

Climate Considerations in North Pacific Fisheries Management

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Case studies on how climate information is incorporated
fisheries stock assessments and catch quota
recommendations

Presentation at Fisheries Management Council training,
Washington DC, October 21, 2008

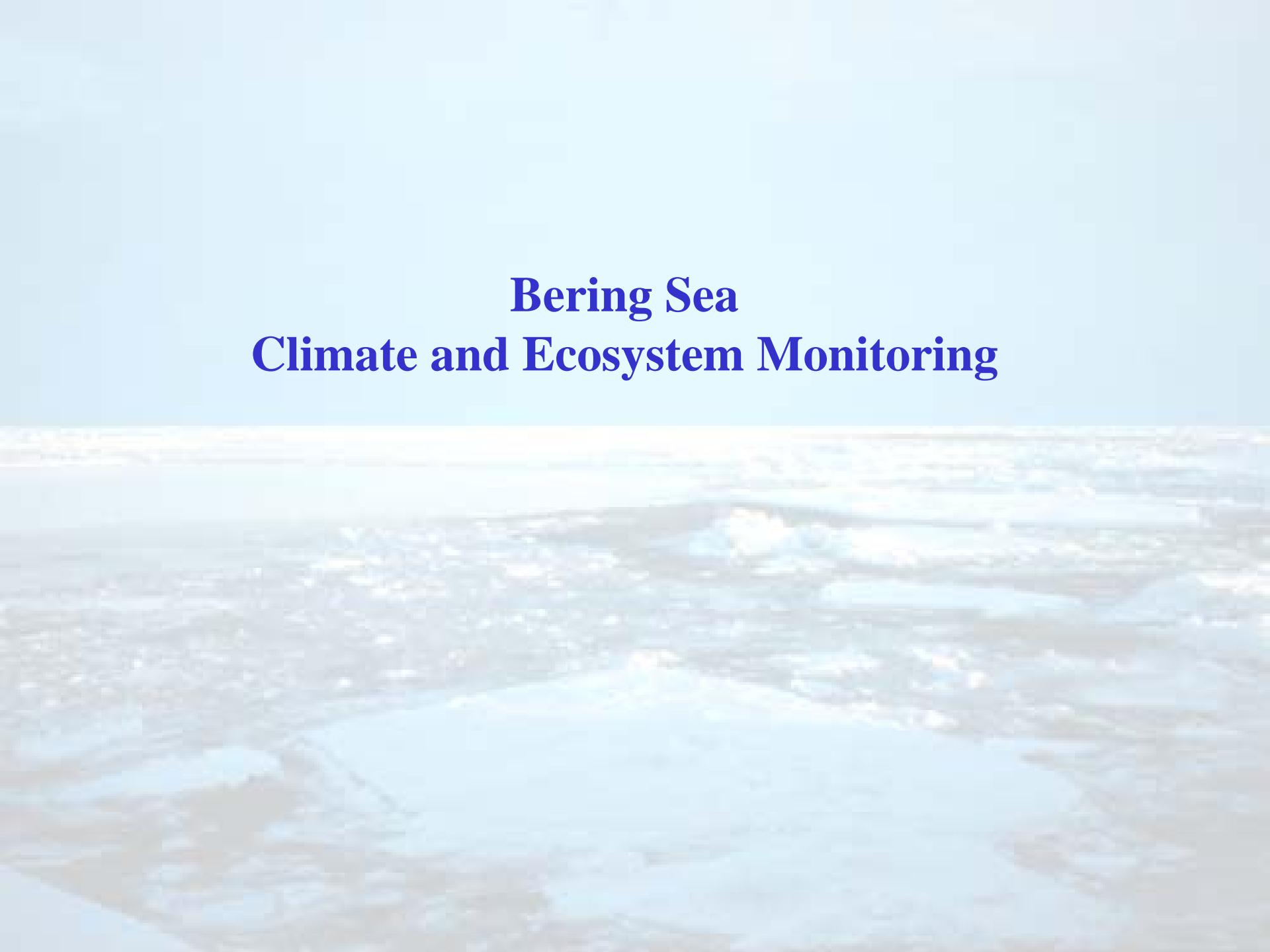
- How is climate and ecosystem information incorporated into fisheries stock assessments?
- How does monitoring and understanding strengthen fisheries stock assessments?

Outline

- Monitoring
- Understanding
- Understanding strengthens stock assessments (Bering Sea examples)



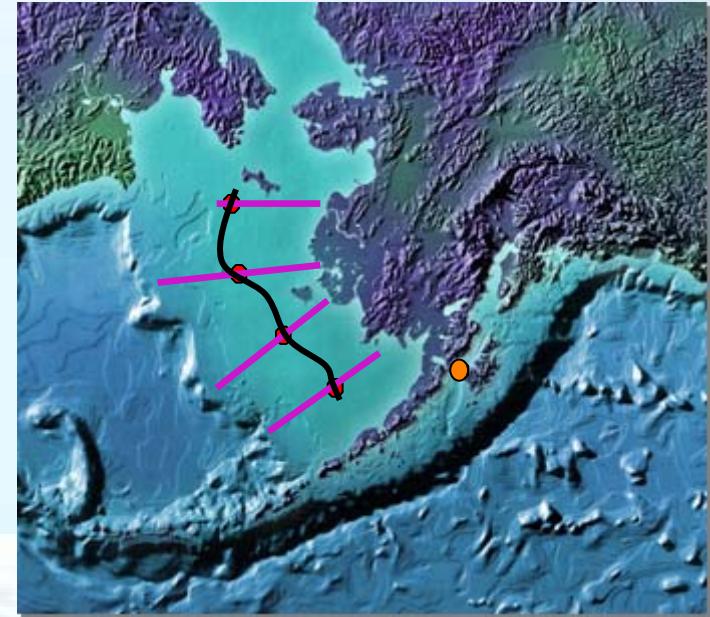
J. Thedinga, AFSC



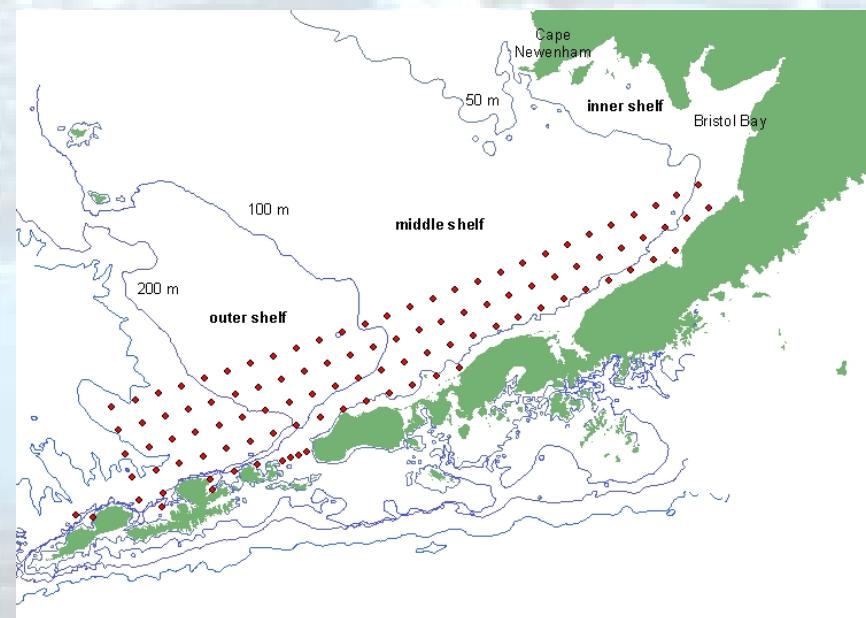
Bering Sea Climate and Ecosystem Monitoring

