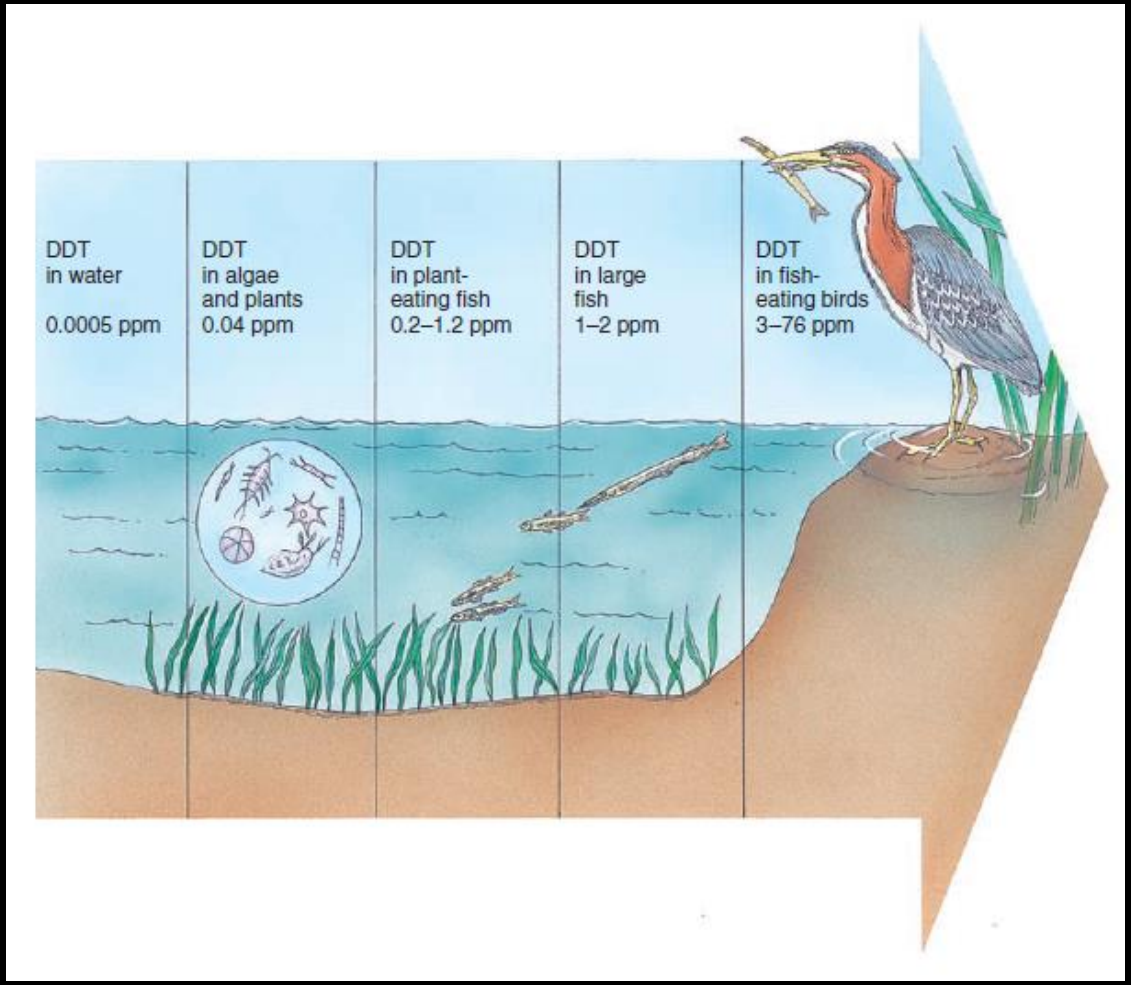
Oceans in Jeopardy

Pollution

- *Biological magnification* is the concentration of pollutants or toxins in higher trophic levels of a food chain.



