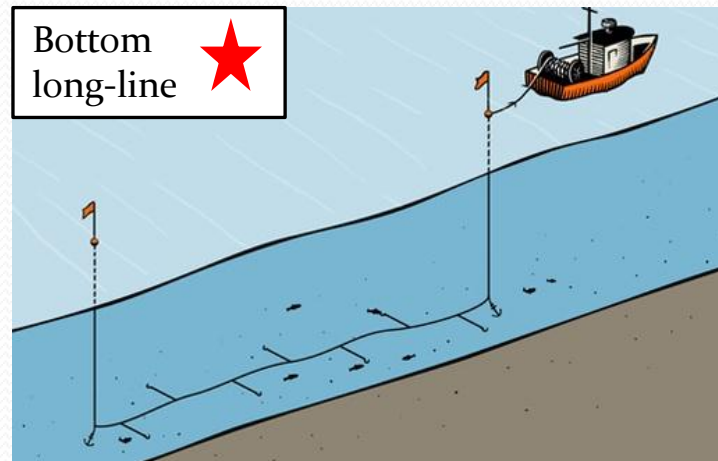
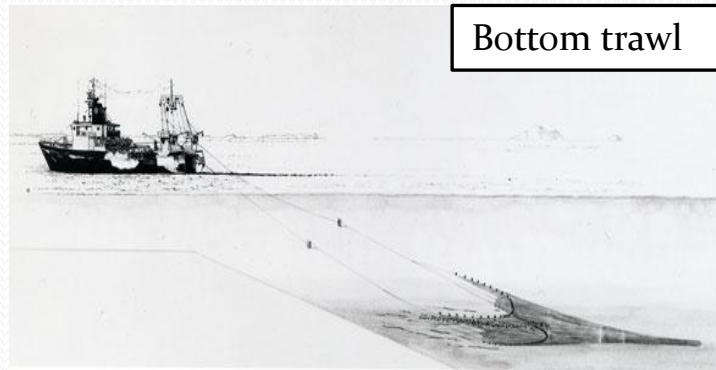


Figure 3. The new turbot inshore management area for Cumberland Sound (area NW of the yellow boundary). Only vessels less than 65 ft (19.8m) have been approved for use within Cumberland Sound (area bounded by shoreline NW of blue line).

