Biology: Changes in distribution – is it temperature or is it food?

Juvenile sockeye salmon appear to respond to ocean temperature

J. Helle, AFSC
Snow crab population has contracted north

Gray whale feeding grounds have changed

Ringed seals

Pups in under-snow lairs in coastal fast ice: feeds in water column/under ice

Ice-dependent seals

Bearded seals

Pups/feeds in pack ice zone over shelf, in areas of rich benthic productivity

Varying dependence on sea ice

Ribbon seals

Pups/molts in marginal ice zone, perhaps as a predator avoidance strategy

Spotted seals

Pups in pack ice – uses land haulout sites during summer
Summary

- Pelagic vs. benthic production
- Trophic consequences
- Control Uncertainties
  - Bottom up
  - Top down
Ocean Chemistry Change - Ocean Acidification

Calcium carbonate saturation horizons are relatively shallow in the North Pacific Ocean; thus this ocean is a sentinel for ocean acidification effects.

Ocean Acidification - Potential Fishery Effect

- Larval blue king crab, Kodiak Alaska, pilot experiment
- Tested range of projected global ocean pH change over the current century.
- ~15% reduction in growth and ~67% reduction in survival when pH was reduced 0.5 units.

M. Litzow and J. Short, AFSC
• The End

Thanks to NOAA, National Marine Fisheries Service, Alaska Fisheries Science Center for supporting this presentation.
Place-based foragers

Hot spot foragers

Central place foragers

J. Sterling, AFSC

M. Sigler, AFSC
Existing & Proposed Sentinel Programs for Climate Change

North Pacific Climate Regimes and Ecosystem Productivity (NPCREP) Picket fence of biophysical moorings Spring and late summer ichthyoplankton surveys

Bering Sea Loss of Sea Ice (LOSI)

Coordinated with NPRB-BSIERP NSF-BEST AOOS

- Expand surveys northward
- Assess ice-dependent seals
- Estimate socioeconomic impacts
Existing Sentinel Programs for Climate Change

Standard Surveys

Hydroacoustic Survey, June-July biennially
Proposed Sentinel Programs for Climate Change

Bering Sea Loss of Sea Ice (LOSI)

• Expand surveys northward
• Assess ice-dependent seals
• Estimate socioeconomic impacts

M. Jones, NMFS

M. Cameron, AFSC