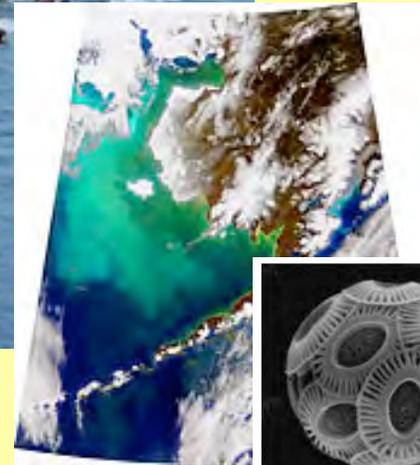
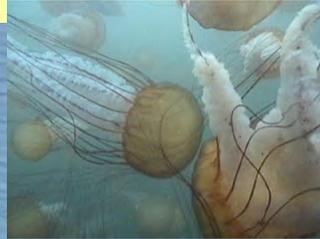
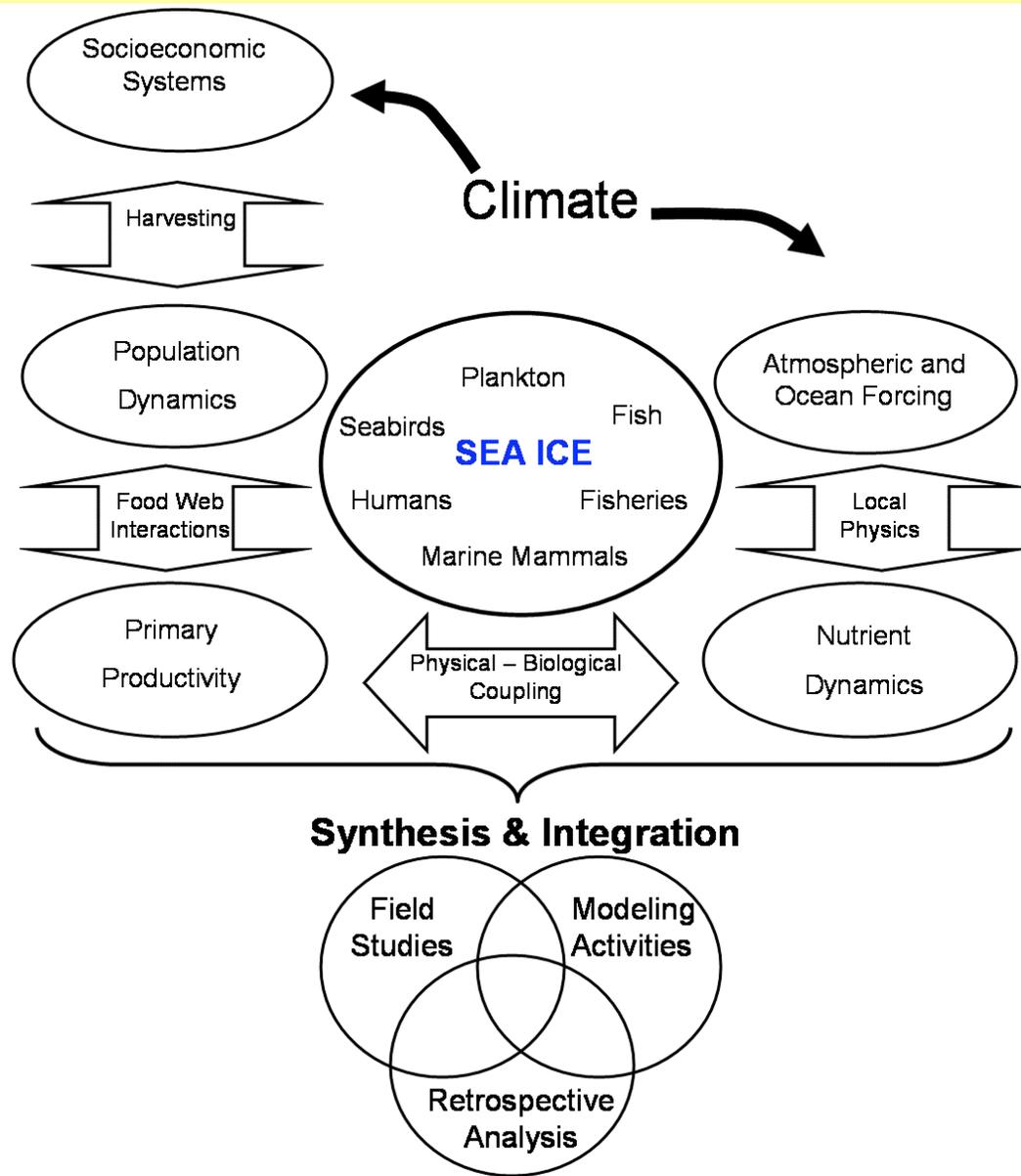


# Agencies Conducting Research in the Bering Sea



# Assembling an End-to-End Program



- Atmosphere / Ocean
  - Local Physics
  - Phys - Biol Coupling
  - Food Web Interactions
  - Harvesting / Fisheries
  - Socioeconomic Aspects
- 
- Modeling Activities
  - Field Research
  - Retrospective Studies

