Lecture 25: Evolution & Humans

- Human-caused evolution
- Global climate change
- Exploitation of evolving populations
  - Fisheries
  - Fish hatcheries
  - Hunting
- Invasive species
- Evolving pathogens

Discussion Week 15


Final, 14 Dec, 8-10

Review session, 13 Dec, Wednesday, 11am, 201 Abelson

Evolution - relevance?

A better understanding of:
- The natural world
- Human origins
- Human welfare

Humans: greatest evolutionary force?

- Human actions accelerates evolutionary change
  - Global climate change
  - Habitat destruction and fragmentation
  - Species invasions
  - “Pathogen pollution”
  - Population harvesting (e.g. fisheries)
  - Genetically modified organisms

Humans: greatest evolutionary force?

- The evolutionary consequences?
  - Exploited natural populations
  - Conservation of biodiversity
  - Pests
  - Diseases

Global warming and evolution

- Measured photoperiod from 1972 - 1996 along latitude gradient
- Change?

- Shift toward shorter critical photoperiods at higher latitude
  - Northern populations growth until day length is shorter in Fall

Exploitation of evolving populations

- Fisheries harvests: strong size selection
- Fishery management has ignored evolutionary change
- Do we need “Darwinian Fisheries Management”?
Exploitation of evolving populations (1)

North Atlantic cod:
- Population crash
- 1992 population <1% of 1960's


Evolution of drastic reduction in size/age at maturity
- Fishing closed 1992
- Warning signals: life-history changes caused by exploitation precede collapse


Exploitation of evolving populations (2)

- Atlantic silverside (Menidia menidia)
- Evolution: in harvestable biomass?
- Lab selection study
- Three harvest treatments, 4 generations:
  - Largest 90%
  - Smallest 90%
  - Random 90%

Why?
- Harvest of small fish:
  - Fast-growing genotypes favored
  - Pass more quickly through harvested size