U.S. Department of the Interior
Bureau of Ocean Energy Management

Science for Informed OCS Decisions

OCS Scientific Committee
May 2014

James F. Bennett, Chief
Division of Environmental Assessment
Office of Environmental Programs

What Drives BOEM's Agenda?

Multiple Uses of the OCS

- Oil and Gas
- Marine Minerals
- Renewable Energy

BOEM Environmental Programs

Environmental Assessment

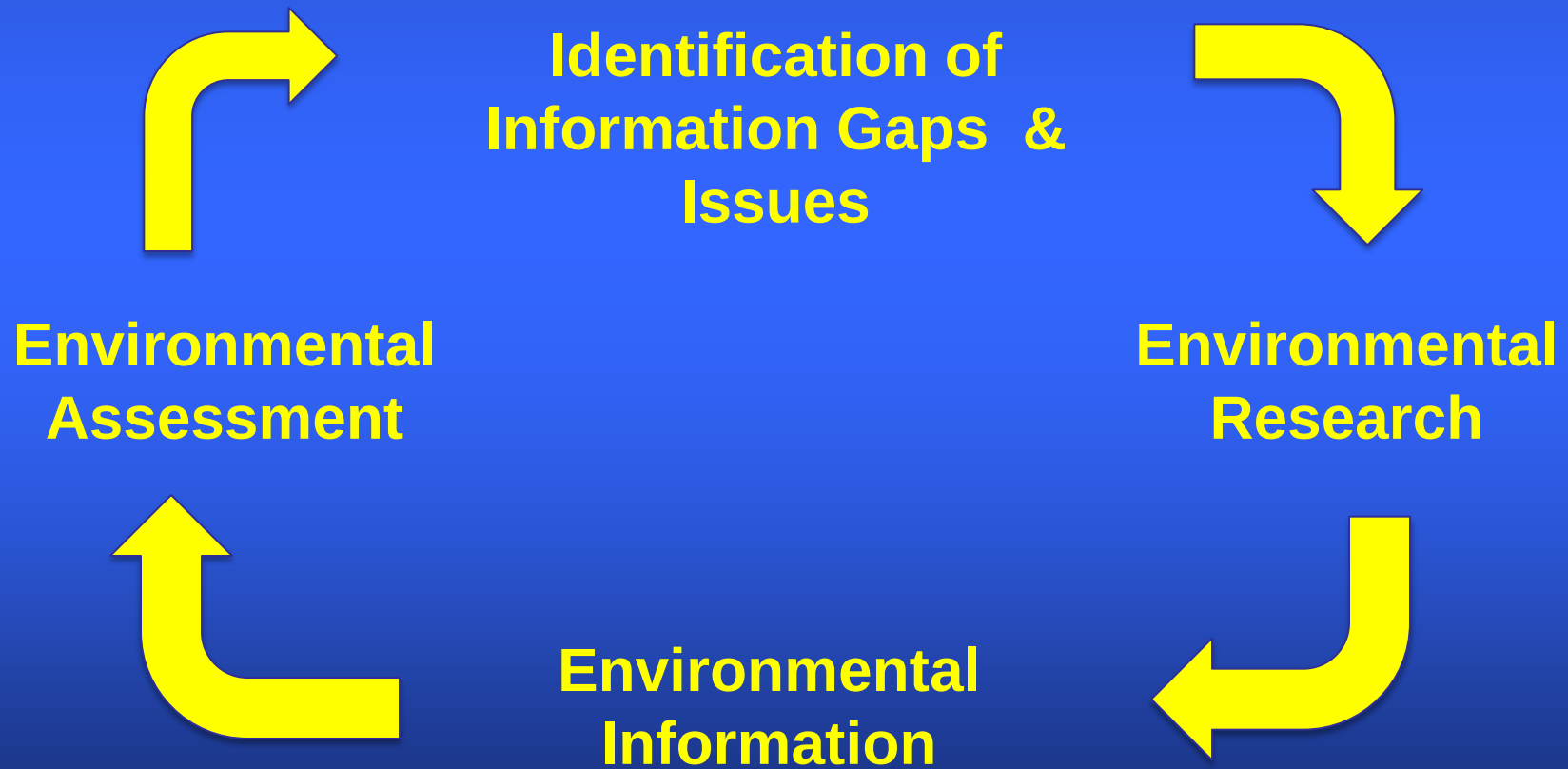
Our Mandate:

Protect the environment and develop information necessary to assess and manage environmental impacts on the human, marine, and coastal environments.