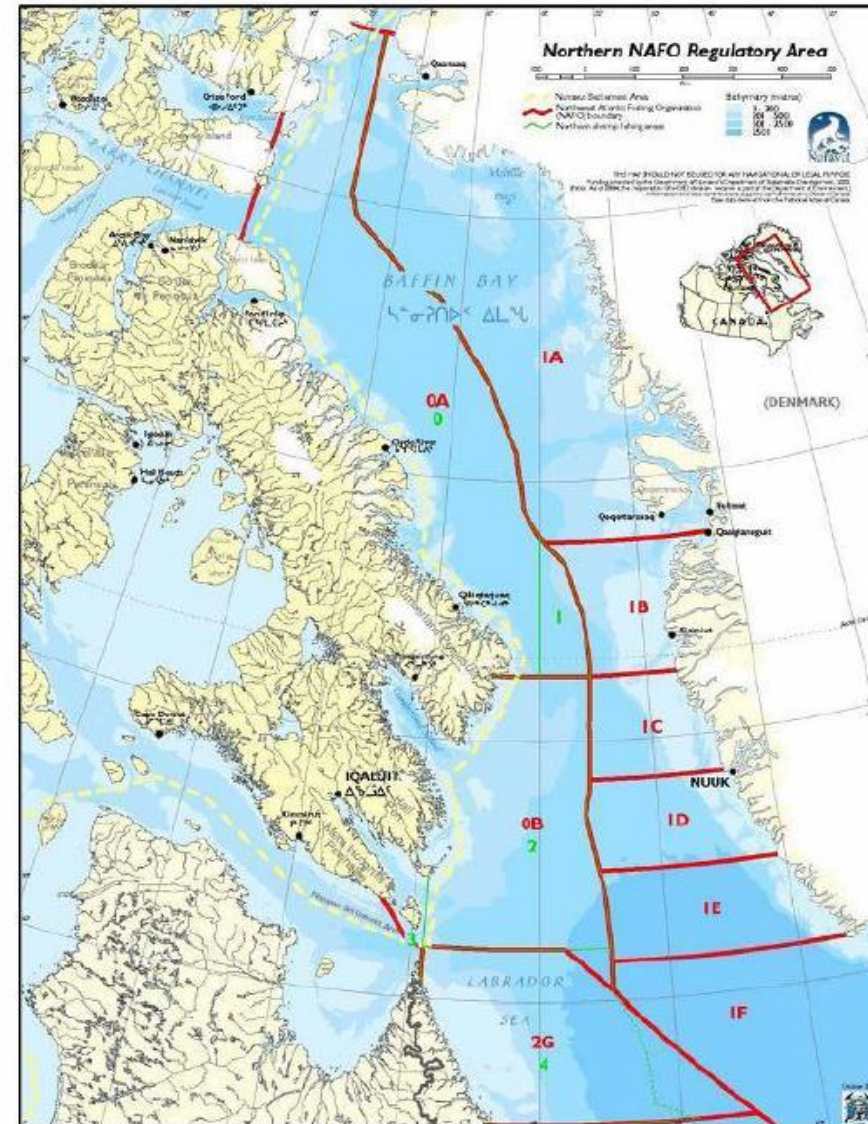
# Gear Impacts – Cumberland Sound & Inshore

- Long-lines pose least amount of risk
  - Bycatch & entanglement
  - Ghost fishing
  - Fish quality
  - Population effects
  - Habitat impacts



# Greenland halibut (turbot) – NAFO Divisions 0A & 0B

- Catches
  - 3,000 t (1989) to 26,900 t (2010)
  - Increase in offshore effort
    - Mainly in Div. 0A & 1A
- TAC
  - Recent increases (1995-2012)
- Div. 0A & 1AB
  - Length - stable
  - Biomass (0A & 1A) - stable
  - CPUE - stable
- Div. 0B & 1C-F
  - Length - stable
  - Biomass (1CD) - stable
  - CPUE – recent increase, but decrease in 2009-2010



# Ongoing areas of interest

- Shrimp
  - Temperature changes → distribution
  - New stock reference points
  - SFA boundary & quota changes
  - Conservation measures → prevent overharvesting (Resolution Island)
  - Bycatch
- Greenland halibut (turbot)
  - Cumberland Sound - changes in ice & catches
  - Inshore fisheries development (winter & summer)
  - Bycatch
  - Age estimation
  - New Integrated Fisheries Management Plan (IFMP)
    - Stock reference points