Existing NOAA Programs for Climate Change

Picket fence
of biophysical
moorings



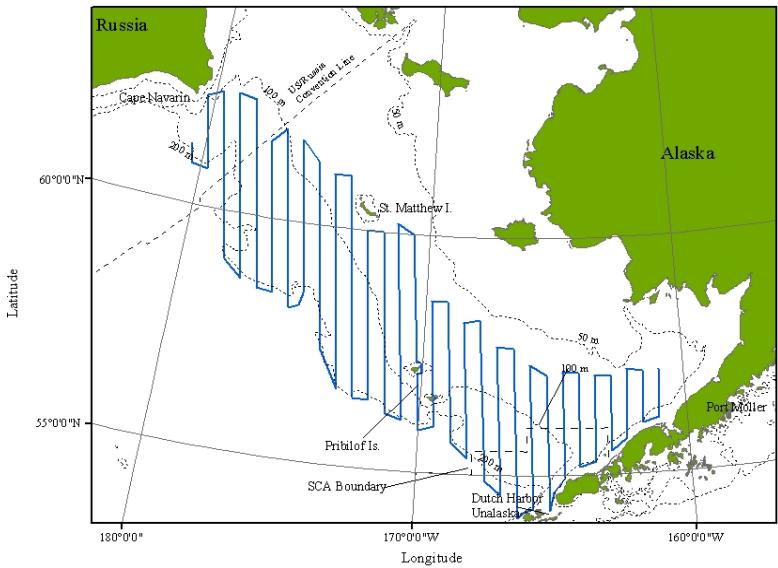
Spring and late summer
ichthyoplankton surveys



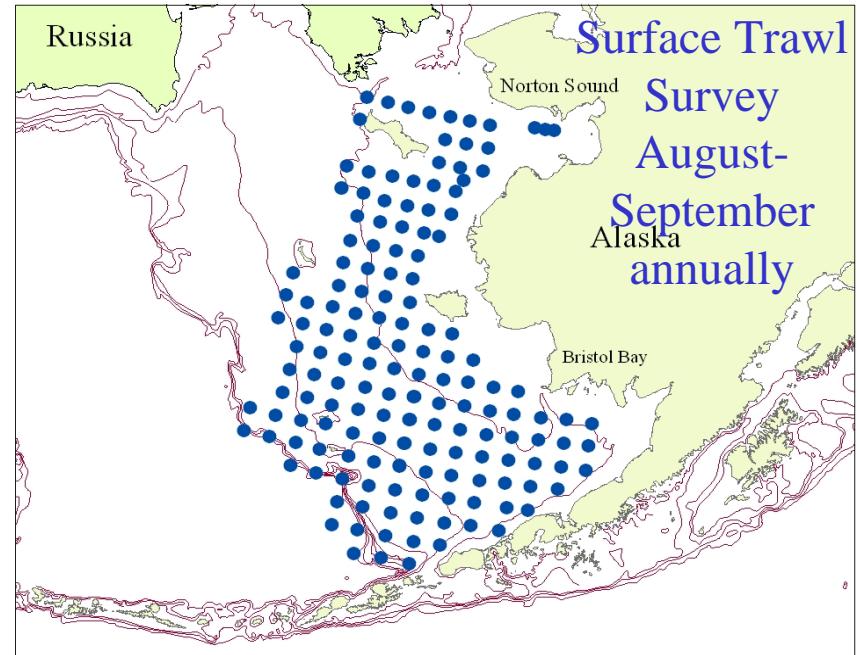
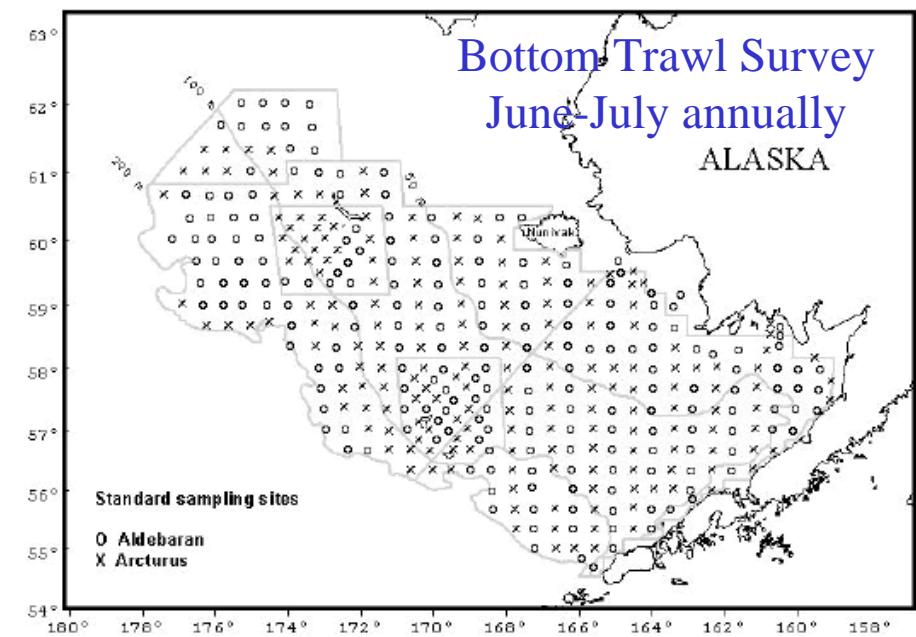
Eco-FOCI and North Pacific Climate Regimes
and Ecosystem Productivity (NPCREP)
J. Napp, AFSC and P. Stabeno, PMEL