Environmental Studies

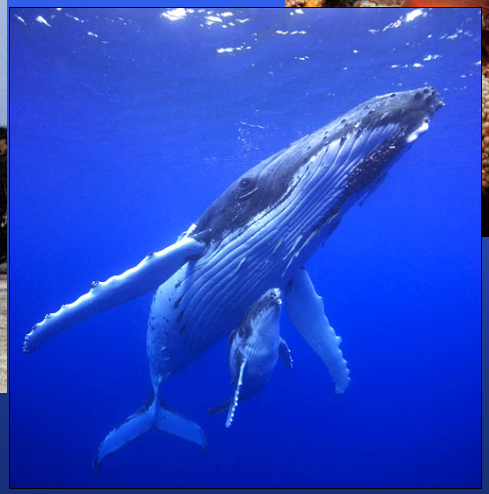
BOEM
Bureau of Ocean Energy Management

Linkage Between Environmental Assessment & Environmental Science



What Informs OCS Decisions?

- Consultations
- Science/Studies
- Environmental Compliance Monitoring
- BOEM Subject Matter Experts



Subsistence Mapping of Nuisquit, Kaktovik, and Barrow

MMS OCS Study No. 2009-003

Map 7 - Overlapping Polygon Example Barrow, Kaktovik, and Nuiqsut

This map represents Barrow, Kaktovik, and Nuiqsut subsistence use areas from 1995 through 2006 for all resources.

Source: Under contract to the U.S. Department of the Interior, Minerals Management Service, Stephen R. Braund & Associates, in coordination with the North Slope Borough Department of Wildlife Management, local tribal governments and local harvesters, selected active and knowledgeable harvesters to interview in the following communities:

Barrow: 75 harvesters in February, March, April and December 2006.
Nuiqsut: 33 harvesters in November 2004, November 2005 and November, December 2006.
Kaktovik: 38 Kaktovik harvesters in June 2005, November 2005 and November 2006.

Overlapping Subsistence Use Areas

High
Low

3,920 use areas reported by 146 respondents

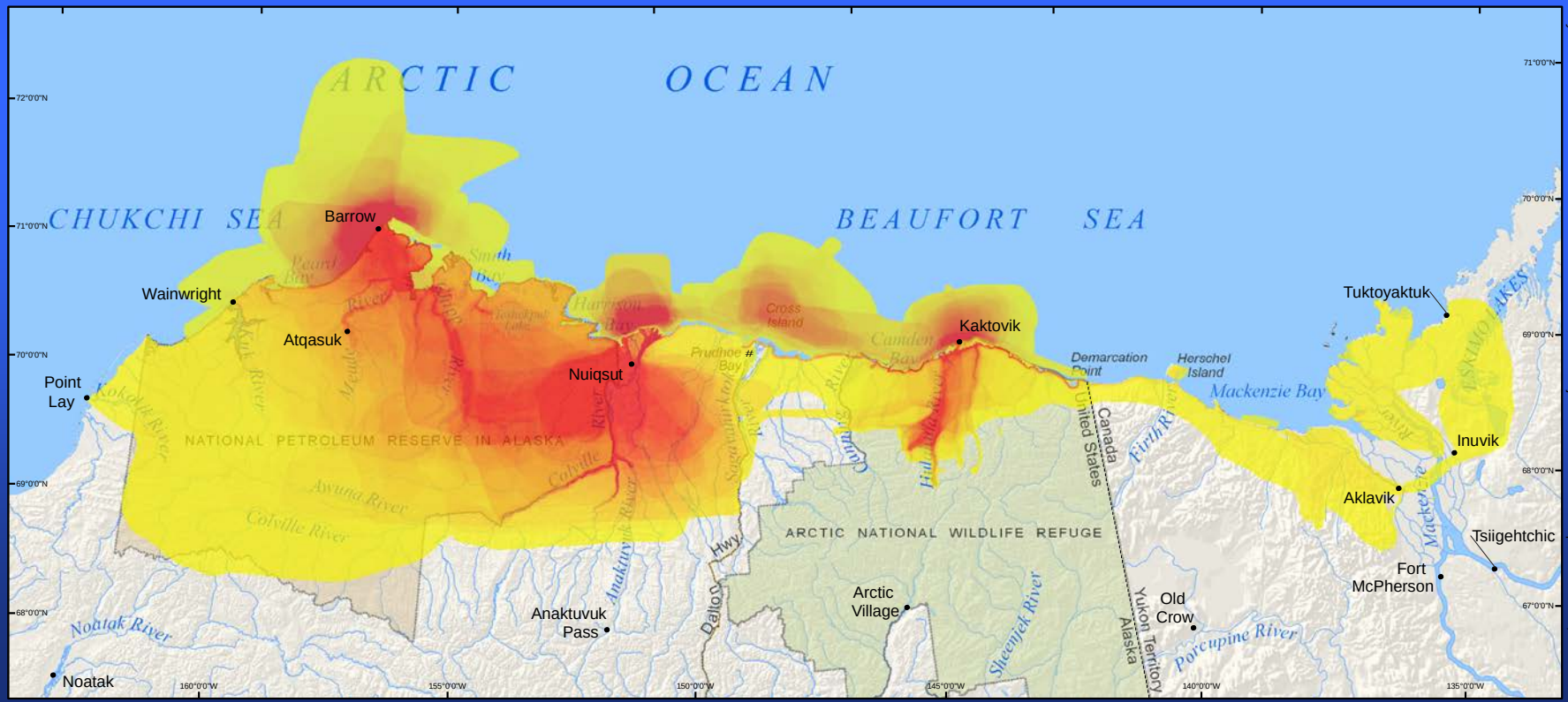
Arctic National Wildlife Refuge
National Petroleum Reserve In Alaska