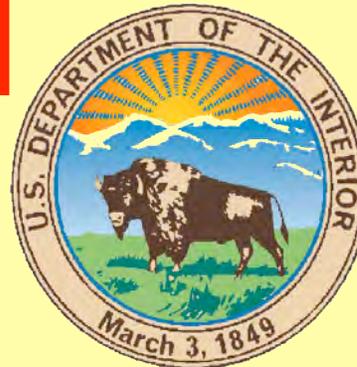
# Integrated Bering Sea Ecosystem Study



**AYK-SSI**  
(interagency)



OPP  
Arctic Natural  
& Social  
Sciences



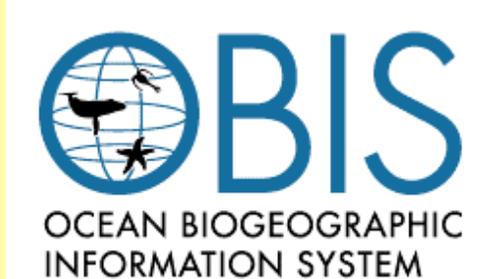
USFWS  
USGS



AFSC  
NMML  
PMEL

# Beyond the Bering Sea

*Integrated Bering Sea  
Ecosystem Study*



Ecosystem Studies of Sub-Arctic Seas



Global Ocean Ecosystem Dynamics



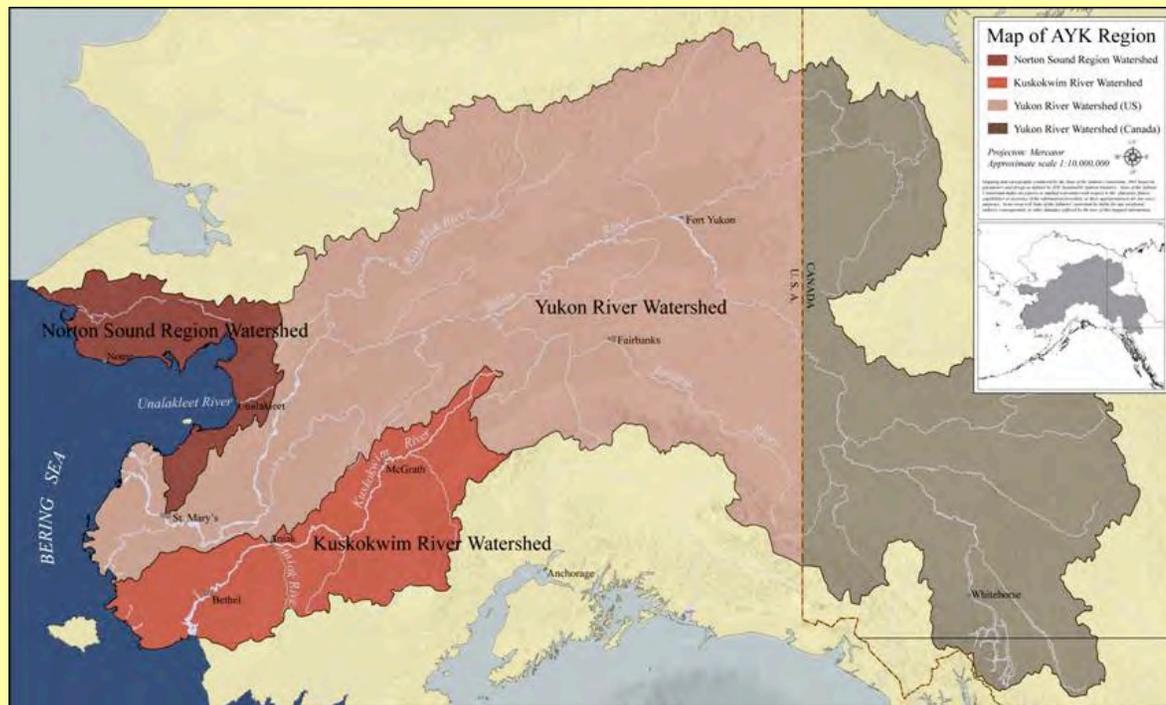
# AYK-SSI

Arctic - Yukon - Kuskokwim Sustainable Salmon Initiative



**Objective:** “... understanding the trends and causes of variation in salmon abundance and fisheries...”

## Current Research: 22 Active Projects (2006)



13 Population Ecology

4 Fisheries Management

2 Run Reconstruction

3 Local Traditional Knowledge

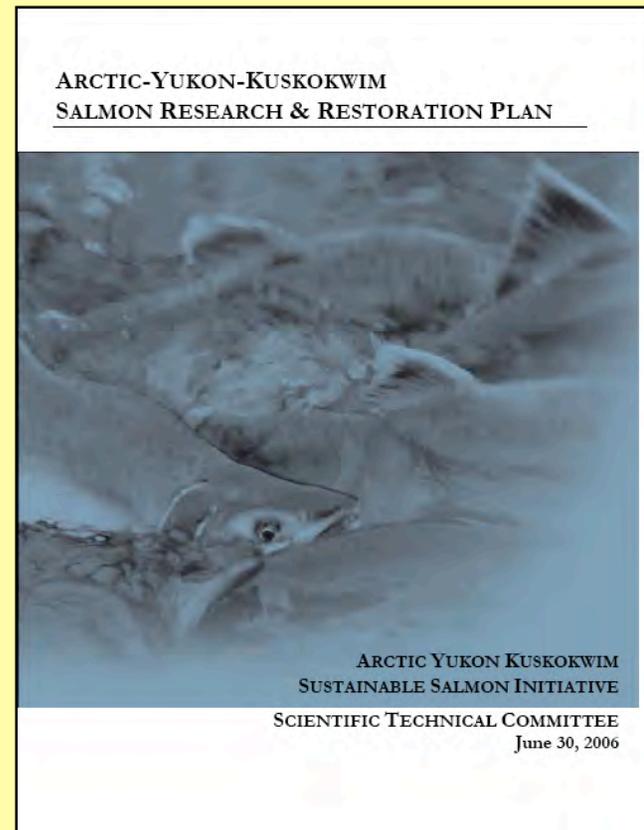
[www.aykssi.org](http://www.aykssi.org)