Existing NOAA Programs for Climate Change

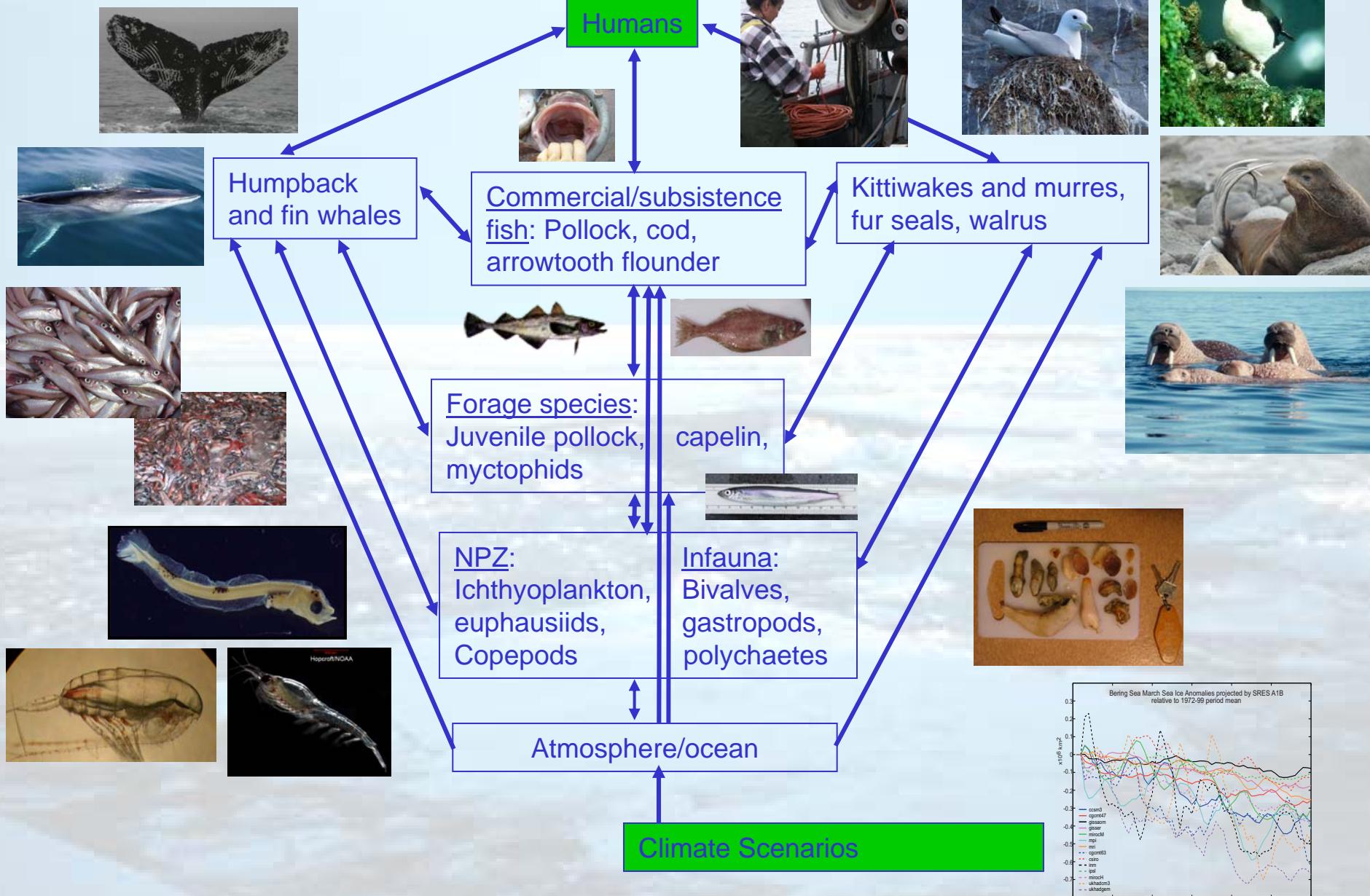
Standard Surveys

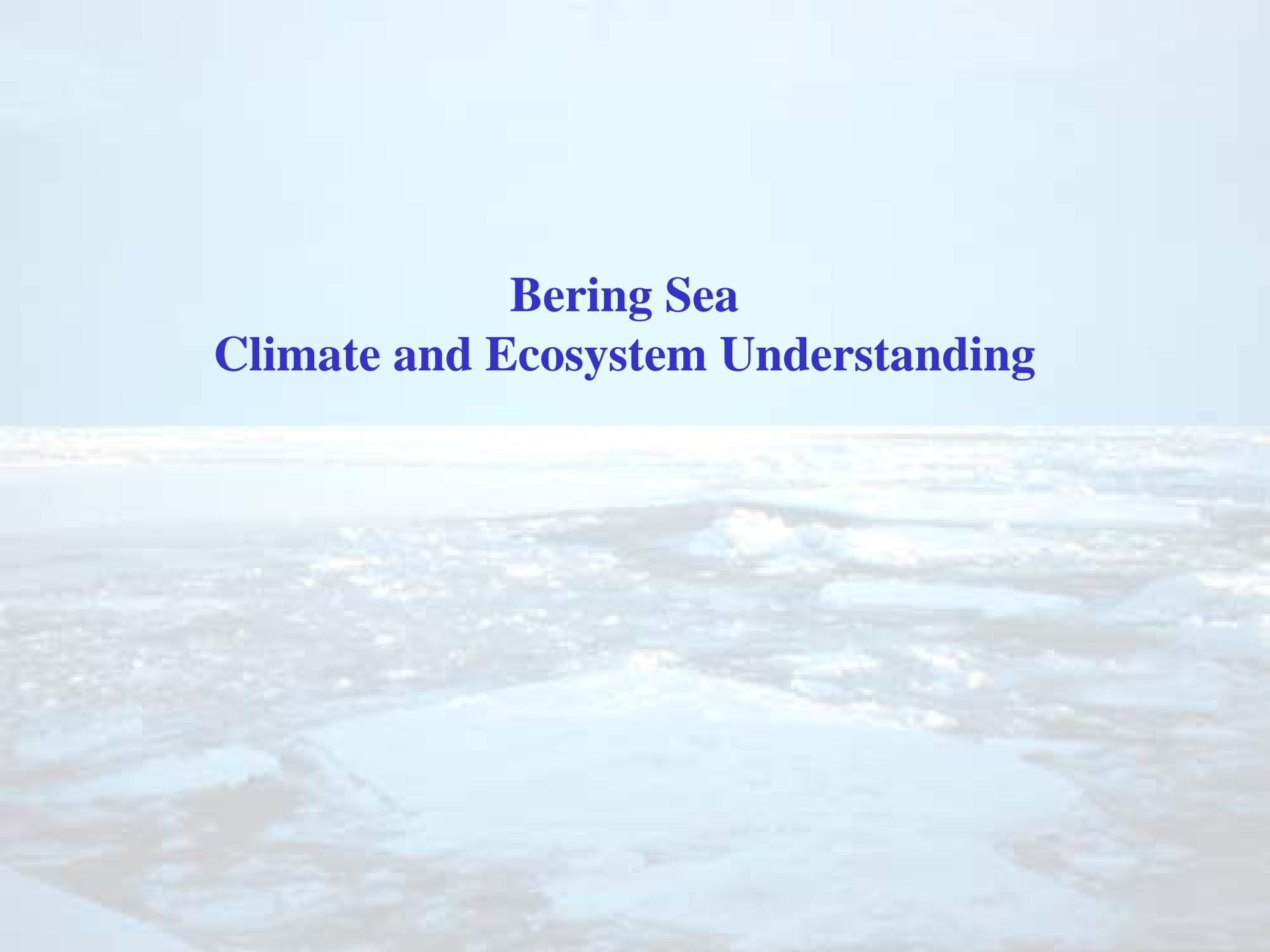


Acoustic Survey, June-July biennially



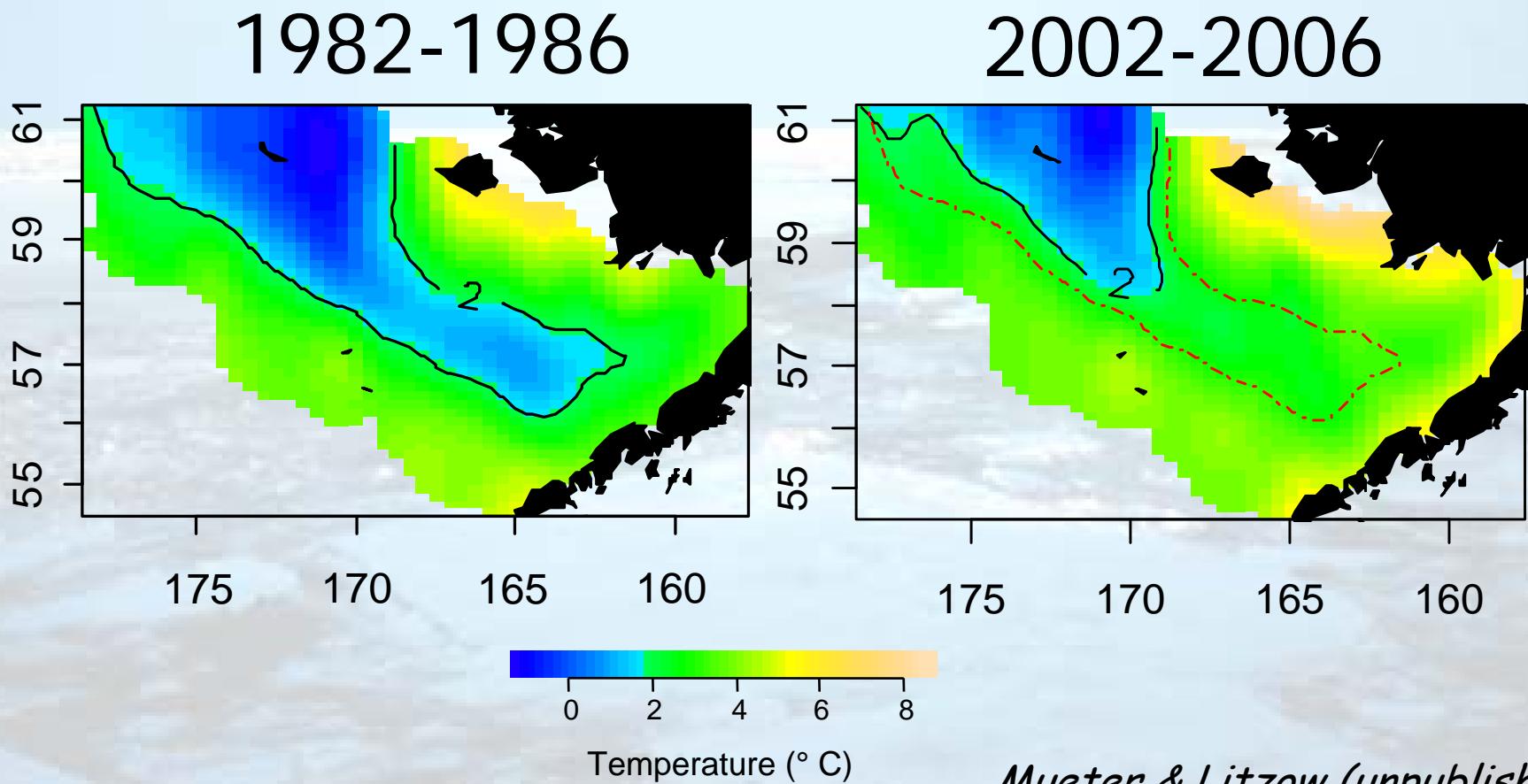
Bering Sea Integrated Ecosystem Study (BSIERP) and Bering Ecosystem Study (BEST)





