

Climate Change Research: MMS Alaska OCS Region

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Outline

- ESP Background
- Climate Change Research at MMS
 - Ongoing studies related to climate change
 - Studies proposed for FY 2011 and FY 2012
 - Topical areas for future studies
- The Alaska OCS Region Environmental Studies Plan
- FedBizOpps.gov

ESP Background

- National in scope: AK annual budget ~\$12M
- Multi-disciplinary (staff of 10)
 - Oceanography: circulation, sediments, discharges
 - Biology: marine mammals, fish, birds, flora
 - Social Sciences: subsistence, culture, economics
- Peer review
 - OCS Scientific Committee Advisory Board
 - Science Review Boards
 - NAS reviews
 - Published reports
 - Stakeholder Review
- Transparency
 - Annual Plan, ITMs, website, final reports
<www.mms.gov/alaska/ess.htm>

Studies Webpage

The screenshot shows a web browser window titled "Environmental Studies Program, Alaska OCS Region - Windows Internet Explorer". The address bar shows "http://www.mms.gov/alaska/ess/index.htm". The browser interface includes a menu bar (File, Edit, View, Favorites, Tools, Help) and a toolbar with navigation buttons. The website content is displayed within the browser window.

MMS Minerals Management Service
Alaska OCS Region

U.S. Department of the Interior

Environmental Studies Section

The Minerals Management Service (MMS) Environmental Studies Program began in 1973 as a means to gather and synthesize environmental, social, and economic information to support decision making for the offshore oil and gas program. Since its beginning, the National Environmental Studies Program has contracted for more than \$600 million dollars of studies throughout the coastal zone of the continental United States. These funds have supported studies of all aspects needed for a thorough understanding of the complex nature of the Alaskan Outer Continental Shelf and have aided in the wise protection of its valuable resources. The MMS uses information from the studies program in evaluating potential environmental problems associated with all levels of oil and gas activities.

- [Alaska Annual Studies Plan FY 2010](#)
- [Aerial Surveys of Endangered Whales, Bowhead Whale Aerial Survey Program \(BWASP\)](#)
- [Coastal Marine Institute Annual Reports](#)
- [Ongoing Studies](#)
- [Completed Studies](#)
- [Results of Completed Studies Available on the Web](#)
- [Environmental Studies Program Information System \(ESPIS\)](#)
- [Proceedings of Alaska Region Information Transfer Meetings](#)
- [Information of Interest to Offerers](#)
- [Links to Other MMS Environmental Studies Sites](#)
- [International Polar Year 2007 - 2008](#)
- [Posters, Presentations & Proceedings](#)

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Local intranet 125%

Alaska ESP – extensive history...

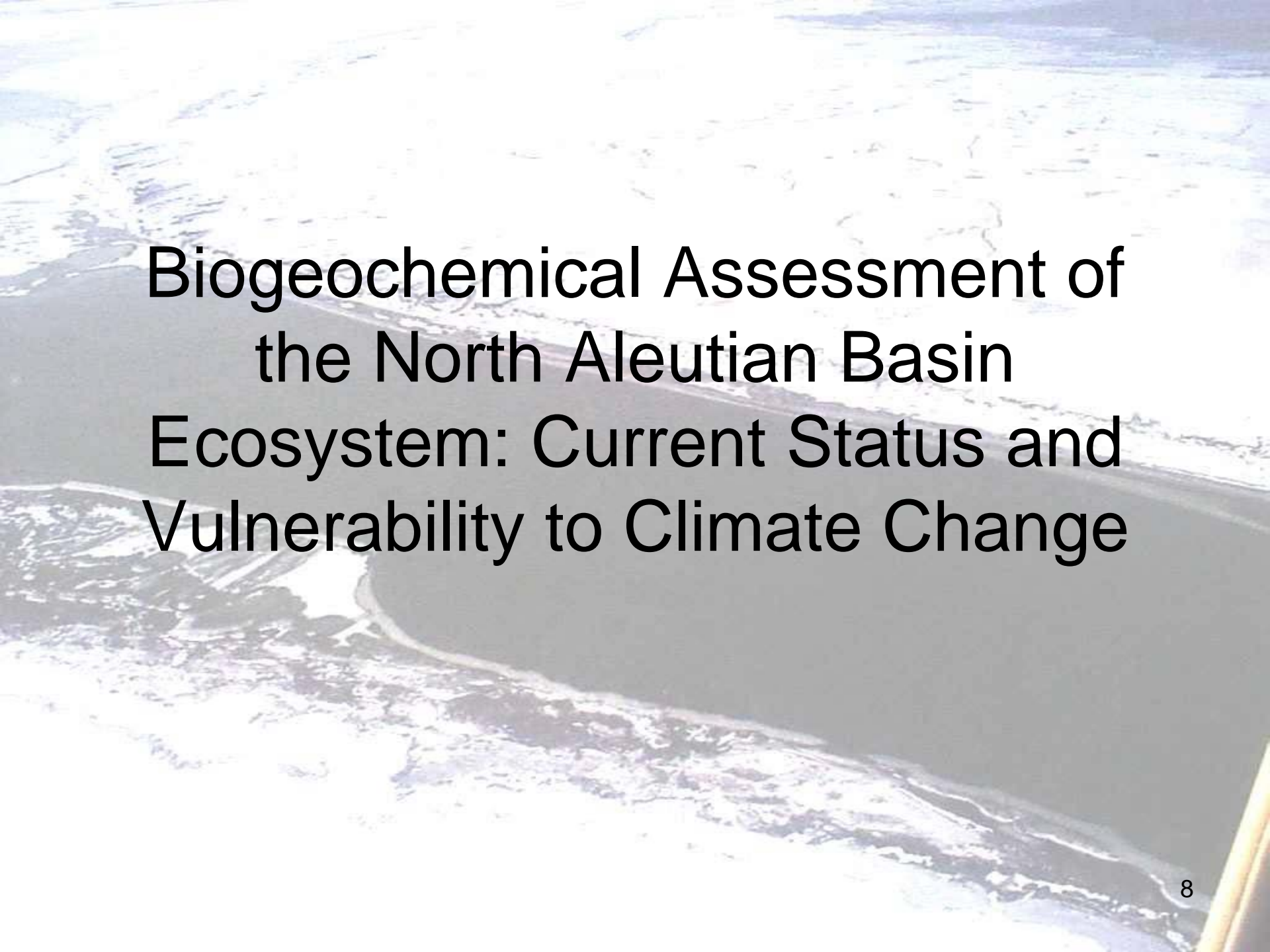
- In place since 1973, completed over 400 studies, numerous syntheses
- Funded \$320M+ on studies
- Maintains 50+ ongoing study projects
- In terms of scale and longevity, the Alaska ESP is most comprehensive Environmental Impact Assessment data collection effort in the world