Other areas may have been used for resource harvesting.

Some areas shown on this map may have been used while respondents visited or lived in other communities

0 25 50 100 Miles
0 25 50 100 Kilometers

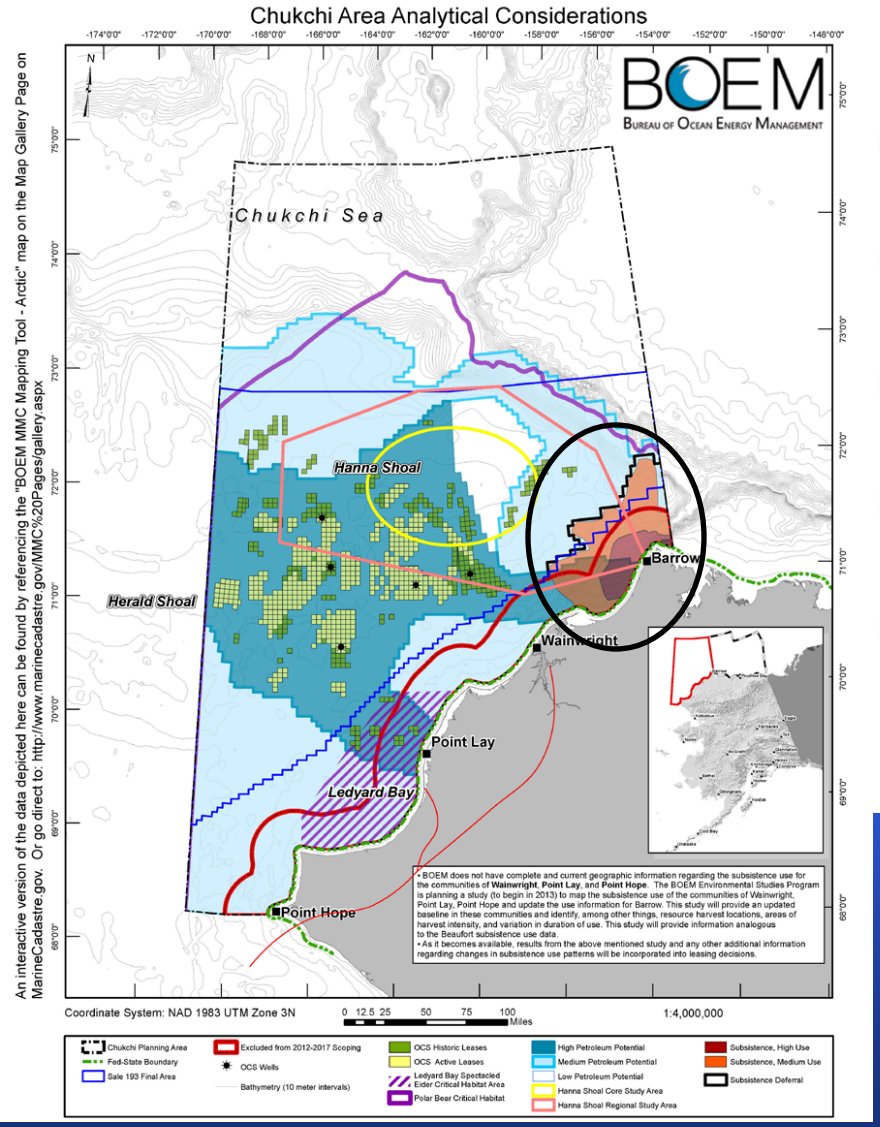
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
907-276-8222 907-276-6117 (fax) srba@alaska.net