Bering Sea Climate and Ecosystem Understanding

Bering Sea and Loss of Sea Ice Climate & Cold Pool Extent



Ice, Wind, Bloom and Copepods

Early Ice Retreat



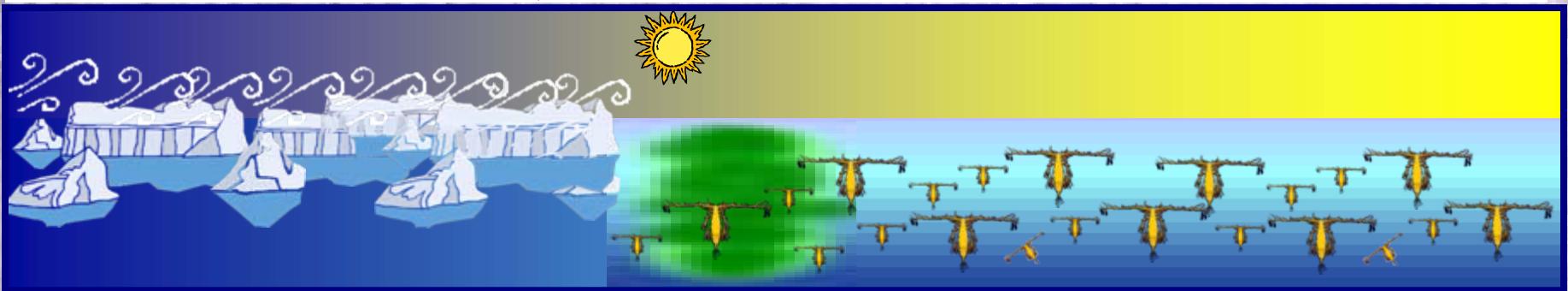
Late Bloom, Warm Water - Large Copepod Biomass