Extensive Science Collaboration

- Federal
 - NOPP; NOAA-NMFS; USGS; FWS; BLM; NSF
- State of Alaska
 - University of Alaska (MMS Coastal Marine Institute); Department of Fish and Game
- Universities
 - CESUs (Pacific Northwest, North and West Alaska)
- Interagency Coordination Units (MMS on Boards)
 - North Slope Science Initiative; Alaska Ocean Observing System; USARC / Arctic Council
- Regional / Native Groups
 - NSB Dept. of Wildlife; AEWG / AWC; Tribal / Village
- Private contractors
- Industry
- MMS Coastal Impact Assistance Program
- MMS Technology Assessment & Research Program

Research is Mission Oriented

- Obtain Quality Information for Environmental Impact Assessment
 - Determine current baselines
 - Assess cumulative impacts from offshore activities
- Monitor Environmental Changes
 - Natural and Anthropogenic
 - Marine and Nearshore
 - Physical, Biological, Social
- Evaluate Potential Adaptations to the Program to Better Support the MMS Mission

An aerial photograph of a coastal area. The top half of the image shows a large, dark body of water, likely the North Aleutian Basin, with some white foam from waves. Below the water is a wide, light-colored sandy beach. The bottom half of the image shows a rugged, rocky coastline with some vegetation and a small inlet or bay. The overall scene is a natural, coastal environment.

Biogeochemical Assessment of the North Aleutian Basin Ecosystem: Current Status and Vulnerability to Climate Change

Biogeochemical Assessment of the North Aleutian Basin Ecosystem

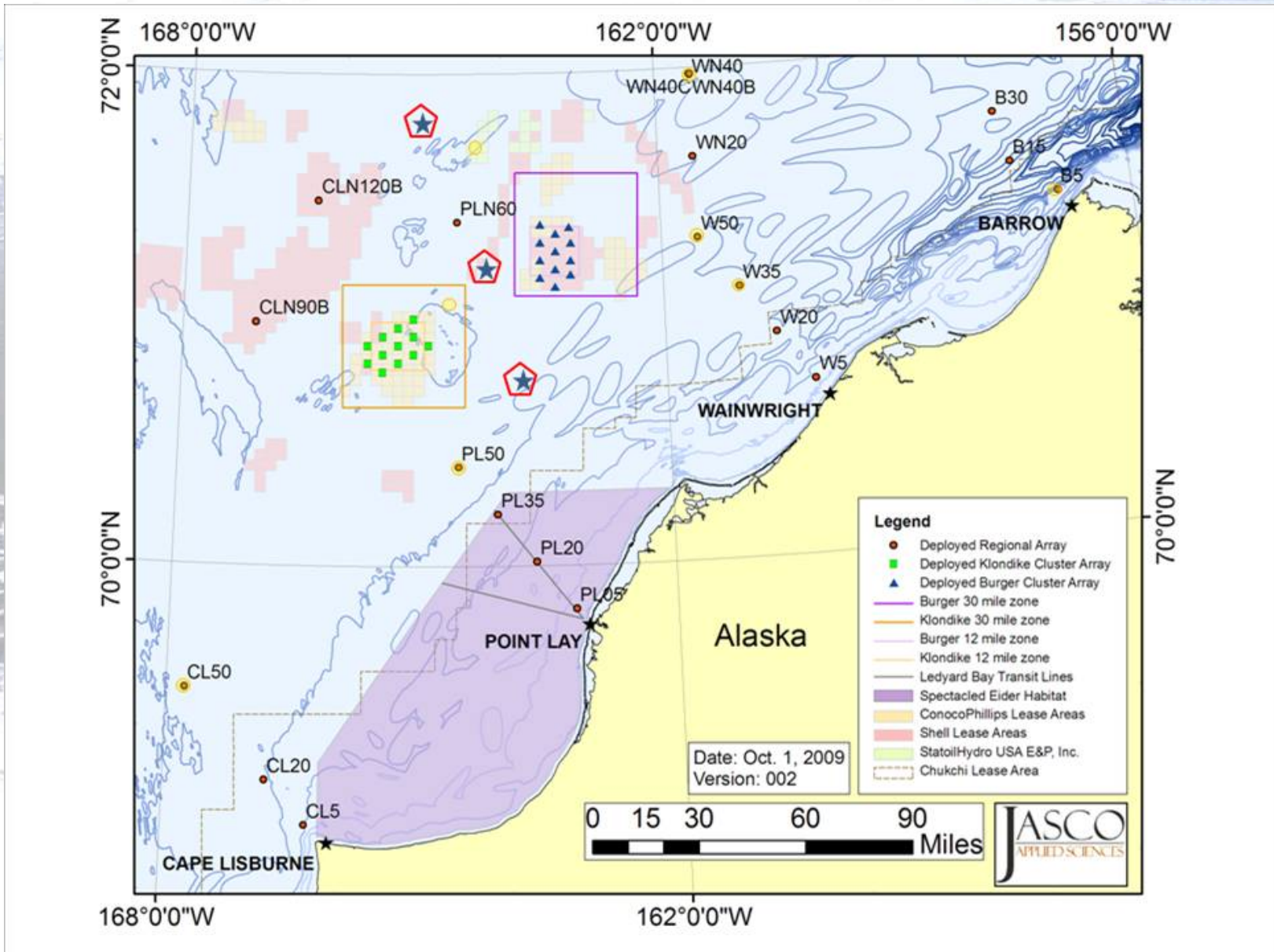
Objectives include:

- Assessing the impact of climate variability on carbon biogeochemistry
- Determining the extent of ocean acidification in the Eastern Bering and Chukchi Seas and developing long-term projections for changes in pH



Chukchi Offshore Monitoring in Drilling Area (COMIDA): Factors Affecting the Distribution and Relative Abundance of Endangered Whales