Thank you





# Greenland Halibut – Catches by Gear

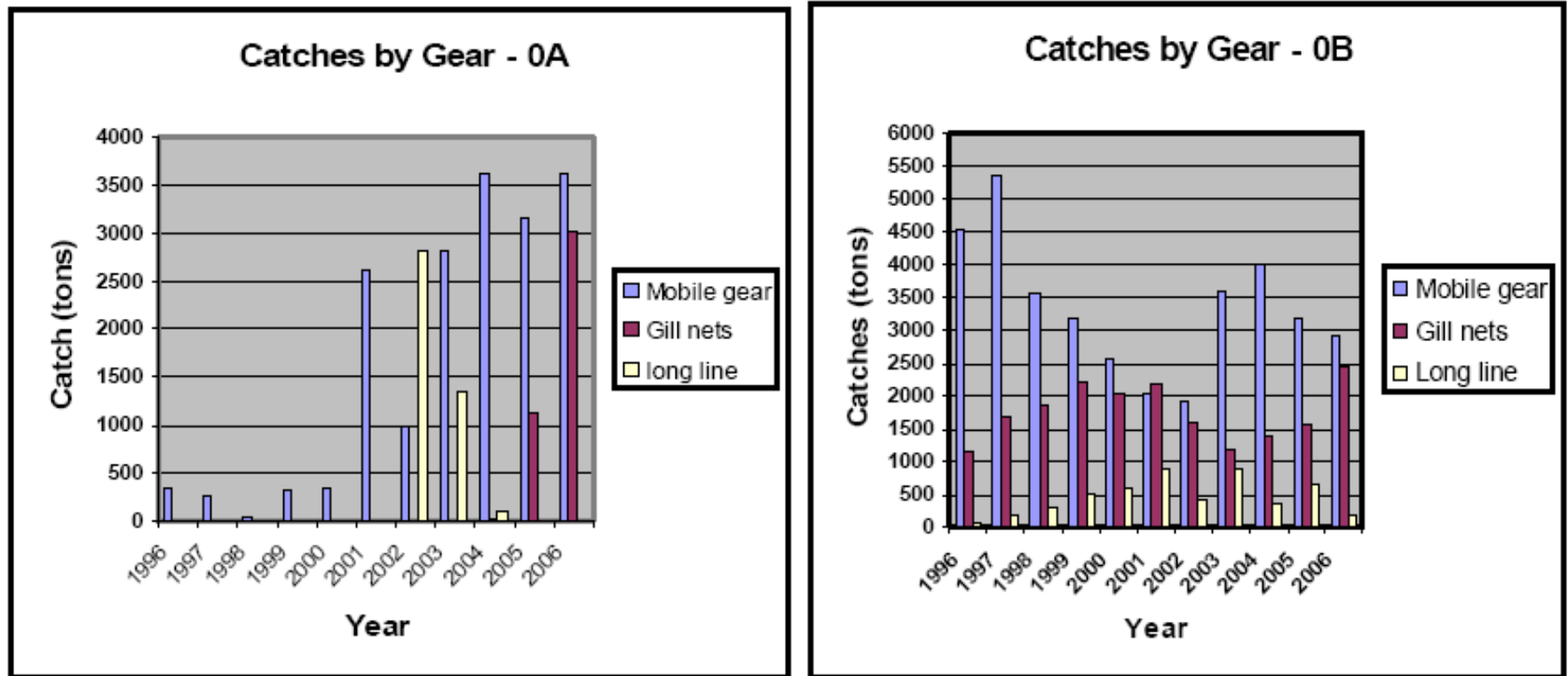


Figure 3. Subarea 0 Greenland halibut catches by gear type (1996-2005).

\* Data for catches by gear type in 0B from 1996 to 1999 may contain inaccuracies.

Figure from DFO Greenland Halibut Management Plan 2006-2008 (NAFO Subarea o)