## Future Research: \$ 4.5 M RRP (2007)

The RRP is organized around a conceptual foundation, several overarching questions and three research frameworks:

- 1) Salmon Life Cycle
- 2) Human Systems
- 3) Synthesis and Prediction



[www.aykssi.org/prod](http://www.aykssi.org/prod)



# North Pacific Research Board

**Current Research: 44 Active Projects (2006)**



Modeling Sea Ice / Productivity

Circulation / Larval transport

Population Structure / Dynamics

*(fish, squid, pinnipeds, cetaceans)*

Species-specific Habitats

*(skates, rockfish, pinnipeds, cetaceans)*

Community Structure

*(plankton / seabirds – cetaceans)*

Human Communities / Health

*(commercial fishing, shellfish poisoning)*

<http://project.nprb.org>



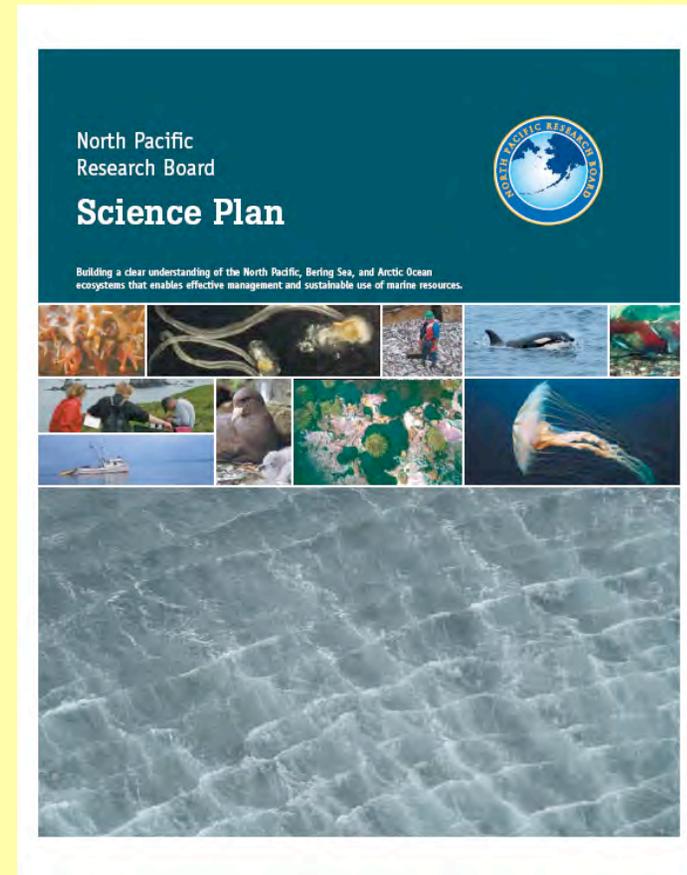
# North Pacific Research Board

Future Research: ~\$15 MILLION RFP (2007)

## Bering Sea Integrated Ecosystem Research Program (BSIERP)

Major component of the 2007 RFP, which will be released Oct. 6, 2006

Draft program documents will be available for public review from July 21 - August 11, 2006



<http://project.nprb.org/research/index>



# NOAA – Objectives

- Continue stock assessments
- Continue and expand biophysical shelf moorings
- Initiate spring biophysical survey of the Bering Sea shelf
- Conduct summer plankton surveys from groundfish charters
- Study transport of larvae on the shelf
- Explore the role of eddies in cross-shelf flux
- Build conceptual /numerical models for eastern Bering Sea
- Develop and refine ecosystem indicators
- Incorporate climate into ecosystem and population modeling
- Improve climate-ecosystem advice to NP Fish. Mgmt. Coun.
- Support the Bering Climate web site