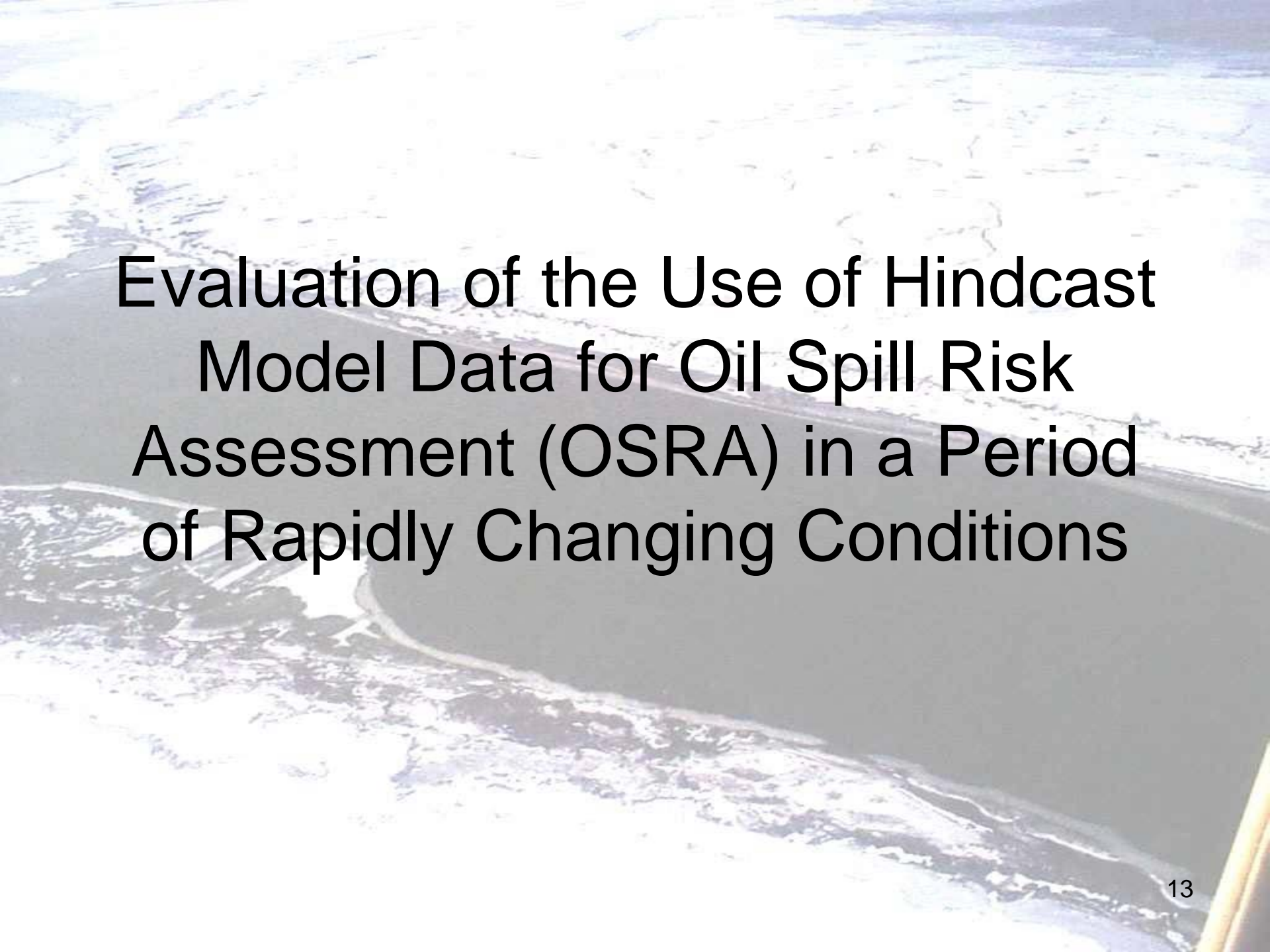
- Passive Acoustic Detection and Monitoring of Endangered Whales in the Arctic
- Ecosystem Observations in the Chukchi Sea: Biophysical Moorings and Climate Modeling



COMIDA: Factors Affecting the Distribution and Abundance of Endangered Whales

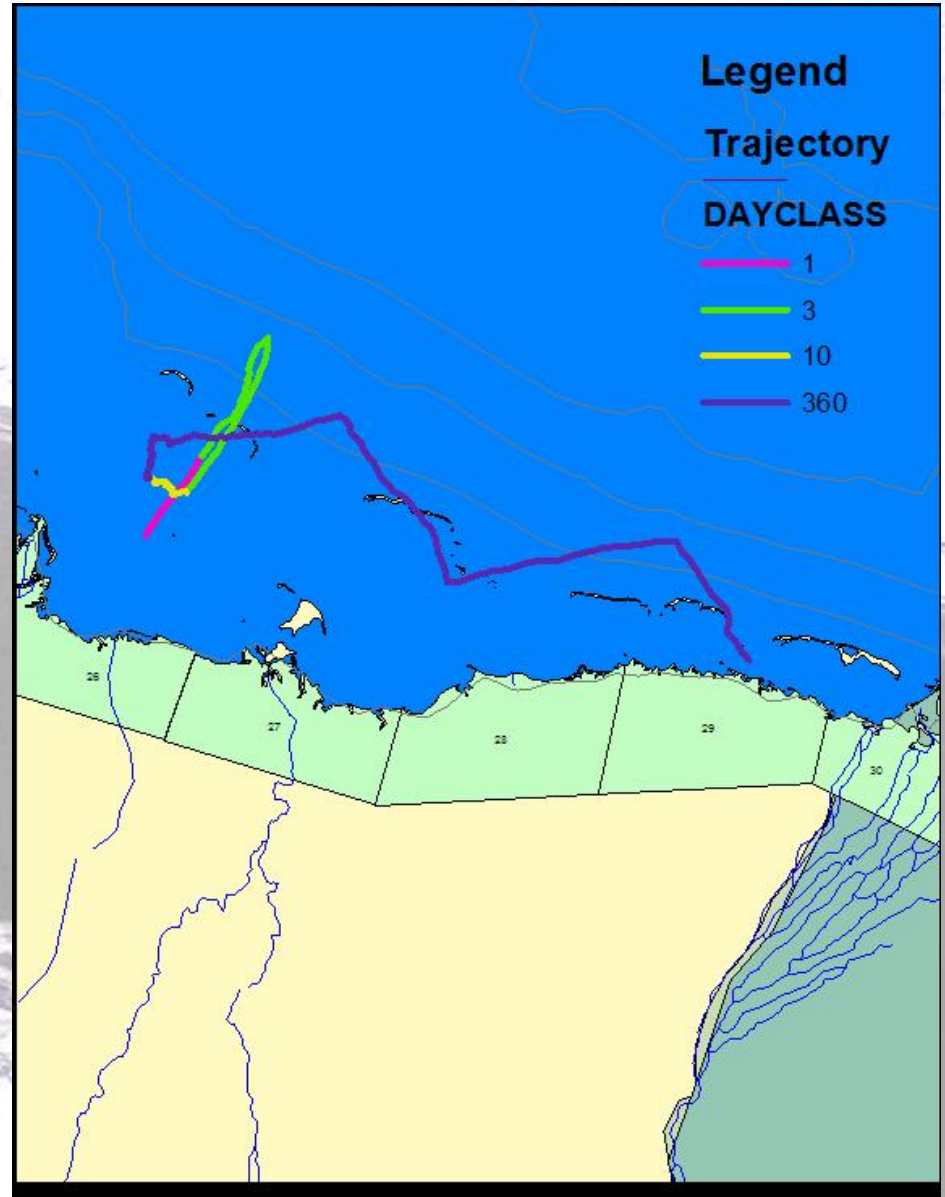
Objectives Include:

- Evaluating whether changes in seasonal sea ice extent is enabling a northward shift of Bering Sea cetacean species
- Evaluating the extent to which variability in environmental conditions such as sea ice, oceanic currents, water temperature and salinity, and prey abundance influence whale distribution and relative abundance
- Establishing predictive variables to describe large whale occurrence by comparing long-term estimates of habitat use by large whale species with predictions of annual ice coverage developed from climate model forecasts

An aerial photograph of a coastline. The ocean is dark blue, and the waves are white and foamy as they crash against the shore. The land is a mix of green and brown, with some buildings and roads visible. The text is overlaid on the image in a large, bold, black font.