Eutrophication

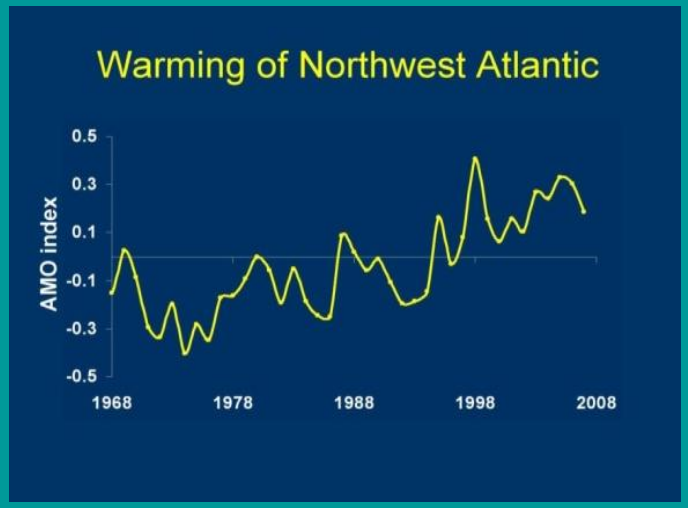
- Sewage add large amounts of nutrients, such as ammonia and urea, to coastal waters. This leads to *eutrophication*, an increase in the amount of dissolved nutrients in the water. Eutrophication leads to blooms of phytoplankton and other marine microbes

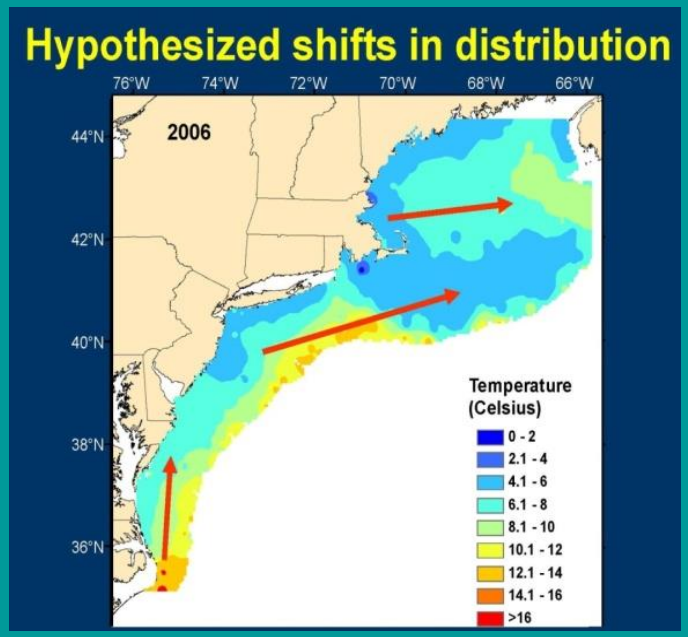
Global Warming

- Changes in species distribution
- Changes in oxygen levels
- Effects on Coral Reefs
- Changes in rainfall and winds

Shifting Fish Distributions with Warming Ocean Temperatures

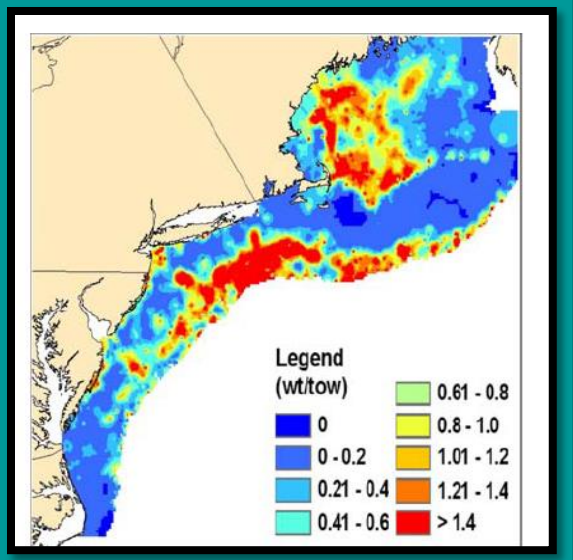
Cyr et al. 2012

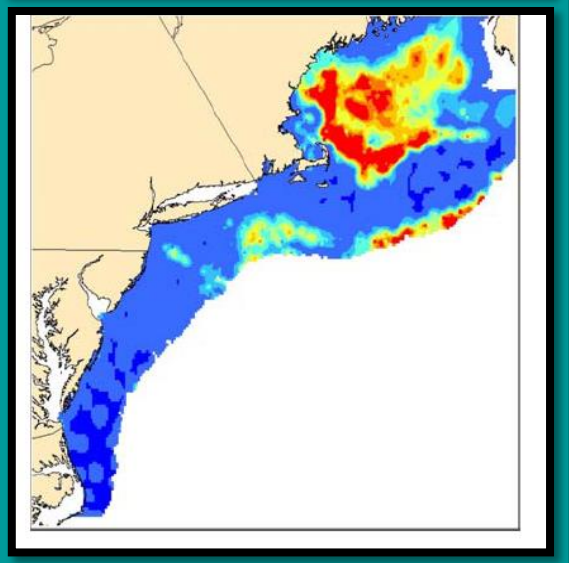




Over past 40 yrs:

- **60% major fish stocks have shifted** distributions poleward (1 mile yr^{-1}) and/or deeper (0.8 ft yr^{-1}).
- **Species shifting at different rates** (25-200 miles poleward)
- **Also changes in** abundance, phenology, species assemblages
- **Why changing?** Future changes?