*[www.beringclimate.noaa.gov](http://www.beringclimate.noaa.gov)*



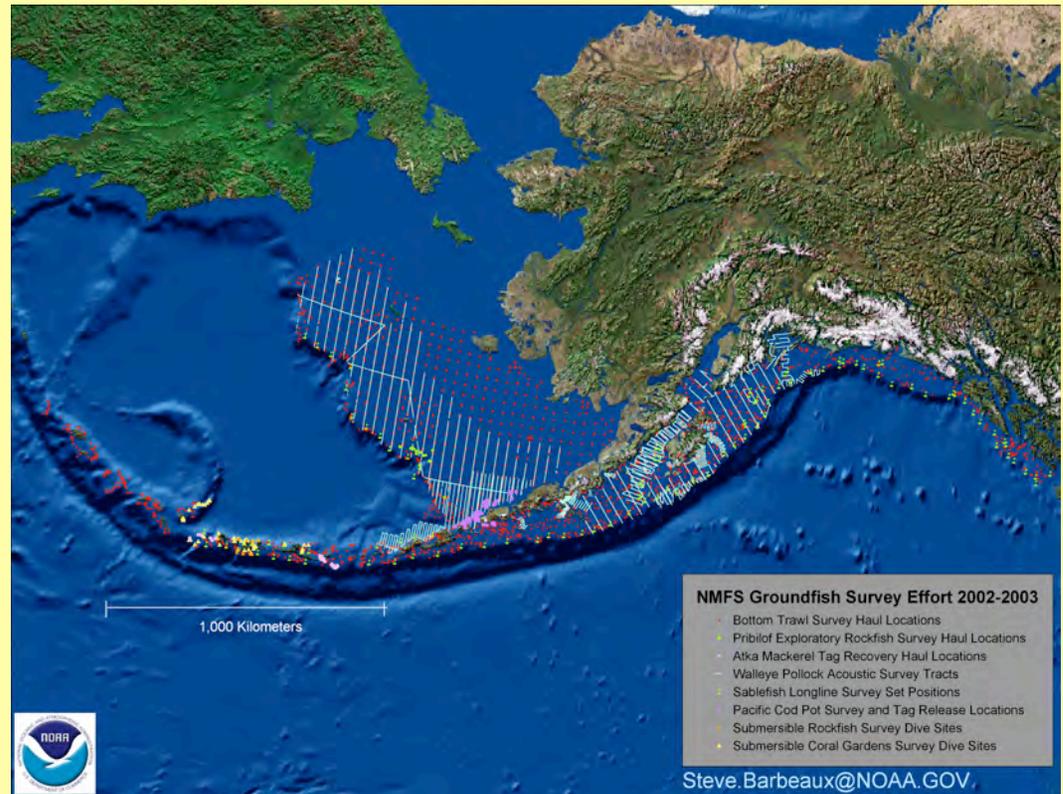
# NOAA – Bering Sea Research

## ➤ Fishery Stock Assessments:

- REFM: Resource Ecology & Fisheries Management
- RACE: Resource Assessment & Conservation Engineering



Acoustic / Trawling / Pots /  
Longlines / Submersible

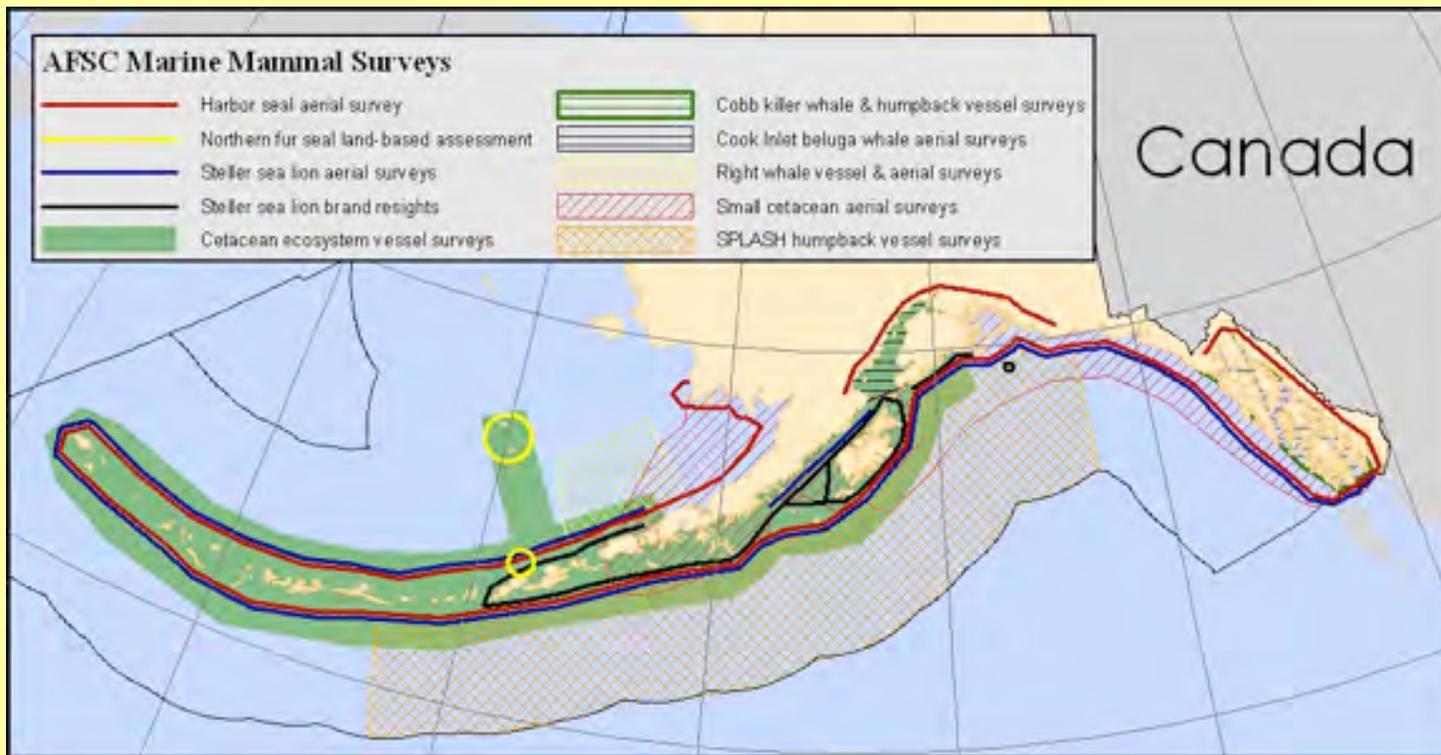




# NOAA – Bering Sea Research

## ➤ National Marine Mammal Laboratory:

- shore-based counts and at-sea surveys
- ice-seal satellite tracking
- photo-identification and genetics