Evaluation of the Use of Hindcast Model Data for Oil Spill Risk Assessment (OSRA) in a Period of Rapidly Changing Conditions

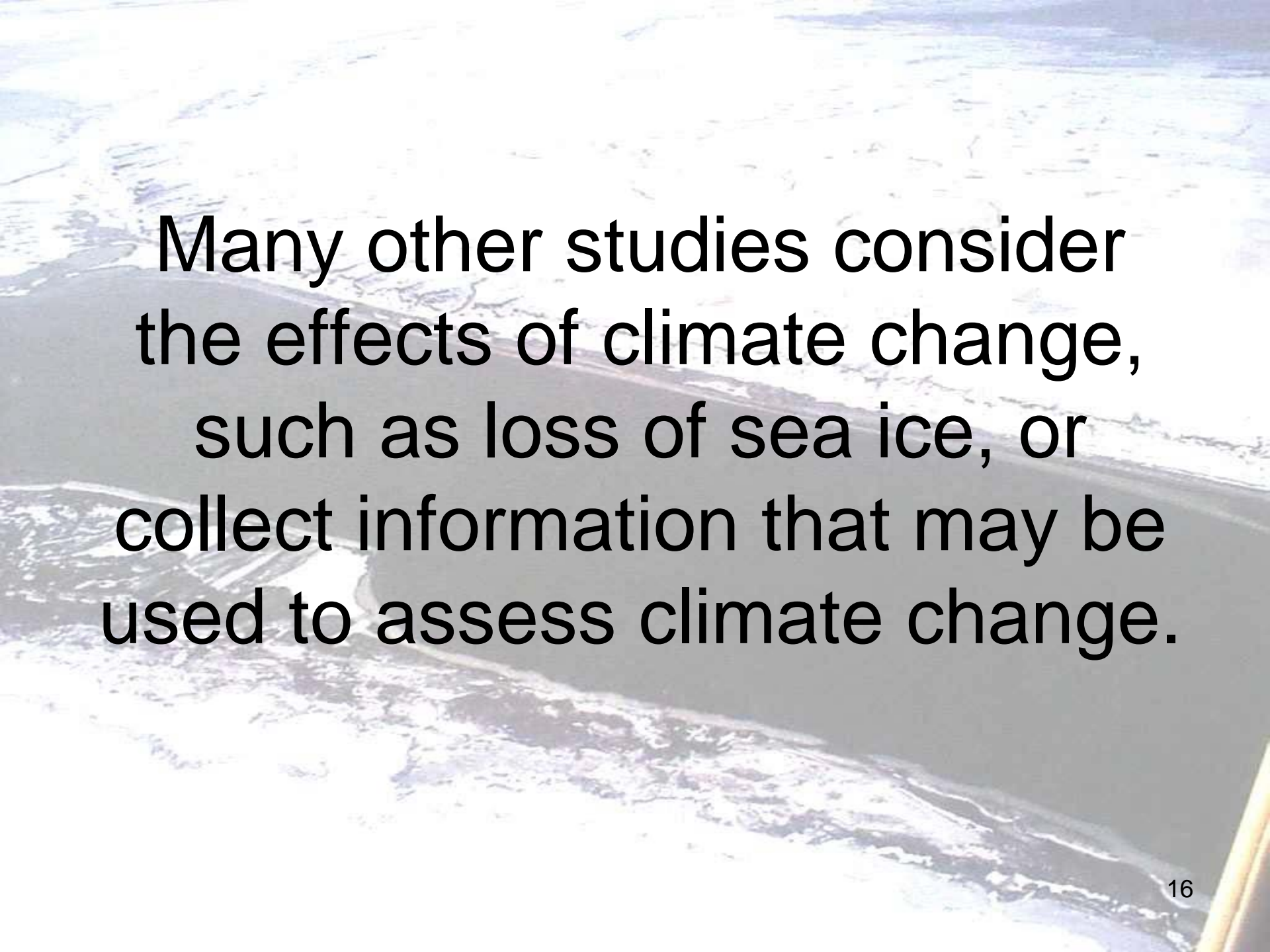
MMS Oil Spill Trajectory Analysis



Evaluation of the Use of Hindcast Model Data for OSRA

Objectives Include:

- Describing the effects of climate change on sea ice, circulation, river discharge, etc. in the Arctic Ocean and the impacts of these changes on surface circulation
- Describing the attributes of hindcast model data currently used for OSRA
- Evaluating alternate approaches such as the incorporation of forecast modeling results in the OSRA process to guide MMS in its study planning process

An aerial photograph of a coastline, showing a large body of water on the left and a narrow strip of land on the right. The water is dark blue, and the land is a mix of green and brown. The text is overlaid on the image.

Many other studies consider the effects of climate change, such as loss of sea ice, or collect information that may be used to assess climate change.

Oceanography / Fates & Effects

- COMIDA Chemistry and Benthos
- Mapping and Characterization of Recurring Polynyas and Landfast Ice in the Chukchi Sea
- Beaufort/Chukchi Seas Mesoscale Meteorology Study Phase II

Biology

- Current and Historic Distribution and Ecology of Demersal Fishes in the Chukchi Sea Lease Area
- Population Connectivity and Larval Dispersal in Bering, Chukchi and Beaufort Sea Snow Crab Populations: Estimating Spatial Scales of Disturbance Impacts