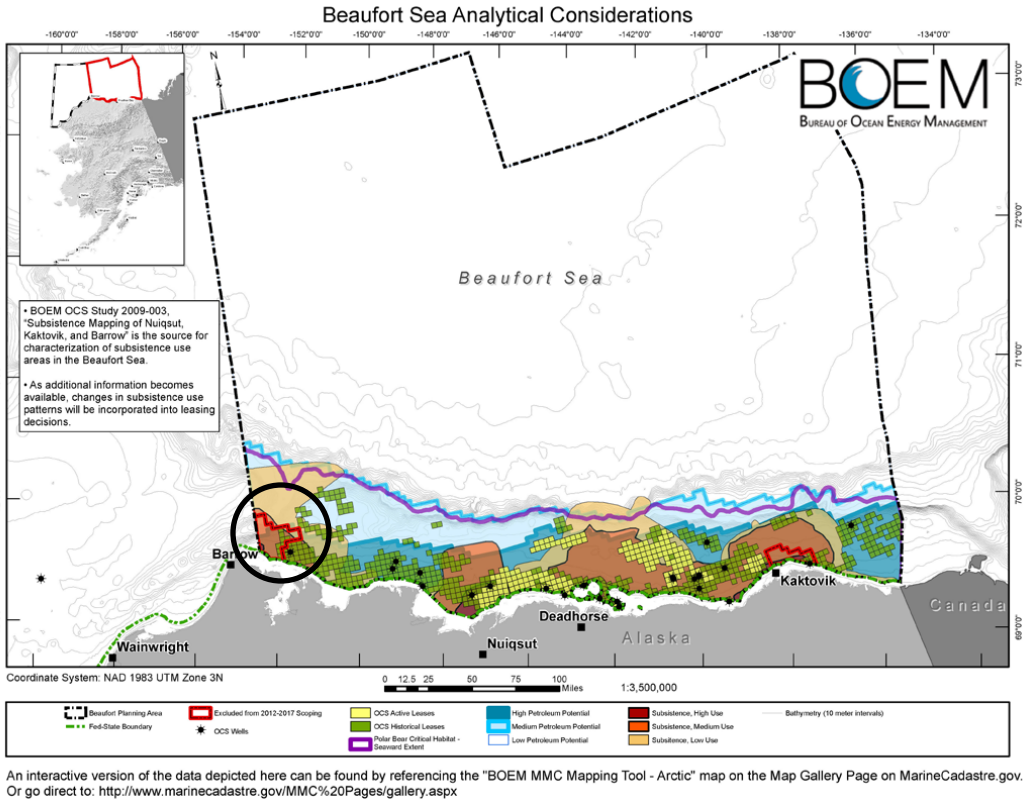
July 2009

Projection: Alaska Albers Equal Area Conic. NAD 1983

2012-2017 5-Year Program



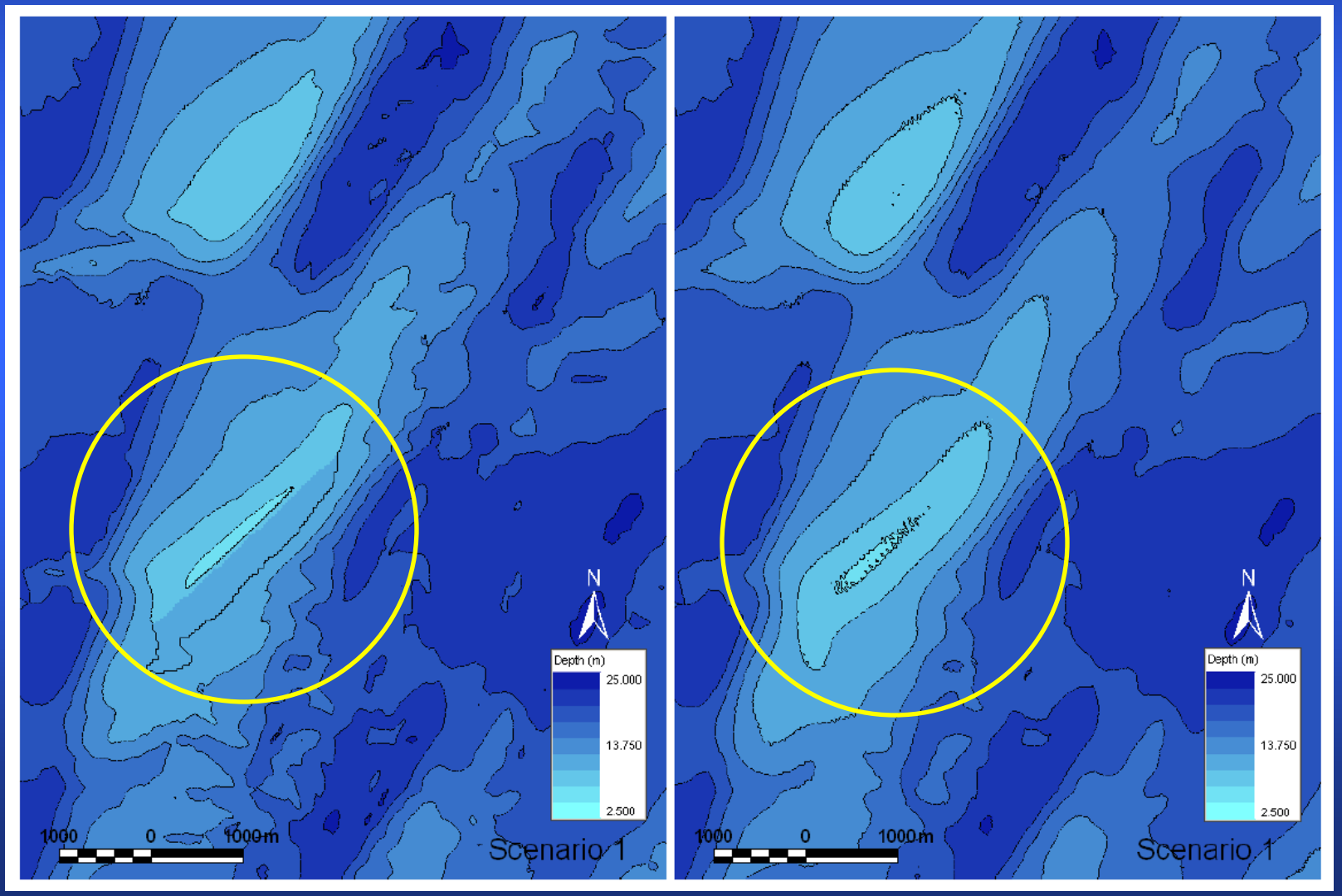
An interactive version of the data depicted here can be found by referencing the "BOEM MMC Mapping Tool - Arctic" map on the Map Gallery Page on MarineCadastre.gov. Or go direct to: http://www.marinecadastre.gov/MMC%20Pages/gallery.aspx