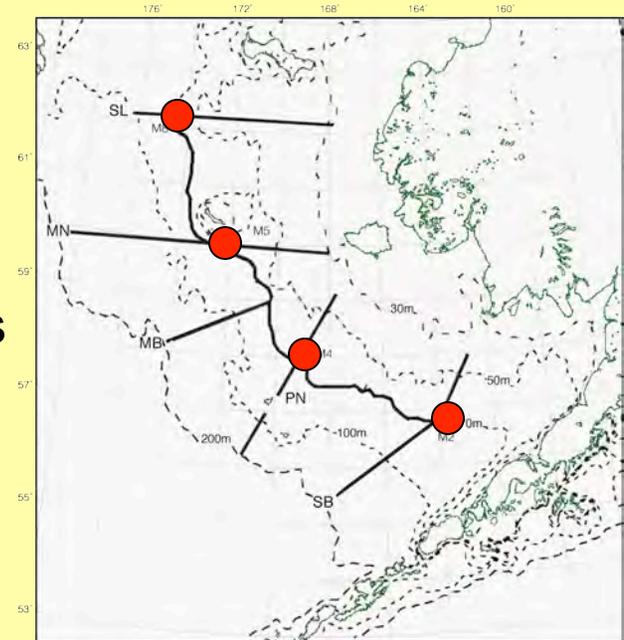




# NOAA – Bering Sea Research

## ➤ Process-Oriented Studies:

- Eco-FOCI: Ecosystem & Fishery  
- Oceanography Coordinated Investigations
- LOSI: LOss of Sea Ice



### Planned Eco-FOCI activities:

- Moorings M2, M4, M5, M8
- Cross-shelf lines, extending from the inner shelf to the slope (500 m depth)

# BASIS

The Bering-Aleutian Salmon International Survey



Fisheries and Oceans  
Canada

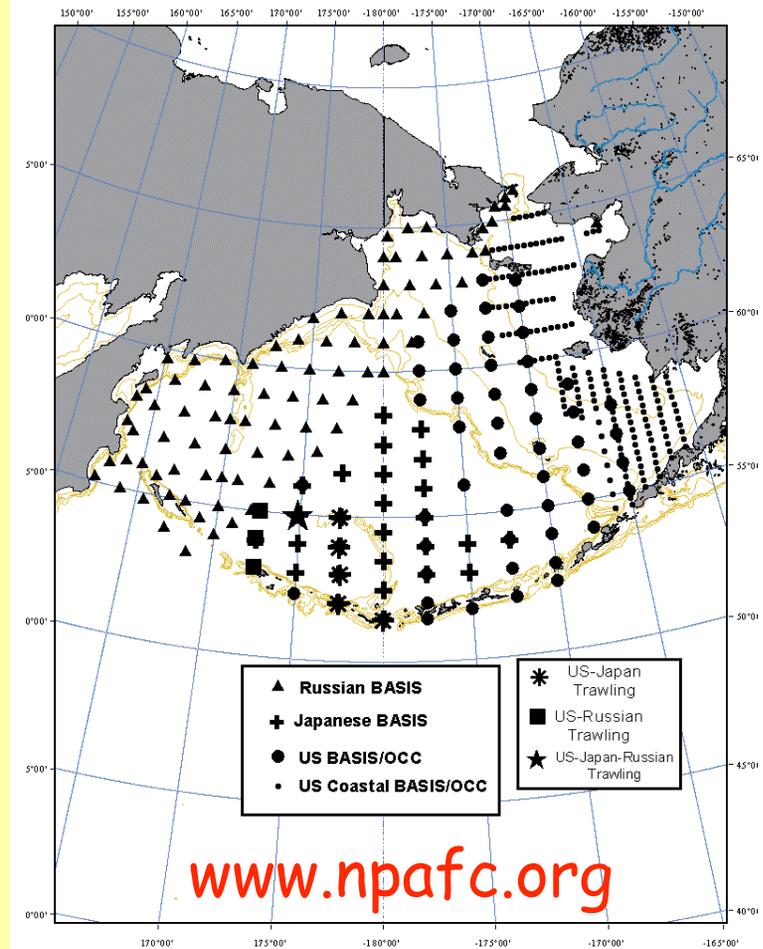


**Objective:** “Study aspects of ocean ecology of salmon in the Bering Sea”

## Key Issues:

- **Salmon and Forage Fish**  
changing ocean conditions and productivity
- **Climate Change**  
sea ice loss, increase in water temperature
- **Fisheries Bycatch**  
expanding salmon distribution due to warming

- Initiated by NPAFC in 2002
- Tri-national surveys: Russia, Japan, US
- Cooperative research: Canada, Korea