Protected Species

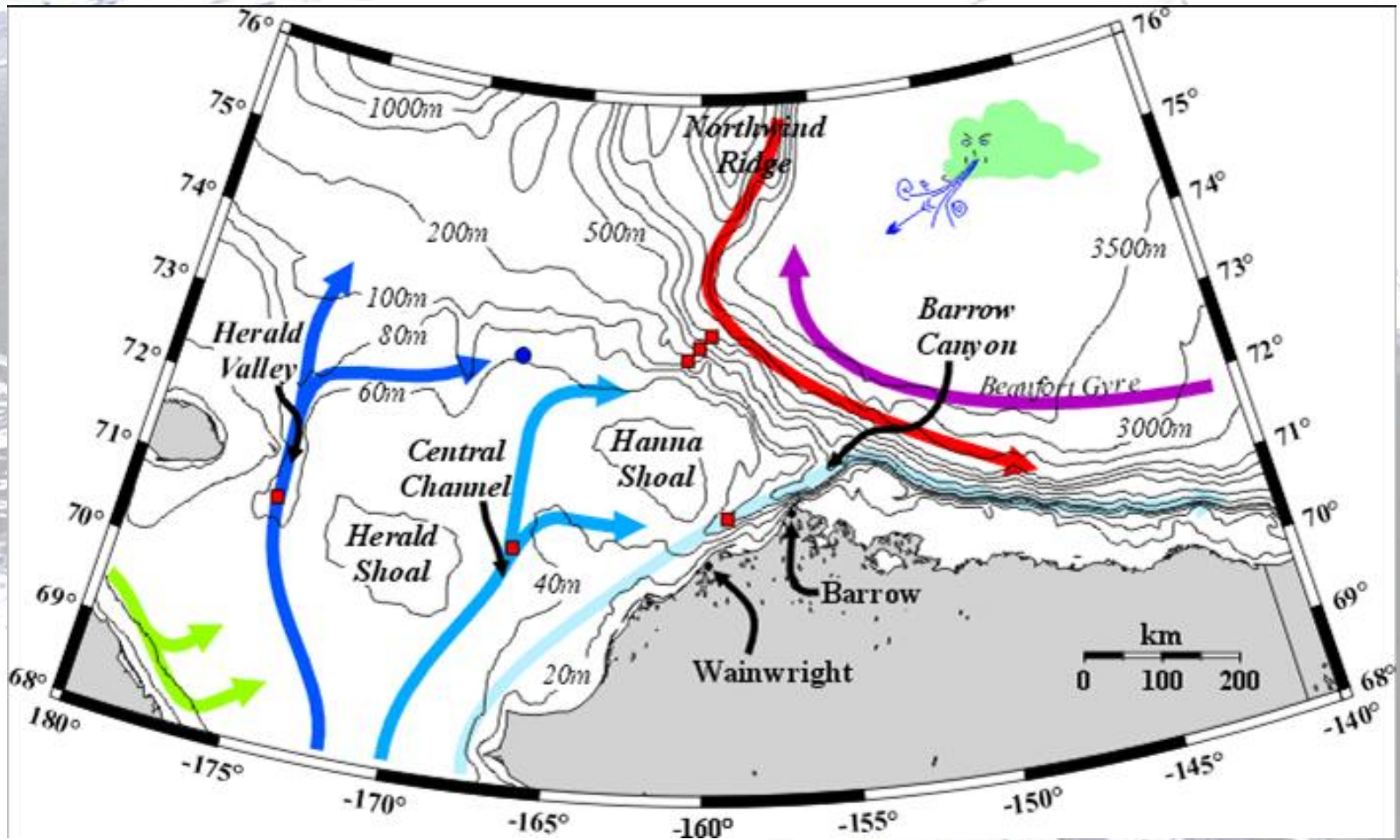
- Bowhead Feeding Variability in the Western Alaska Beaufort Sea
- Pinniped Movements and Foraging: Bearded Seals
- Pinniped Movements and Foraging: Walrus Habitat Use in the Potential Drilling Area (Chukchi)
- Demography of Polar Bears Summering on Shore in Alaska
- Population and Sources of Recruitment in Polar Bears
- Migration and Habitat Use by Threatened Spectacled Eiders in the Eastern Chukchi Near and Offshore Environment



Studies Proposed for FY 2011 and FY 2012

* This presentation does not constitute a commitment by MMS to conduct or fund any or all of these studies. The scope of the studies is subject to change prior to initiation of any work.

Hanna Shoal Ecosystem Study



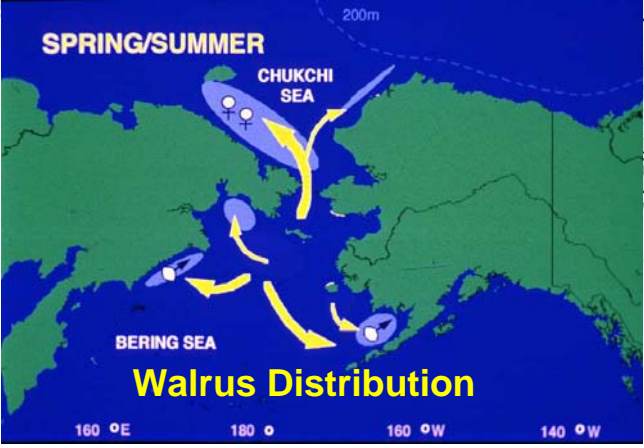
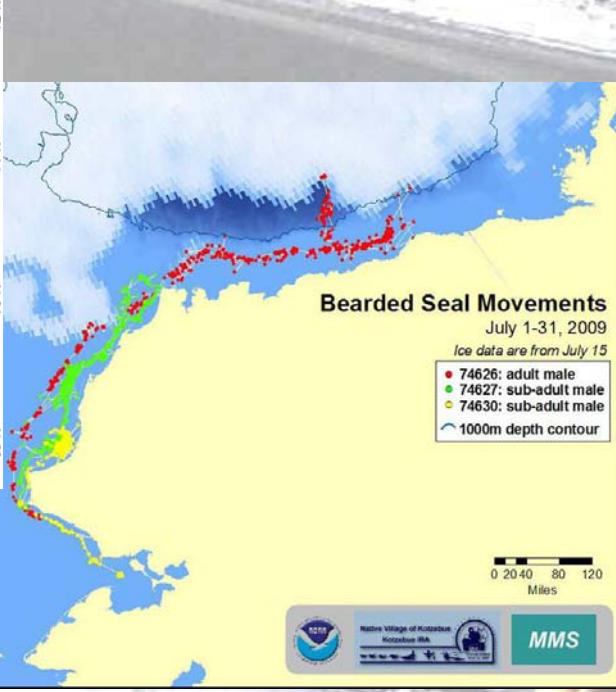
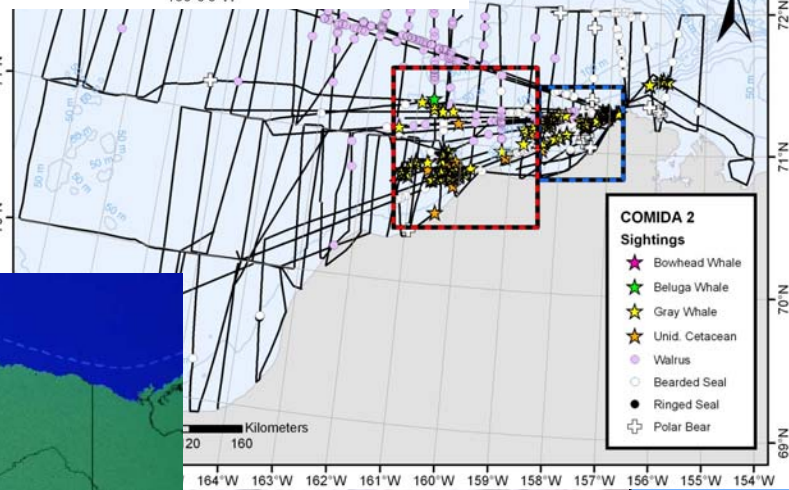
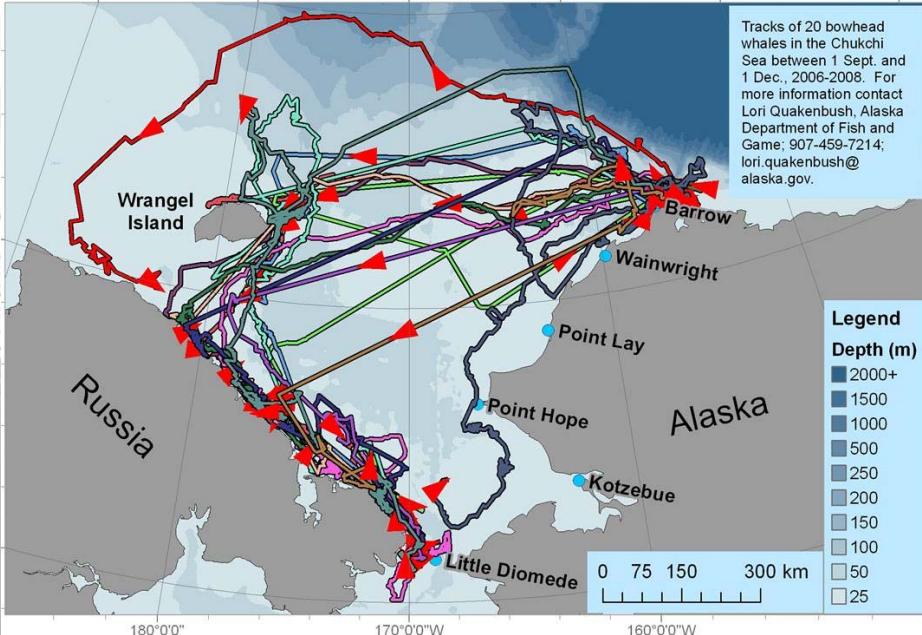
Weingartner, <http://www.ims.uaf.edu/chukchi/>