# Greenland Halibut NAFO - Catches

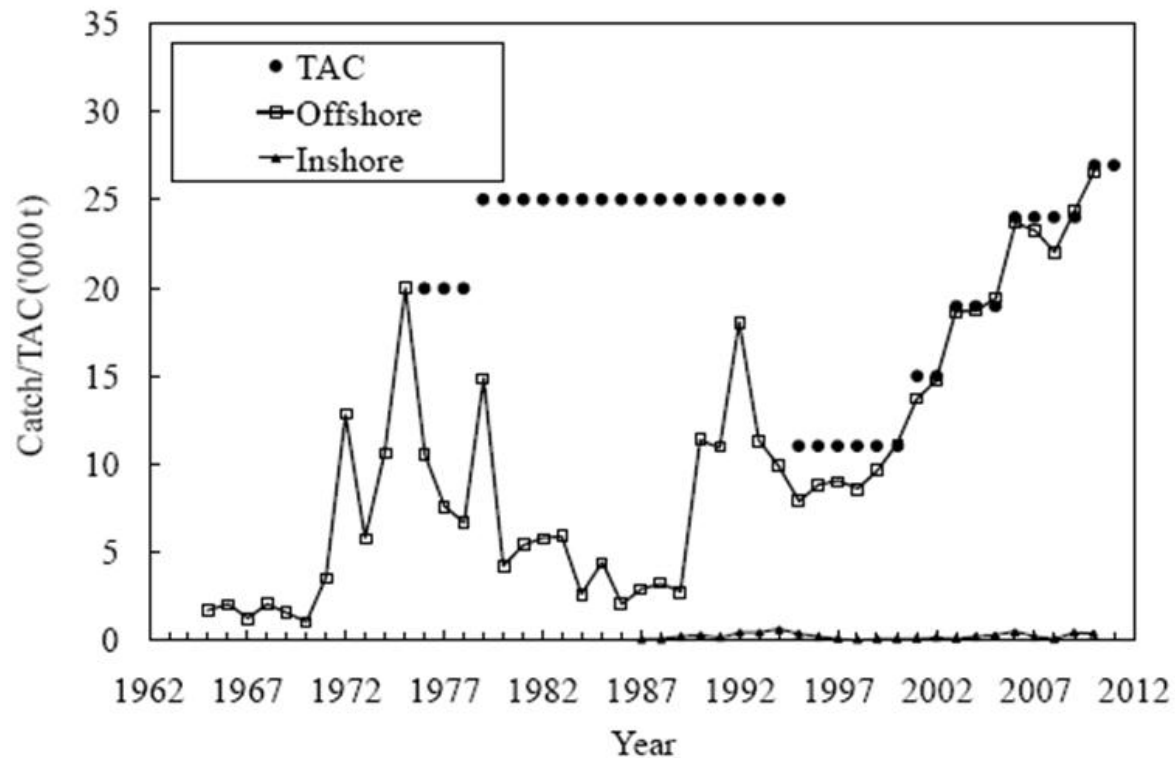


Fig. 1.1. Greenland halibut in Subareas 0+1 (excluding Div. 1A inshore): catches and TACs.

