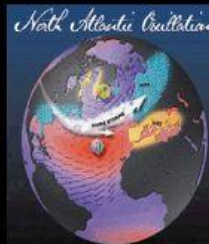


GLOBEC

- Predictive Understanding
- 20 years in development
- 2010 => Very strong NAO -

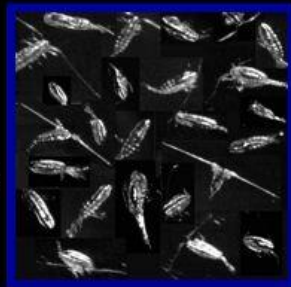
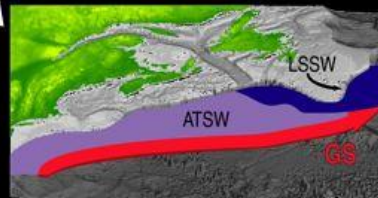
Complex Linkages

right whales



climate

physical
oceanography



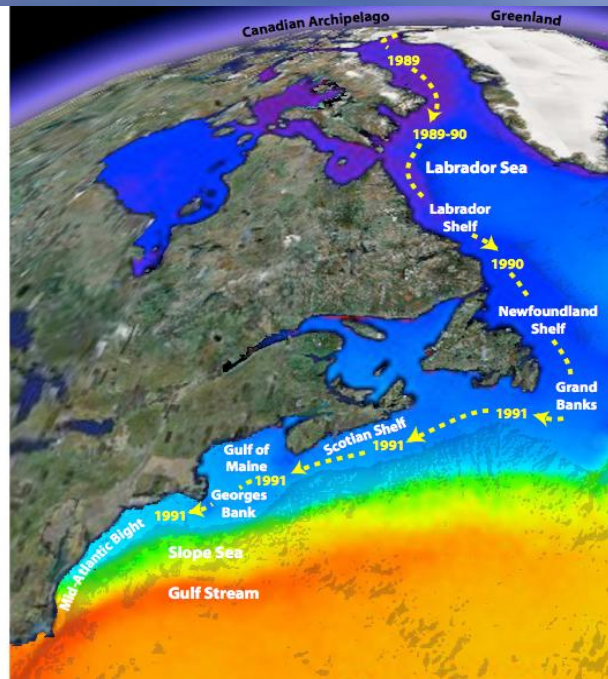
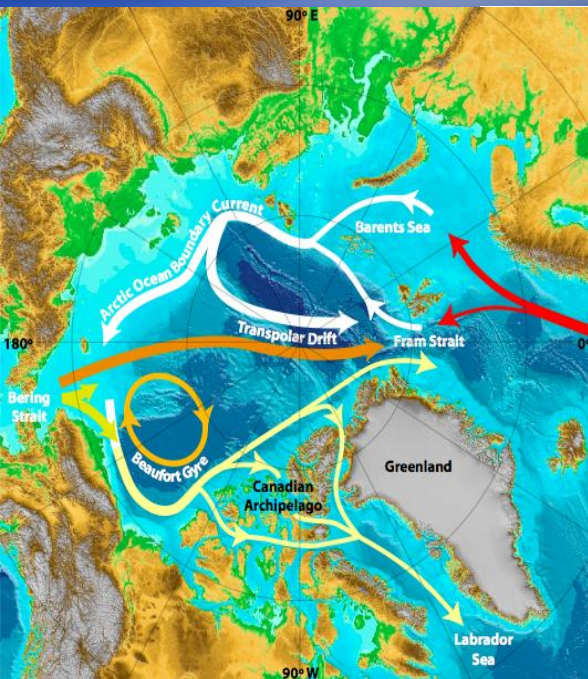
Calanus

Greene, C.H., and A.J. Pershing.
2004. Climate and the
conservation biology of North
Atlantic right whales: the right
whale at the wrong time? *Front.
Ecol. Environ.* 2: 29-34.

- Labrador Current flow around Tail of Grand Banks
- Coupled Slope Water System response
- GOM Deep-Water Hydrography
- Commercial Fisheries & Right Whales

GLOBEC

- Great Salinity Anomalies
- Approximately one every decade
- Highest freshwater storage in Arctic Ocean on record
- When does the Big One come?