Hanna Shoal Ecosystem Study

Objectives include:

- Documenting circulation and density fields around Hanna Shoal
- Measuring and evaluating ecosystem productivity and biomass
- Enhance and expand the food web/contaminant bioaccumulation structure developed in the COMIDA CAB study

Marine Mammal / Physical Oceanography Synthesis



Natrional Marrine Mammal Lab, Seattle, WA

An aerial photograph of a coastal region, likely the Chukchi Sea, showing a wide river delta with multiple channels flowing into the ocean. The water is a mix of light blue and white, indicating shallow depths and wave activity. The sky is a pale, hazy blue.

Marine Mammal / Physical Oceanography Synthesis

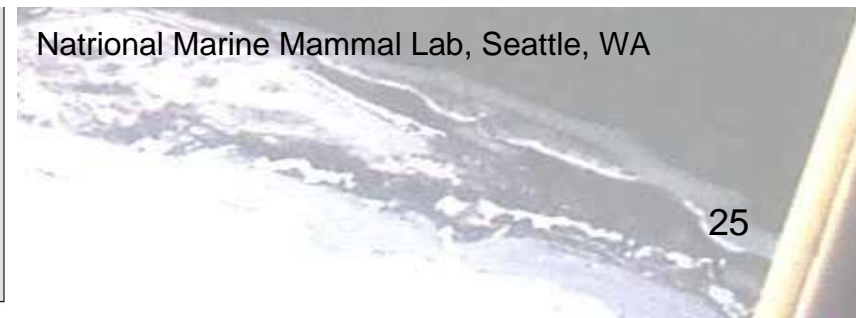
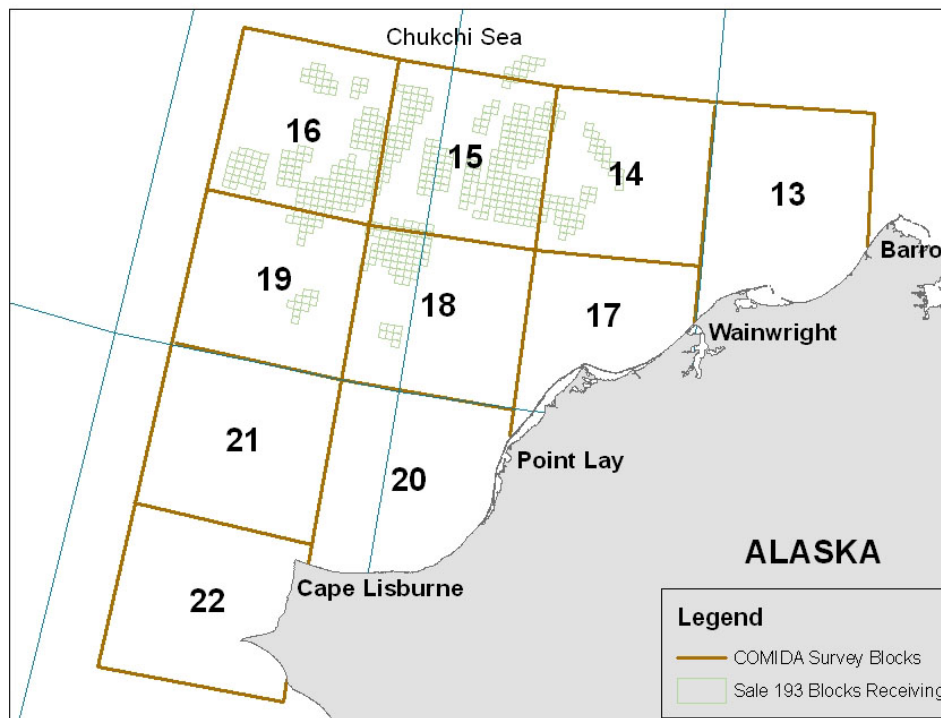
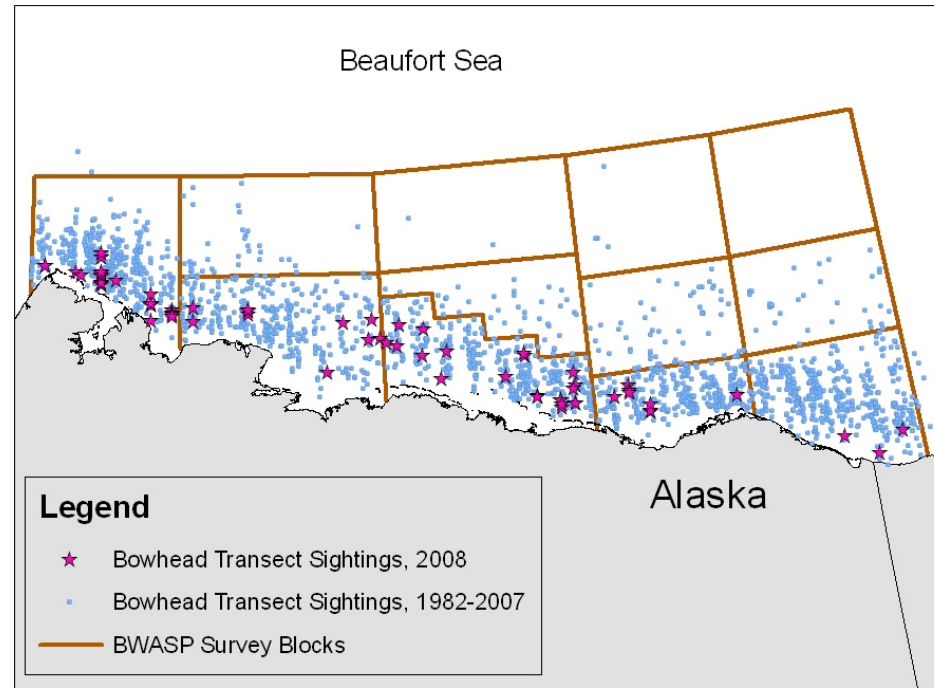
Objectives include:

- Increasing understanding among oceanographic conditions, lower trophic prey species and marine mammal distribution and behavior in the Chukchi
- Enhancing capability to predict future changes in these factors