Late Ice Retreat



Early Bloom, Cold Water - Small Copepod Biomass



February

March

April

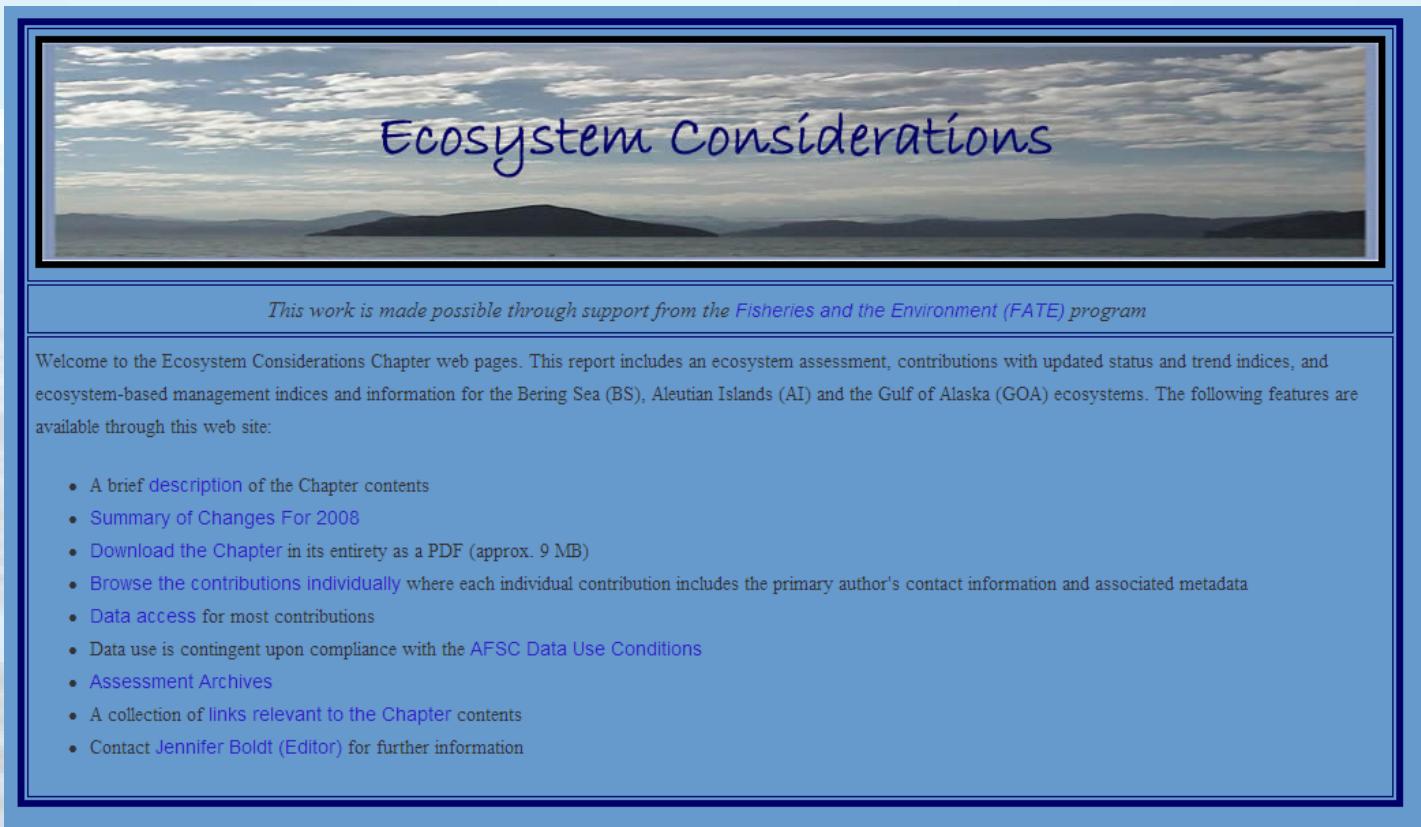
May

June

- How is climate and ecosystem information incorporated into fisheries stock assessments?

Ecosystem Considerations

- Separate chapter of stock assessment report
- Incorporated into each stock assessment



Ecosystem Considerations

This work is made possible through support from the Fisheries and the Environment (FATE) program

Welcome to the Ecosystem Considerations Chapter web pages. This report includes an ecosystem assessment, contributions with updated status and trend indices, and ecosystem-based management indices and information for the Bering Sea (BS), Aleutian Islands (AI) and the Gulf of Alaska (GOA) ecosystems. The following features are available through this web site:

- A brief [description](#) of the Chapter contents
- [Summary of Changes For 2008](#)
- [Download the Chapter](#) in its entirety as a PDF (approx. 9 MB)
- [Browse the contributions individually](#) where each individual contribution includes the primary author's contact information and associated metadata
- [Data access](#) for most contributions
- Data use is contingent upon compliance with the [AFSC Data Use Conditions](#)
- [Assessment Archives](#)
- A collection of [links relevant to the Chapter](#) contents
- Contact [Jennifer Boldt \(Editor\)](#) for further information

Population Modeling

- Single species models
- Single species models with environmental information incorporated
- Multispecies models
- Ecosystem models

- How does monitoring and understanding strengthen fisheries stock assessments?