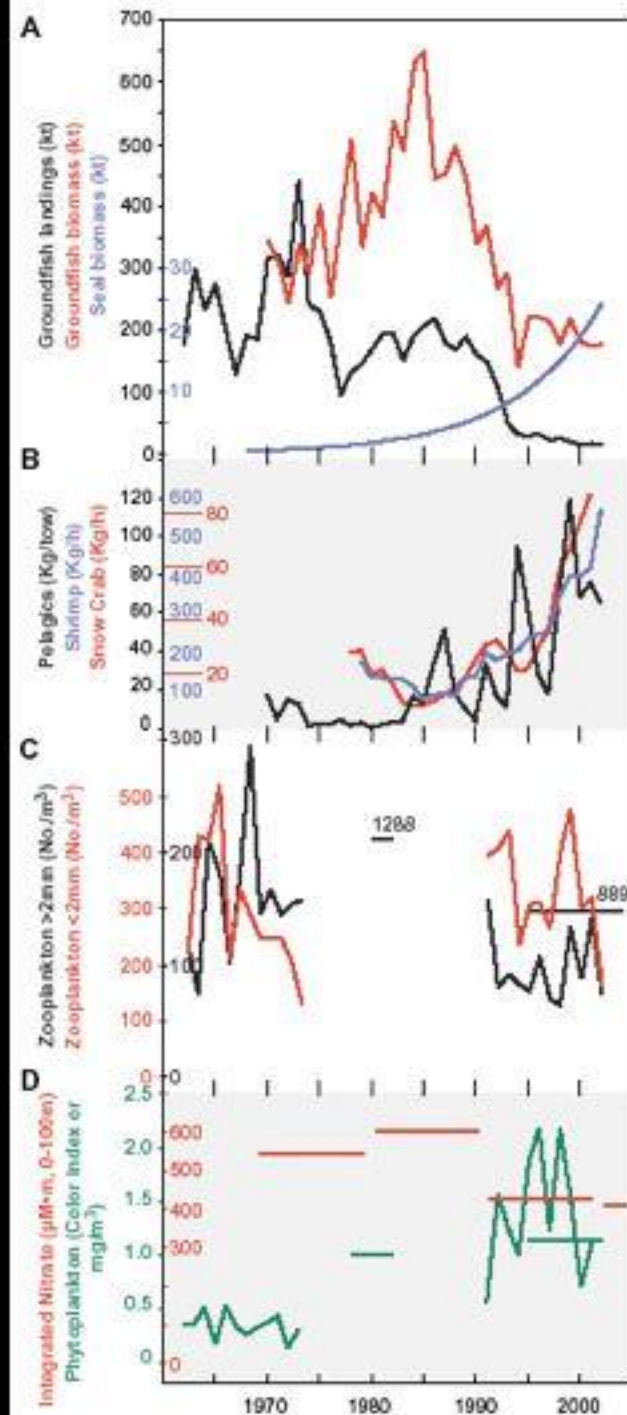


Regime Shifts: Climate and Trophic Cascades:

Top-Down versus Bottom-Up Structuring of NW Atlantic Shelf Ecosystems

Frank et al. 2005. Trophic cascades in a formerly cod-dominated ecosystem. *Science* 308: 1621-1623.

Greene, C.H., and A.J. Pershing. 2007. Climate drives sea change. *Science* 315: 1084-1085.



GLOBAL OCEAN ECOSYSTEMS AND CLIMATE: A PAN-REGIONAL SYNTHESIS

**Friday Harbor Laboratories
August 2010**

**Ecosystem Regime Shifts
Biogeographic Range Shifts
Trans-Arctic Invasions**

GLOBAL OCEAN ECOSYSTEMS AND CLIMATE: A PAN-REGIONAL SYNTHESIS

- **Review of evidence for ecosystem regime shifts.
biogeographic range shifts, and trans-Arctic
invasions as well as the analytical methods used detect
them.**
- **Review of alternative hypotheses used to explain the
causes of these regime shifts, range shifts, and invasions.**
- **Review status of modeling studies being conducted to link
climate forcing of these regime shifts, range shifts, and
invasions**