Monitoring the Distribution of Arctic Whales (COMIDA/BWASP Extension)



BWASP Bowhead Whale Transect Sightings, 1982-2008



Monitoring the Distribution of Arctic Whales

Objectives include:

- Continuing long-term monitoring conducted by MMS since 1987 that is based on similar work dating to 1979
- Monitoring temporal and spatial trends in the distribution, relative abundance, habitat, and behaviors (especially feeding) of endangered whales in arctic waters

Distribution of Fish, Crab and Lower Trophic Communities in the Chukchi Sea Lease Area

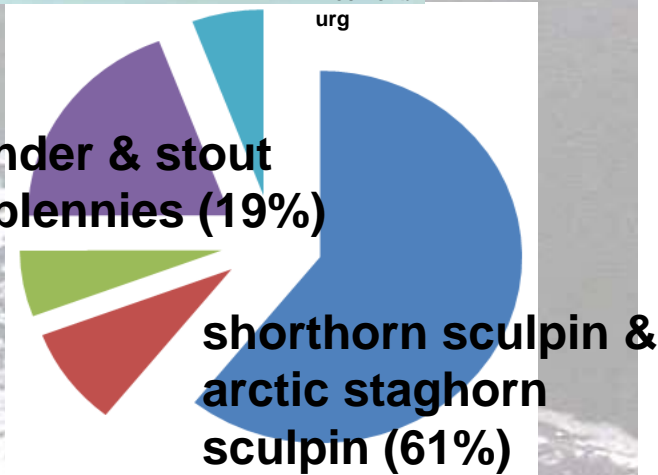
2004 (Norcross et al. 2009)

1990 (Barber et al. 1997)



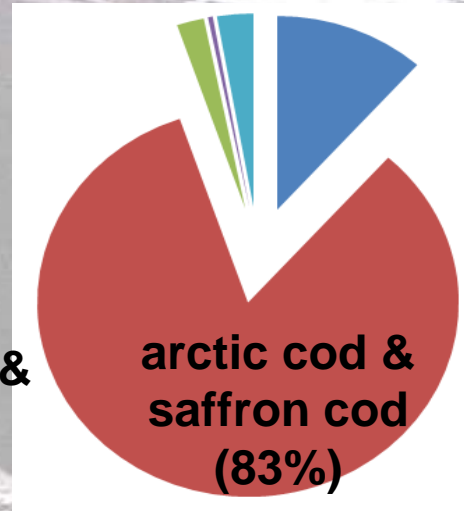
Mecklenburg

slender & stout eelblennies (19%)



Mecklenburg

shorthorn sculpin & arctic staghorn sculpin (61%)



Sheiko

Demersal fish composition

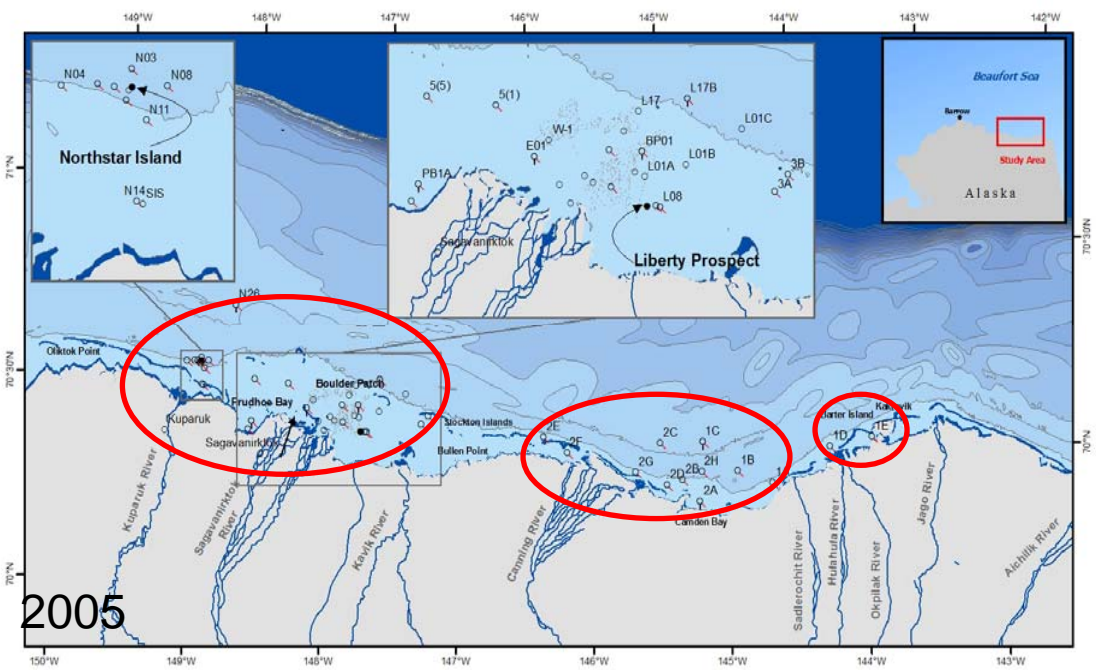
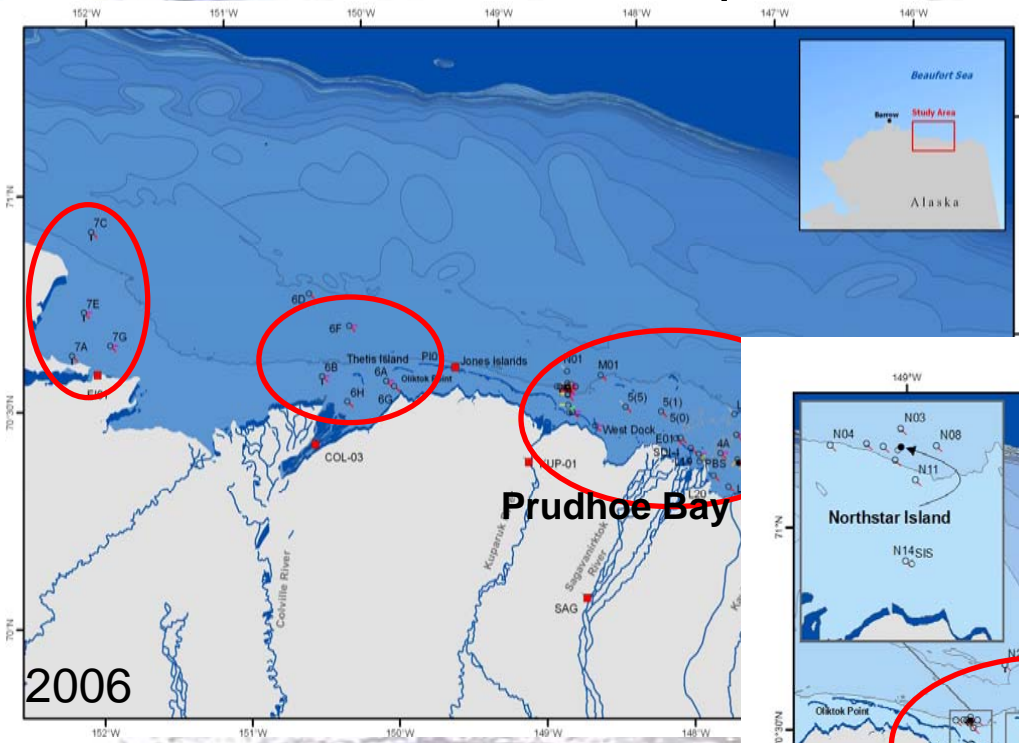
■ sculpin ■ cod ■ flatfish ■ prickleback ■ other