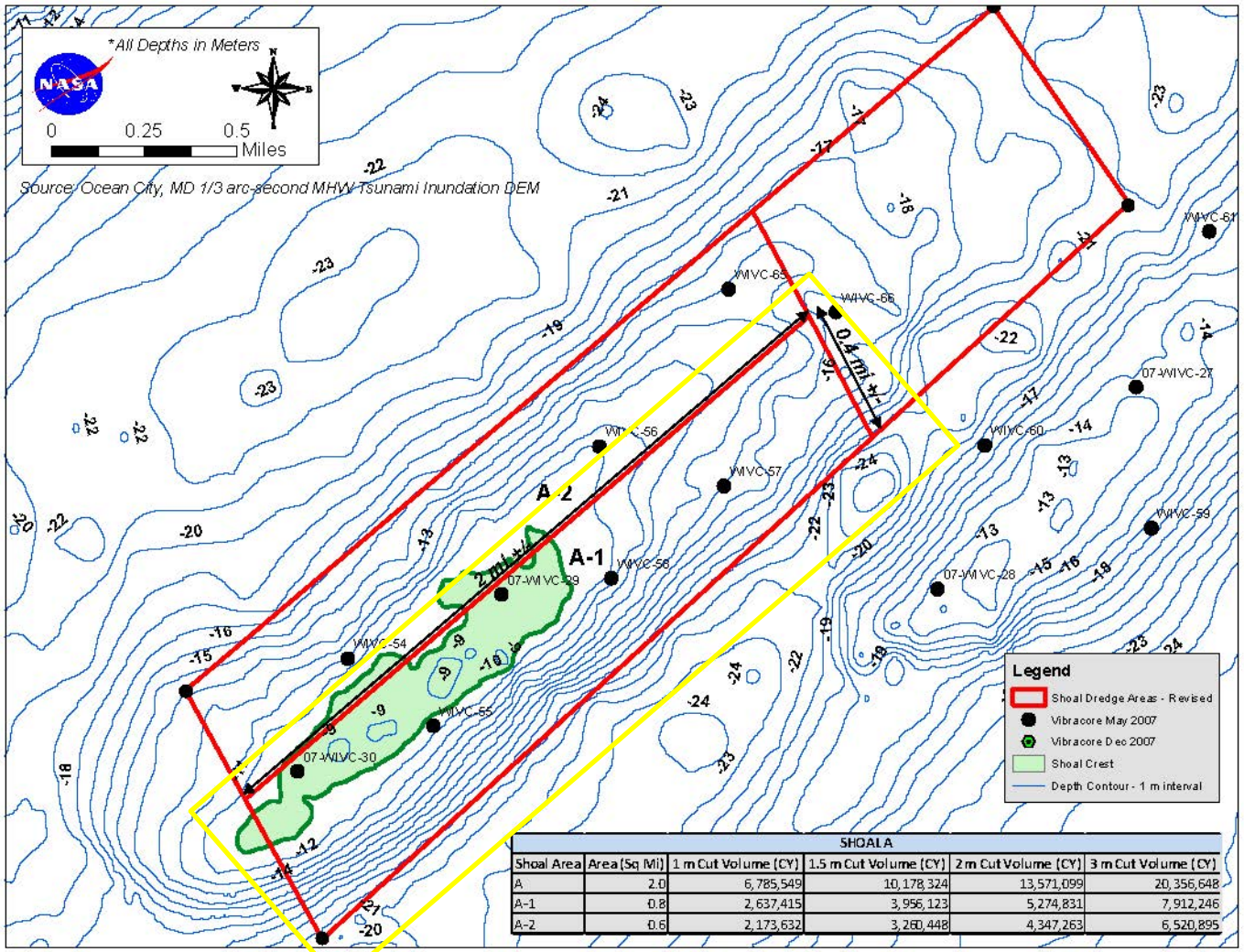
An interactive version of the data depicted here can be found by referencing the "BOEM MMC Mapping Tool - Arctic" map on the Map Gallery Page on MarineCadastre.gov. Or go direct to: http://www.marinecadastre.gov/MMC%20Pages/gallery.aspx

Arctic Subsistence Use Deferral Areas: Beaufort and Chukchi

Investigation of dredging guidelines to maintain and protect the geomorphic integrity of offshore ridge and shoal regimes: Detailed morphological evaluation of offshore shoals MMS OCS Study No. 2011-025



Investigation of dredging guidelines to maintain and protect the geomorphic integrity of offshore ridge and shoal regimes: Detailed morphological evaluation of offshore shoals MMS OCS Study No. 2011-025



SHOALA					
Shoal Area	Area (Sq Mi)	1 m Cut Volume (CY)	1.5 m Cut Volume (CY)	2 m Cut Volume (CY)	3 m Cut Volume (CY)
A	2.0	6,785,549	10,178,324	13,571,099	20,356,648
A-1	0.8	2,637,415	3,956,123	5,274,831	7,912,246
A-2	0.6	2,173,632	3,260,448	4,347,263	6,520,895