# Greenland Halibut NAFO - CPUE

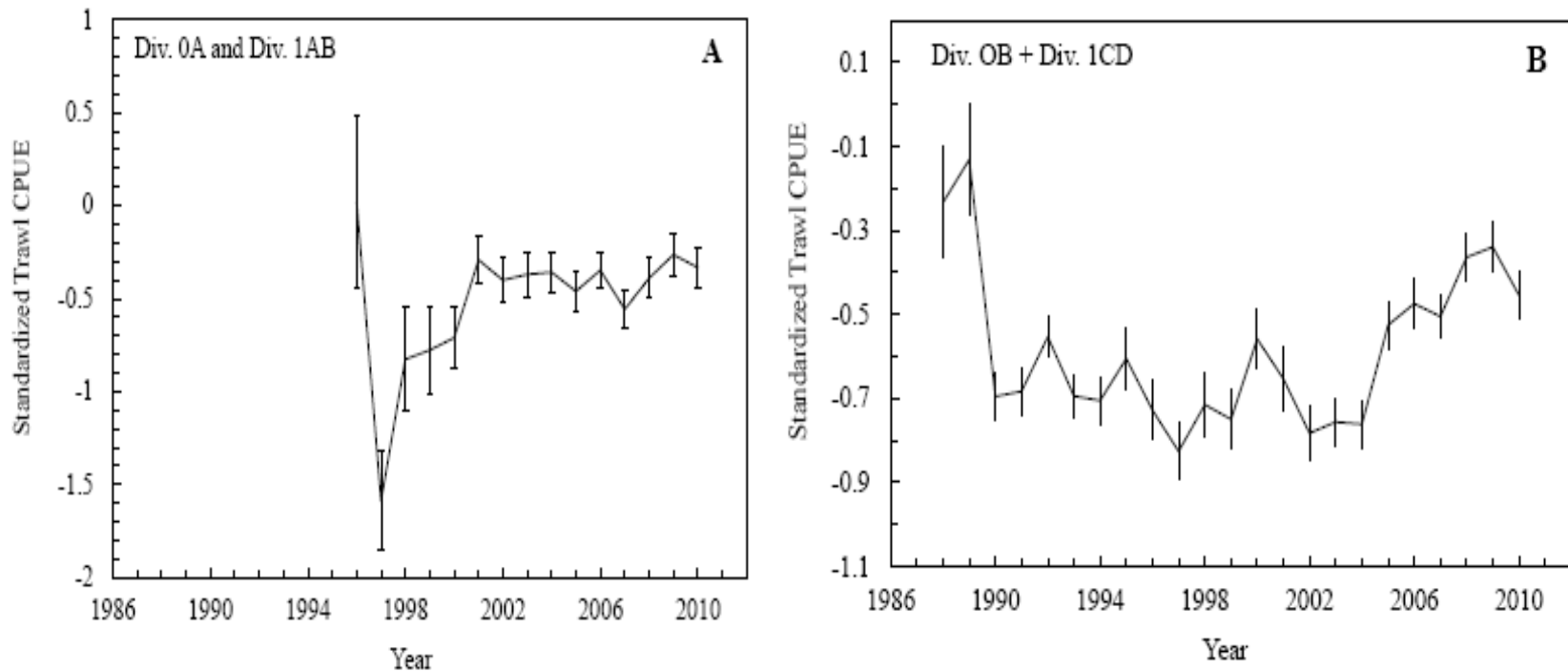


Fig. 1.2. Greenland halibut in Subareas 0+1 (excluding Div. 1A inshore): A: Combined standardized trawler CPUE from Div. 0A and Div. 1AB with  $\pm$  S.E. . B: Combined standardized trawler CPUE from Div. 0B and Div. 1CD with  $\pm$  S.E.