# BASIS

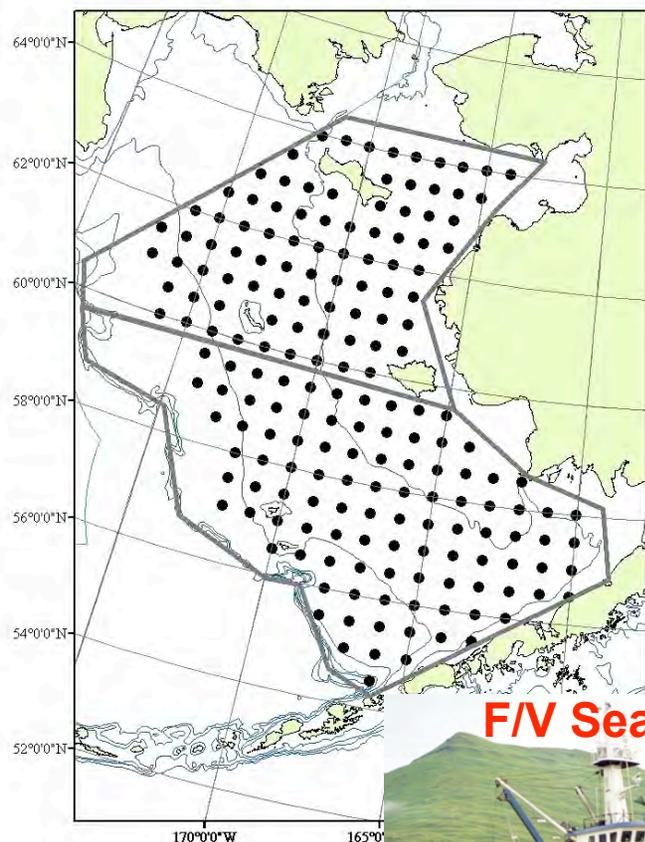
The Bering-Aleutian Salmon International Survey



Fisheries and Oceans  
Canada



## US BASIS Stations



August – October (60 days)

- Physical / Biological Oceanography
- Distribution in relation to ocean conditions: physics and prey
- Critical size and marine survival
- Spatially Explicit Habitat Quality
- Trophic Interactions

### **BASIS Working Group Points of Contact**

**Chairman: Jack Helle**

Auke Bay Laboratory, NMFS, Juneau, AK

email: [jack.helle@noaa.gov](mailto:jack.helle@noaa.gov)



**Alaska Fisheries Science Center**

NATIONAL MARINE FISHERIES SERVICE



# Alaska Ocean Observing System

## Objective:

Develop a Regional Observing System within the Integrated Ocean Observing System

## Key Issues:

- Improve prediction of climate change impacts
- Improve safety and efficiency of marine ops.
- More efficiently protect and restore healthy coastal ecosystems
- Sustain marine resources
- Mitigate effects of natural hazards
- Reduce public health risks
- Improve national security

*(Adapted From: An Integrated and Sustained Ocean Observing System, Ocean.US 2002)*



[www.aoot.org](http://www.aoot.org)



# Alaska Ocean Observing System

## Components:

weather, moorings, cruises

***Real Time Data***

***Historical Data***

***Forecasts***

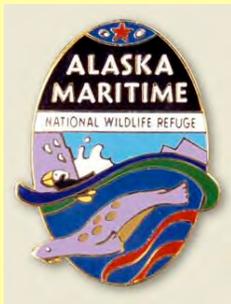
The screenshot shows the AOOS website interface for the Pribilof Islands Stations. On the left is a navigation menu with icons and labels for: Weather Maps, Air Temp, Wind, Gusts, Pressure, RADAR, Water T, Wave Height, Surface Currents, and Sea Ice. The main area features a satellite map of the Pribilof Islands with various colored markers (triangles, squares, circles) representing different stations. A dropdown menu at the top right is labeled 'Pribilof Islands Stations' and contains the text 'Choose station'. Below the map, there is a link that says 'Click on station to go to station page'. At the bottom right, the time is displayed as 'UTC Time: 2006-07-14 01:28' and 'Local Time: 2006-07-13 18:28'. At the bottom of the page, there is a navigation bar with links: 'Basic | Advanced | Interactive | Google Maps | Search and Rescue | Marine | Aviation | Oil Spill'.

[www.aos.org](http://www.aos.org)

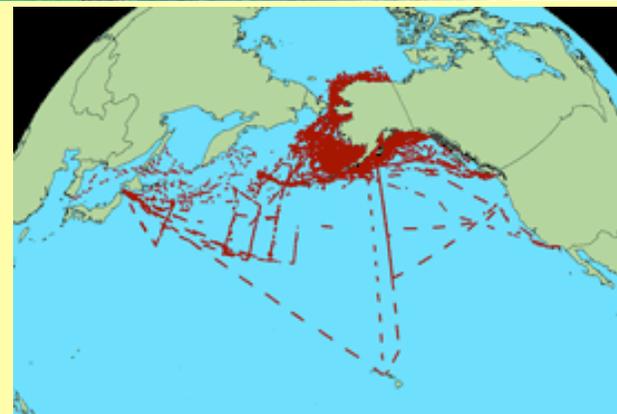


# U.S. Fish and Wildlife Service

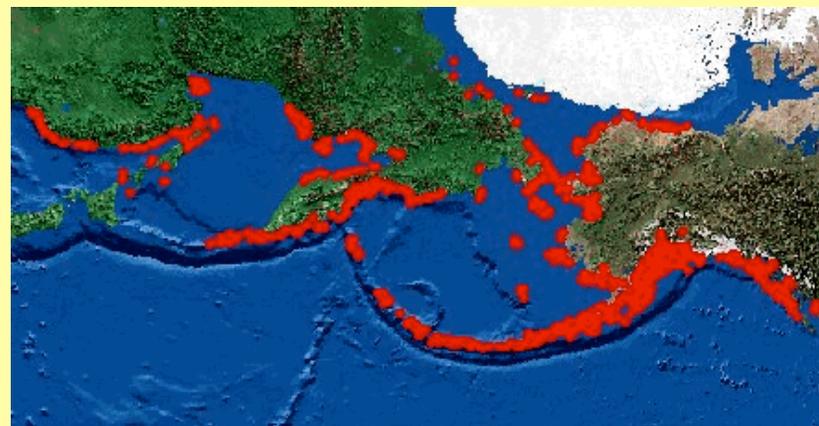
**Objective:** Monitoring of  
Natural Resources  
Alaska Maritime Refuge