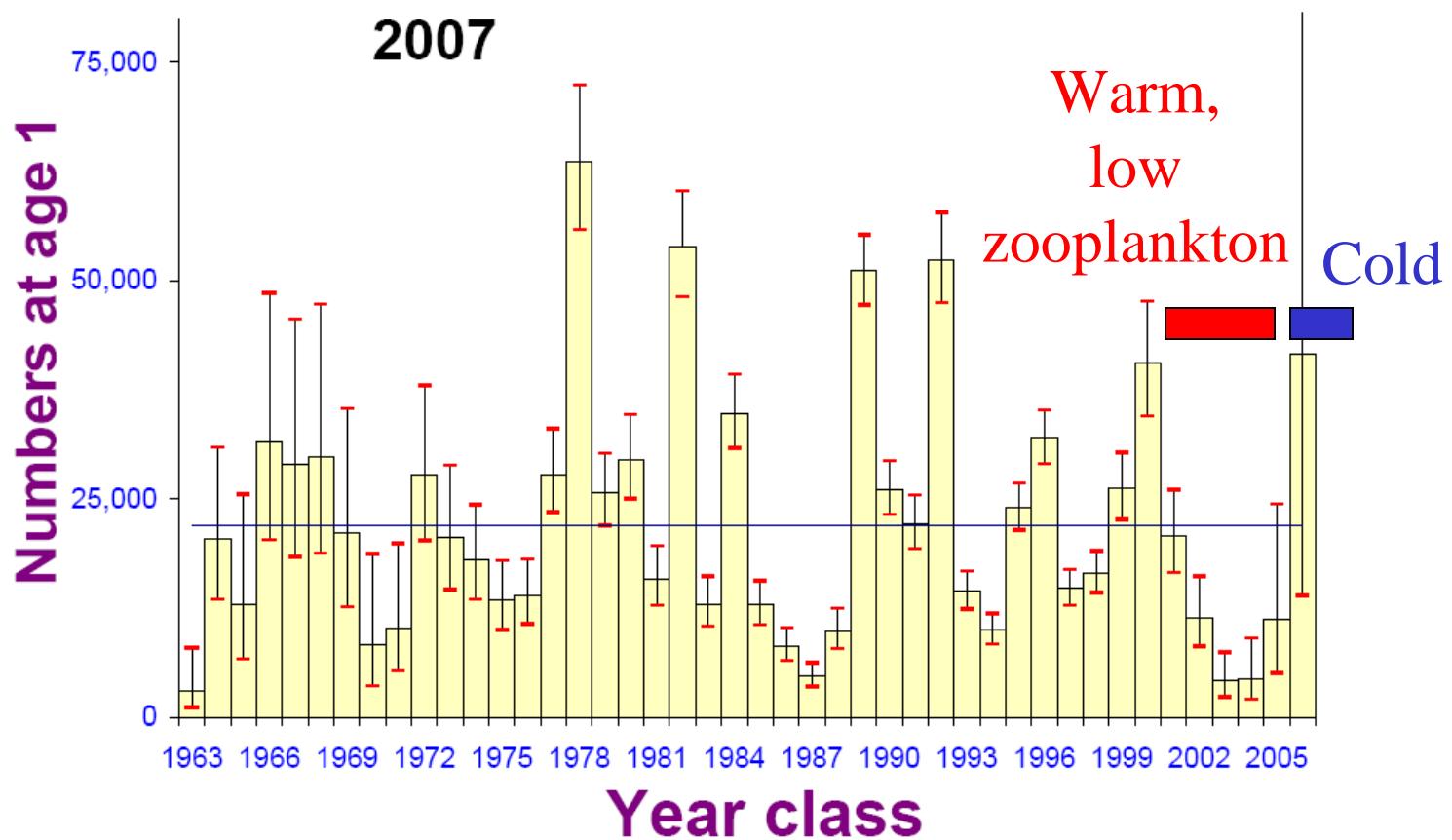
Two examples

- Bering Sea Pollock
- Bering Sea Flatfish

Bering Sea Pollock Year Class Strength

EBS Walleye Pollock

December 2007



Bering Sea Pollock Biomass

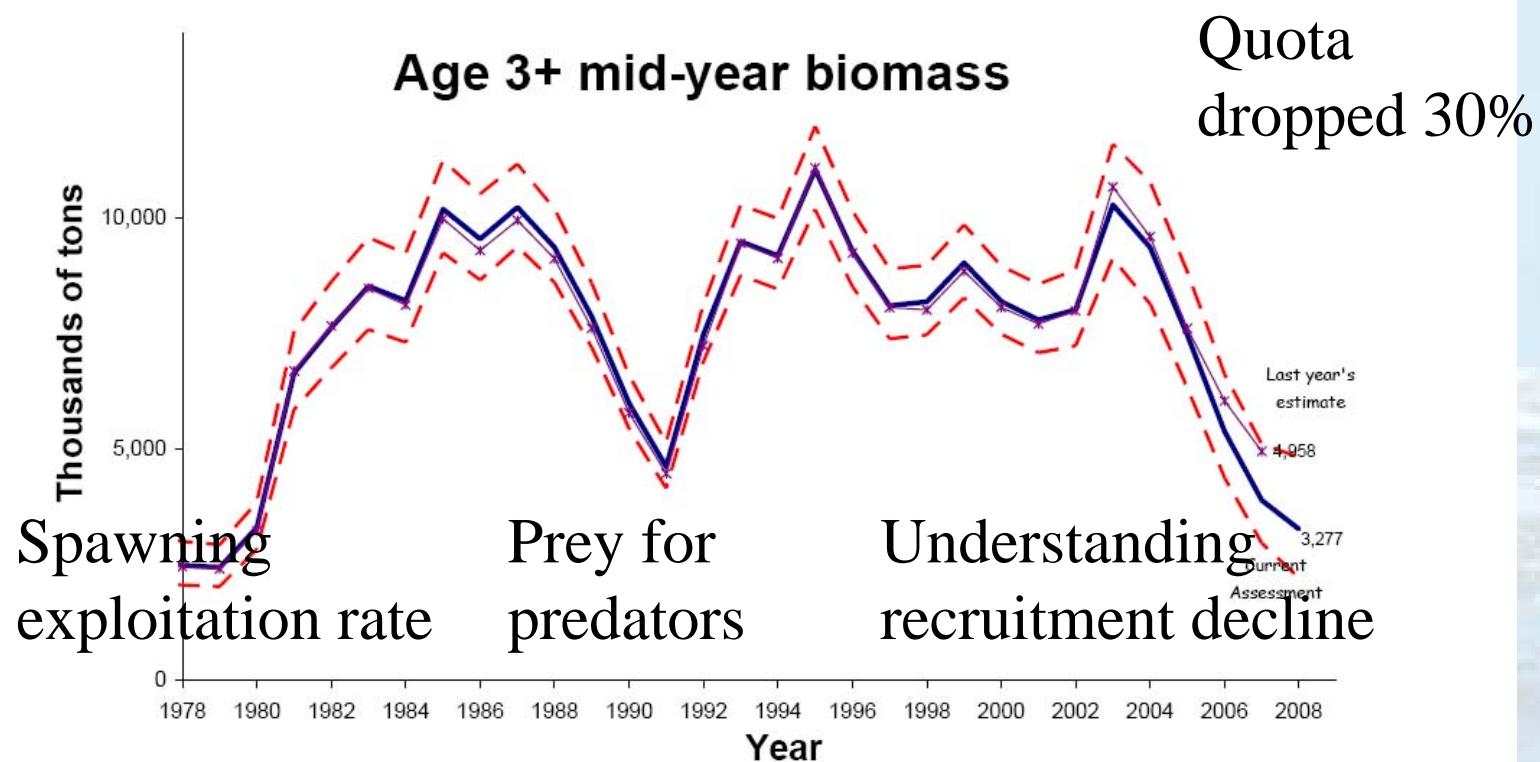
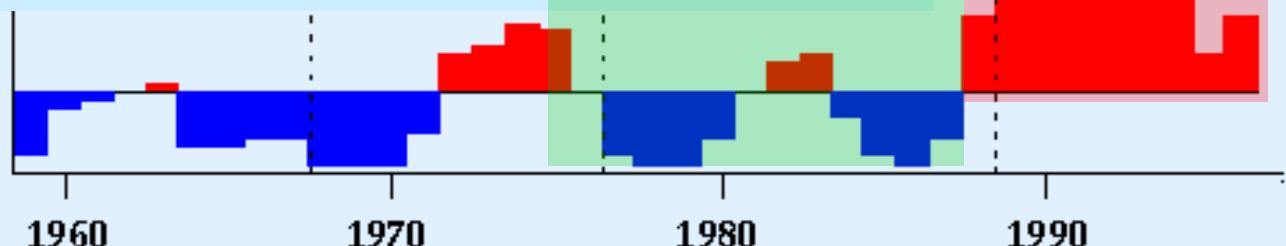