# Greenland Halibut NAFO - Biomass

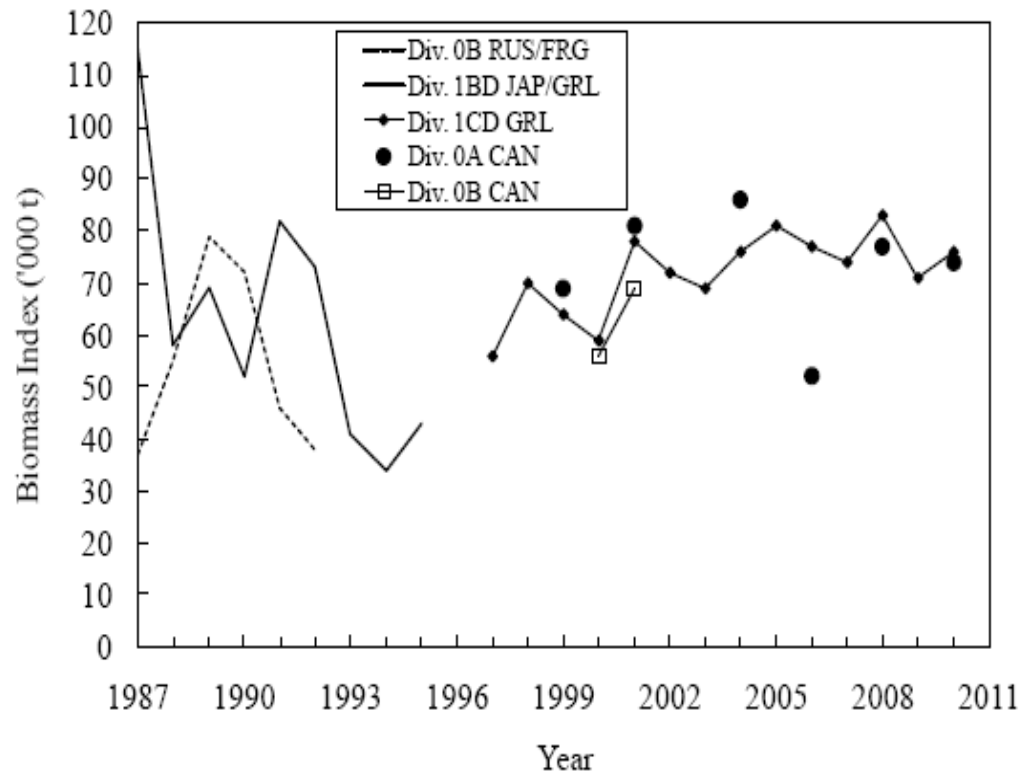


Fig. 1.3. Greenland halibut in Subareas 0+1 (excluding Div. 1A inshore): biomass estimates from bottom trawl surveys. Note, incomplete coverage of the 2006 survey in Div. 0A and that survey estimates from Div. 0A does not include surveys in the northern part in 2004 and 2010. Further, the survey estimates from Div. 1A in 2001, 2004 and 2010 are not included.

# Greenland Halibut NAFO - Recruitment

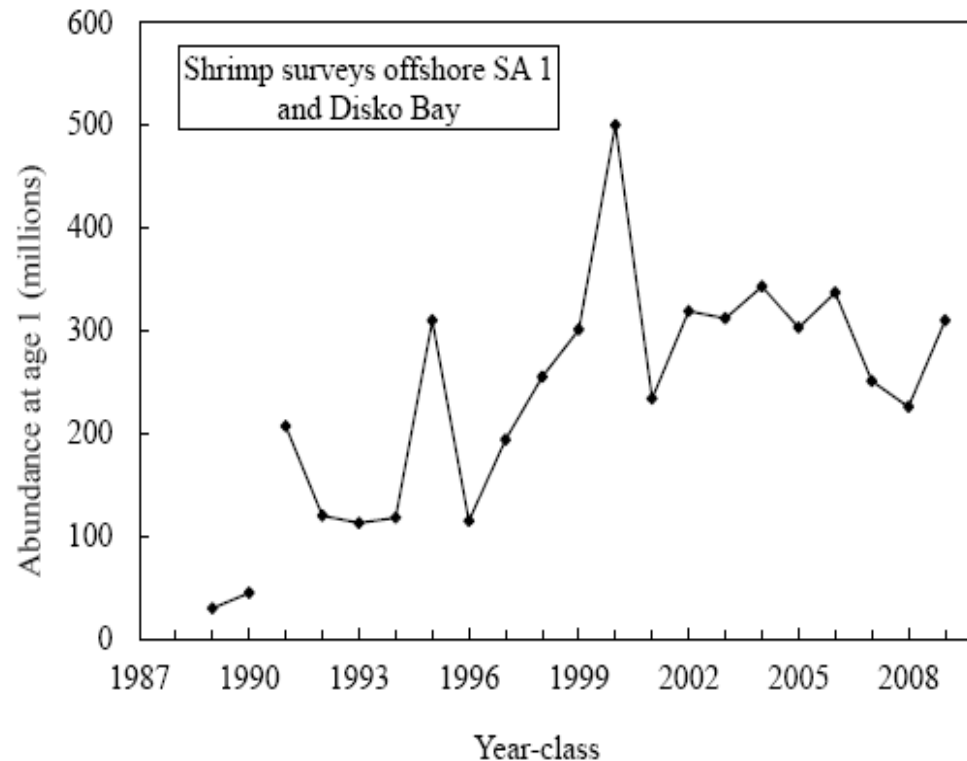


Fig. 1.4. Greenland halibut in Subareas 0+1: recruitment index at age 1 in Subarea 1 derived from the Greenland shrimp trawl surveys. Note that the survey coverage was not complete in 1990 and 1991 (the 1989 and 1990 year-classes are poorly estimated as age 1).