- Seabird colonies
- Marine mammal rookeries
- Sea otters
- Seabirds at-sea
- Marine mammals at-sea
- Fish
- Invertebrates



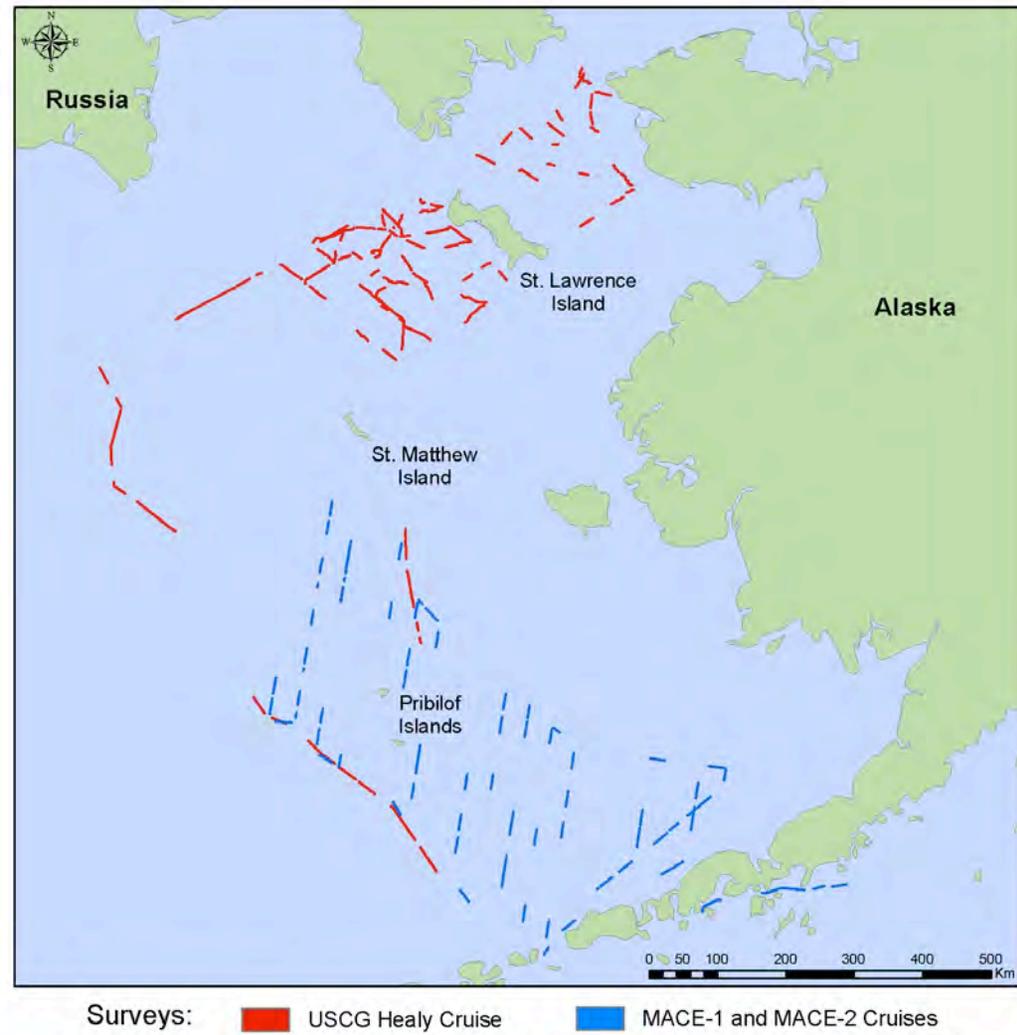
## NORTH PACIFIC SEABIRD COLONY DATABASE





# U.S. Fish and Wildlife Service

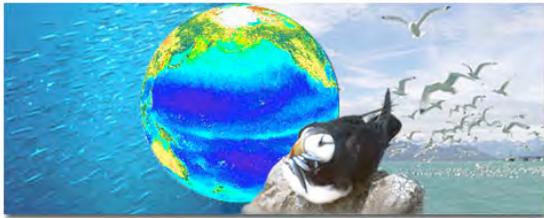
Host project	Lead	Dates	Area
Shelf-Basin Interactions	Grebmeier U.TN.	May 5- Jun 4	N Bering Sea
AK Maritime Natl. Wildl. Refuge - operations	USFWS & USGS	Jun 11- Jul 31	Aleutians - AK Penin.
Mid-water Assessment & Conservation Engineering	NOAA	Jun 3- Jul 31	Bering Sea shelf
Bering-Aleutian Salmon International Survey	NOAA	Jul 27- Sep 3	Bering Sea shelf
Fisheries-Oceanography Coordination Investigation	NOAA	Sep 9- Oct 10	Bering Sea shelf