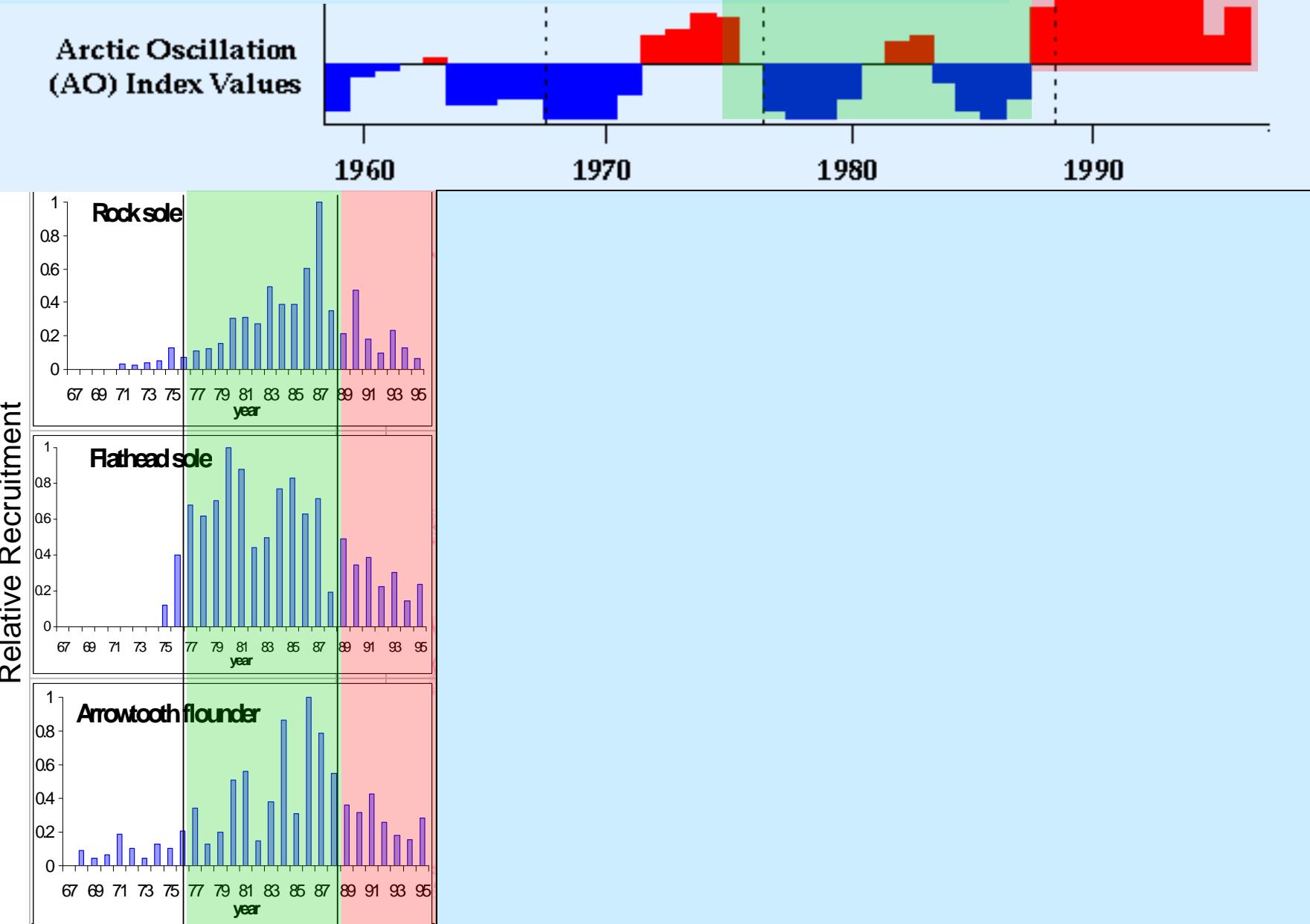
Figure 1.37. Estimated age 3+ EBS mid-year pollock biomass, 1978-2008. Approximate upper and lower 95% confidence limits are shown by dashed lines. Superimposed is the estimate of mid-year age 3+ biomass from last year's assessment

Index of Advection in the E. Bering Sea and effects on winter-spawning flatfish recruitment