Distribution of Fish, Crab and Lower Trophic Communities in the Chukchi Sea Lease Area


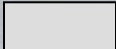

Objectives include:

- Documenting the distribution of pelagic and demersal fish and invertebrate communities in the Chukchi Sea lease area
- Providing a comparison of these communities with that of prior studies, as well as adjacent regions (Beaufort and Bering Seas)

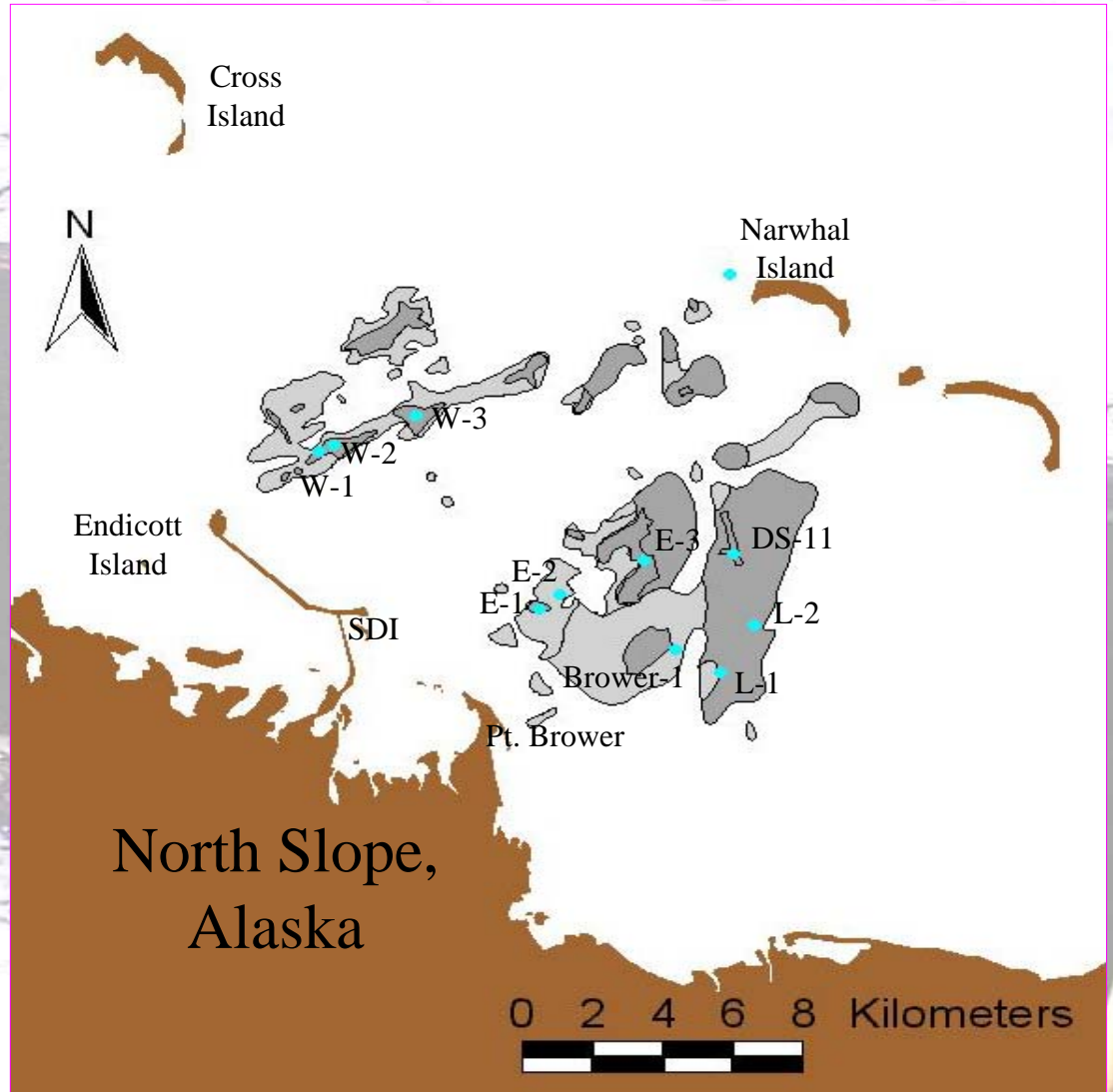
ANIMIDA III: Contaminants, Sources, Bioaccumulation



Stefansson Sound Boulder Patch

-  = >25% boulder cover
-  = Between 10-25% boulder cover
-  = Historical and cANIMIDA permanent sampling sites

Boulder cover based on
Geologic survey conducted
In 1999 (Ban *et al.*)



ANIMIDA III: Contaminants, Sources, Bioaccumulation

Objectives include:

- Continuing the Arctic Nearshore Impact Monitoring in Development Area (ANIMIDA) and continuation of ANIMIDA (cANIMIDA) started in 1999 to monitor chemical contamination, turbidity and Boulder Patch productivity in the vicinity of oil industry development in the Beaufort Sea OCS
- Improving ANIMIDA/cANIMIDA conceptual models of suspended sediment behavior and bioaccumulation

Cape Lisburne Seabird Colony Productivity and Foraging Areas (FY 2012)



USFWS Lisa Sheffield



USFWS Max Kauffman

Cape Lisburne Seabird Colony Productivity and Foraging Areas (FY 2012)

Objectives include:

- Estimating productivity of Common and Thick-billed Murres and Black-legged Kittiwakes at the Cape Lisburne colony to establish a current baseline
- Comparing the data to results of older surveys

Topical Areas for Future Studies Related to Climate Change

- Changes to both physical oceanography and ecosystem productivity caused by loss of sea ice cover
- Ramifications of loss of sea ice for marine mammals, bird and fish species that live on, below, or near the ice
- Effects on ocean circulation due to changes in climatological factors such as winds and river runoff and sea ice coverage

Topical Areas for Future Studies Related to Climate Change

- Socio-economic issues including:
 - increased shoreline erosion and permafrost melt that threatens arctic villages and infrastructure
 - changes in distribution and availability of hunted subsistence species
 - potential changes in commercial and subsistence fisheries as commercial species such as salmon move north

The Alaska OCS Region Environmental Studies Plan

- The Alaska Annual Studies Plan is published each year in late summer and includes a letter to stakeholders soliciting suggestions for new studies for the following year.
- It is posted on our webpage:
<http://www.mms.gov/alaska/ess/index.htm>
- Send email to Heather.Crowley@mms.gov to be placed on the mailing list

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