(Figure courtesy Kathy Kuletz & David Irons)



# U.S. Geological Service



## **Vision:**

To provide scientific leadership and accurate, objective, and timely data, information, and research findings to address important natural resource issues and natural hazards assessments in Alaska and circumpolar regions

## **Ecosystems & Habitats**

- [Coastal and Marine](#)

## **Fish & Fisheries**

- [Fisheries Projects](#)



## **Mammals**



- [Polar Bears](#)
- [Sea Otters](#)
- [Walrus](#)



## **Birds**

- [Seabirds](#)
- [Waterfowl](#)
- [Seaducks](#)
- [Shorebirds](#)
- [Loons](#)

[alaska.usgs.gov/science/biology](http://alaska.usgs.gov/science/biology)



# U.S. Geological Service

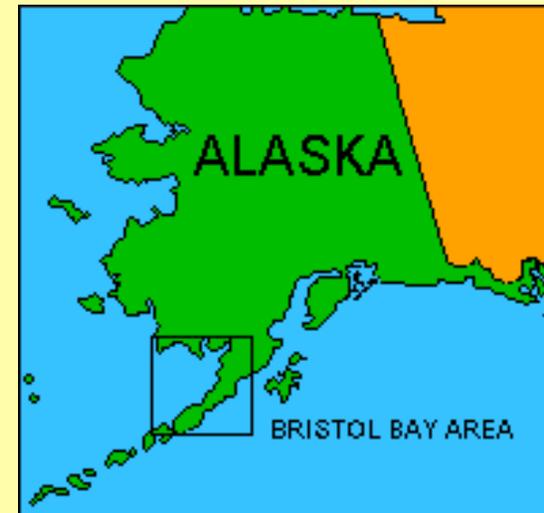
## Alaska Science Center



[alaska.usgs.gov/science/biology](http://alaska.usgs.gov/science/biology)

- To identify the movements and habitats of marine organisms
- **Birds:** Loons, eider, brant, ducks
- **Mammals:** Walrus, polar bears

## Global Change Research in Biology



[geochange.er.usgs.gov](http://geochange.er.usgs.gov)

- To measure patterns of Bristol Bay sockeye growth in marine and freshwater environments and identify linkages between growth rates and climatic conditions



# Alaska Department Fish and Game - Wildlife Conservation and Fisheries -

## Objective:

To protect, maintain and improve the fish, game and aquatic plant resources of Alaska, and manage their use and development for the maximum benefit of the people of Alaska

## Priorities:

- Optimize economic benefits from fish and wildlife resources.
- Enhance public participation in management
- Increase public knowledge about fish and wildlife populations



[www.adfg.state.ak.us](http://www.adfg.state.ak.us)



# Alaska Department Fish and Game

## - Subsistence -

### **Objective:**

To scientifically, quantify, evaluate and report information about customary and traditional uses of Alaska's Fish and wildlife resources.

### **Priorities:**

- Research, quantify, and disseminate information to the public about customary and traditional uses by Alaskans of fish and wildlife resources
- Provide scientifically-based information for evaluating opportunities for customary and traditional resource uses

### Studies

- wild resource harvest / use
- seasonality of harvesting
- methods of harvesting
- methods of and processing
- harvest levels
- sharing / trading foods
- geographic areas used
- cultural and economic values
- groups sharing resources
- trends in resource use patterns



# Climate Change and the Bering Sea Ecosystem: An Integrated, Interagency / Multi-Institutional Approach

## **Bering Sea Inter-Agency Working Group (BIAWG)**

Alaska Ocean Observing System  
Bering Ecosystem Study  
NOAA Alaska Fisheries Science Center  
NOAA Pacific Marine Environmental Lab.  
North Pacific Research Board  
U.S. Arctic Research Commission  
U.S. Fish and Wildlife Service  
U.S. Geological Survey  
University of Alaska Fairbanks

- *Workshop: April 2005*
- *White Paper: February 2006*

Climate Change and the Bering Sea Ecosystem:  
An Integrated, Interagency / Multi-Institutional Approach

Workshop held 8 April 2005  
Seattle, WA

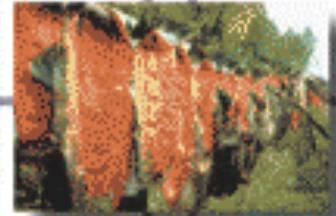
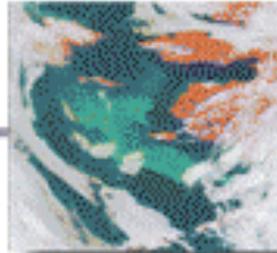


Walrus herd in the Chukchi Sea, June 2002  
Photo courtesy of G. Sheffield.



February 2006

# BEST



**Bering Ecosystem Study Program**

# BEST Information Sources

- **Web Site:**  
<http://www.arcus.org/Bering/index.html>
- **Science Plan, available in Hard Copy at:**  
Arctic Research Consortium of the U.S. (ARCUS)  
3535 College Road, Suite 101, Fairbanks, AK 99709  
Phone: 907-474-1600; Fax: 907-474-1604
- **Planning Group. c/o George L. Hunt, Jr.**  
School of Aquatic & Fishery Sciences  
University of Washington, Seattle  
Email: [geohunt2@u.washington.edu](mailto:geohunt2@u.washington.edu)