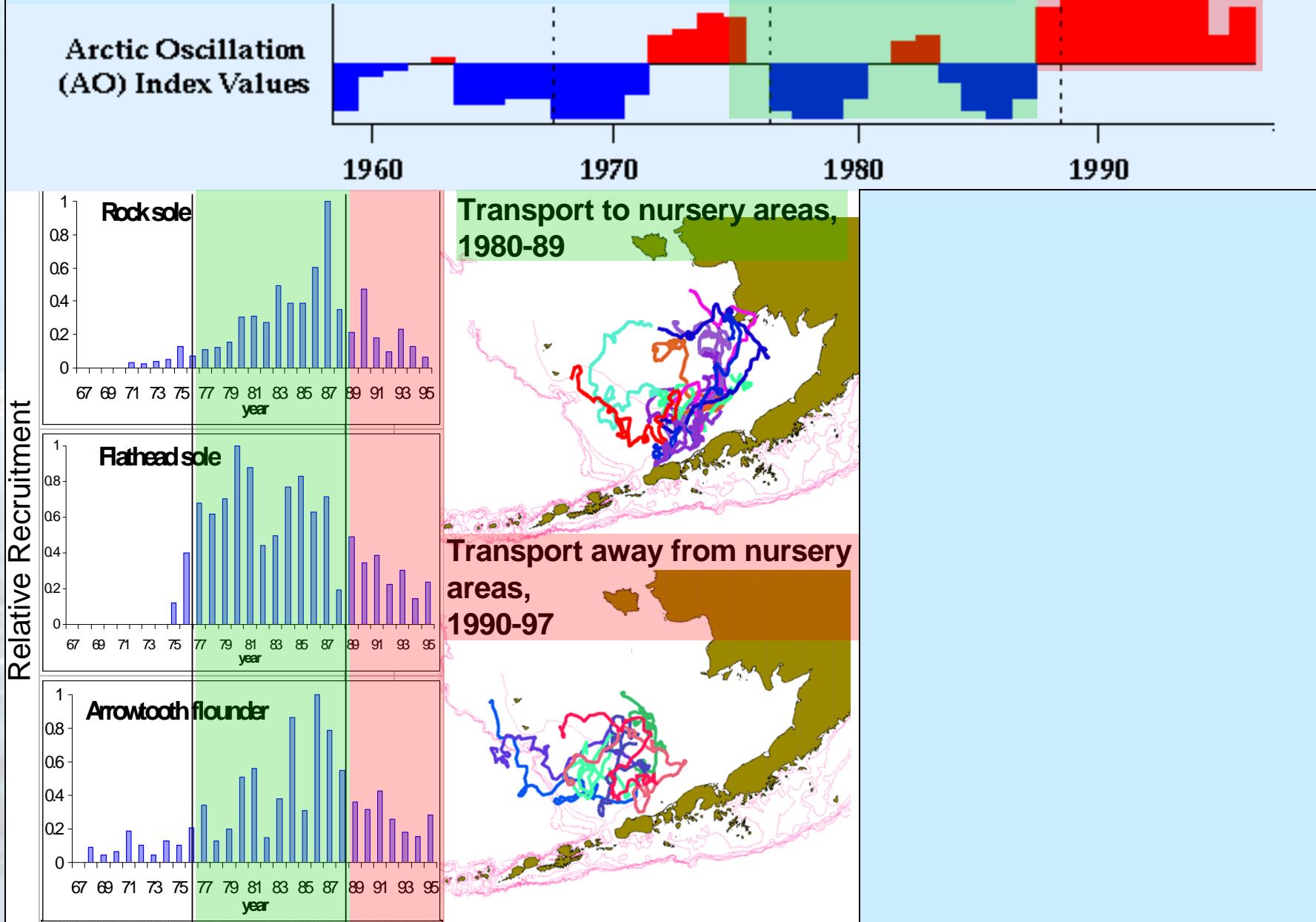
Arctic Oscillation
(AO) Index Values



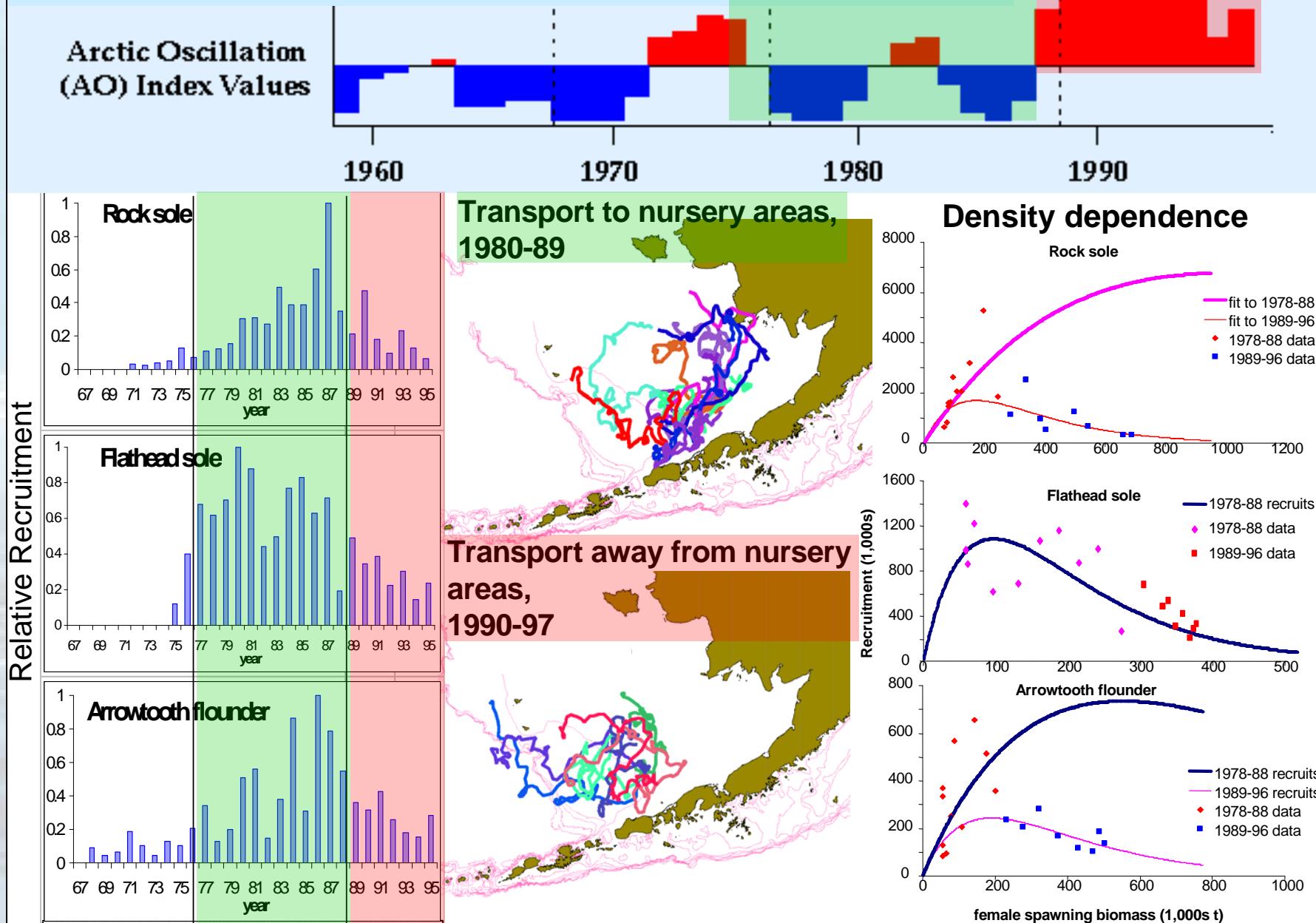
Index of Advection in the E. Bering Sea and effects on winter-spawning flatfish recruitment



Index of Advection in the E. Bering Sea and effects on winter-spawning flatfish recruitment



Index of Advection in the E. Bering Sea and effects on winter-spawning flatfish recruitment



Predicting Ecosystem Changes Consequential to Fishery Management

Piscivorous fish abundance will increase.



Competition with abundant, piscivorous fish will lead to a decline in murres, kittiwakes and fur seals.



Growing populations of humpback and fin whales increasingly will both consume and compete with forage fish (including juvenile pollock) for zooplankton.



For more information:

- EcoFOCI - <http://www.ecofoci.noaa.gov/>
- Bering Sea Integrated Ecosystem Research Program/Bering Ecosystem Study (BSIERP/BEST) funded by the North Pacific Research Board and the National Science Foundation - <http://bsierp.nprb.org/>
- Ecosystem Considerations - <http://access.afsc.noaa.gov/reem/ecoweb/index.cfm>