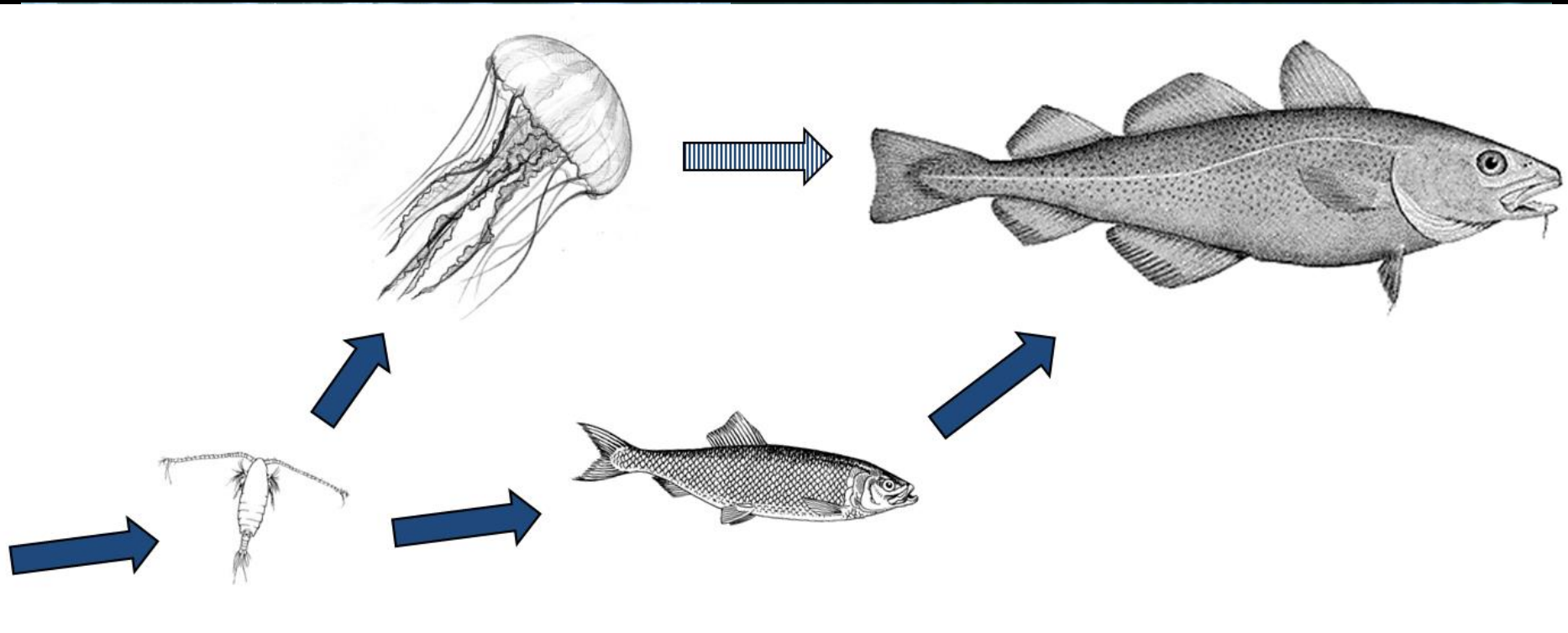


King Crabs Invade Antarctica

Introduction of Nonnative Species

- (a) The European green crab was introduced in the early 1800s and now occupies an extensive range where it competes with other organisms, including humans, for food.
- (b) Lionfish were accidentally introduced into the Atlantic in 1992. They swiftly spread and now compete with native species for food and habitat.

Jellyfish as Monitors of Ocean Health



What Should We Do?

- 1. Mind Your Carbon Footprint and Reduce Energy Consumption
- 2. Make Safe, Sustainable Seafood Choices
- 3. Use Fewer Plastic Products
- 4. Help Take Care of the Beach
- 5. Don't Purchase Items That Exploit Marine Life
- 6. Support Organizations Working to Protect the Ocean
- 7. Educate Yourself About Oceans and Marine Life