Applied Science Informs…

- Regulations
- NTLs
- Lease Stipulations
- Plan Conditions of Approval

BOEM
Bureau of Ocean Energy Management

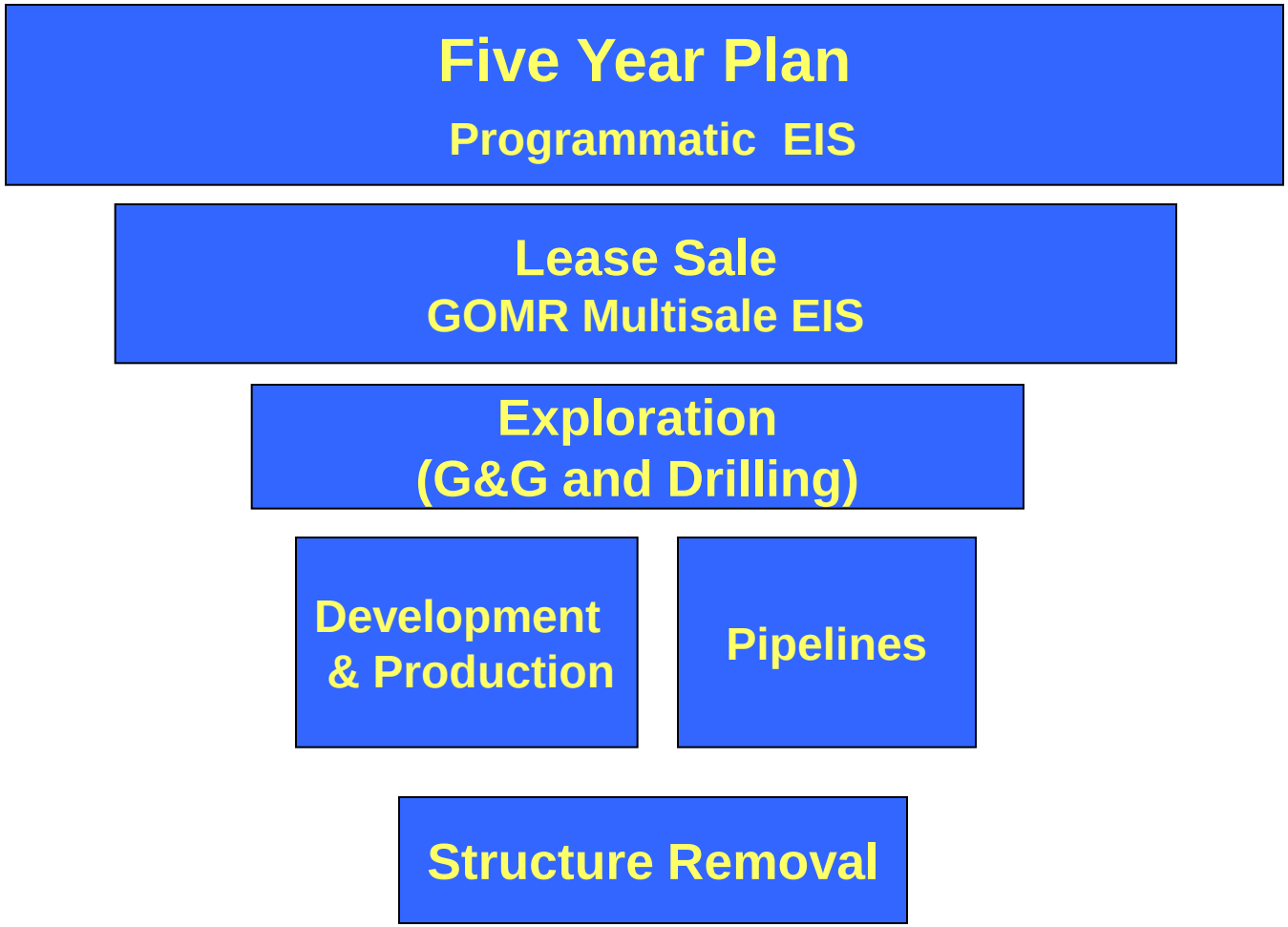
U.S. Department of the Interior
Bureau of Ocean Energy Management

Science for Informed OCS Decisions

OCS Scientific Committee
May 2014

Joe Christopher
Regional Supervisor for Environment
Gulf of Mexico OCS Region

GOM OCS Region Environmental Workload



Pre- Lease Activities:
10-12 GOMR EISs over 5-Year Program

Post Lease Activities:
Avg ~350 GOMR plan/permit reviews annually (Range of 175-820 plan/permit reviews annually)

GOM and Atlantic Consultation Workload

Federal Water Pollution Control Act

Marine Mammal Protection Act

National Historic Preservation Act

National Marine Sanctuary Act

NEPA

Tribal Consultation

E.O. 12898: Environmental Justice

Clean Air Act

Coastal Zone Management Act

Magnuson-Stevens Fishery Conservation and Management Act

Endangered Species Act

Applied Science to Inform NEPA Needs

Input to Study Development

Examples:

– Information Gaps

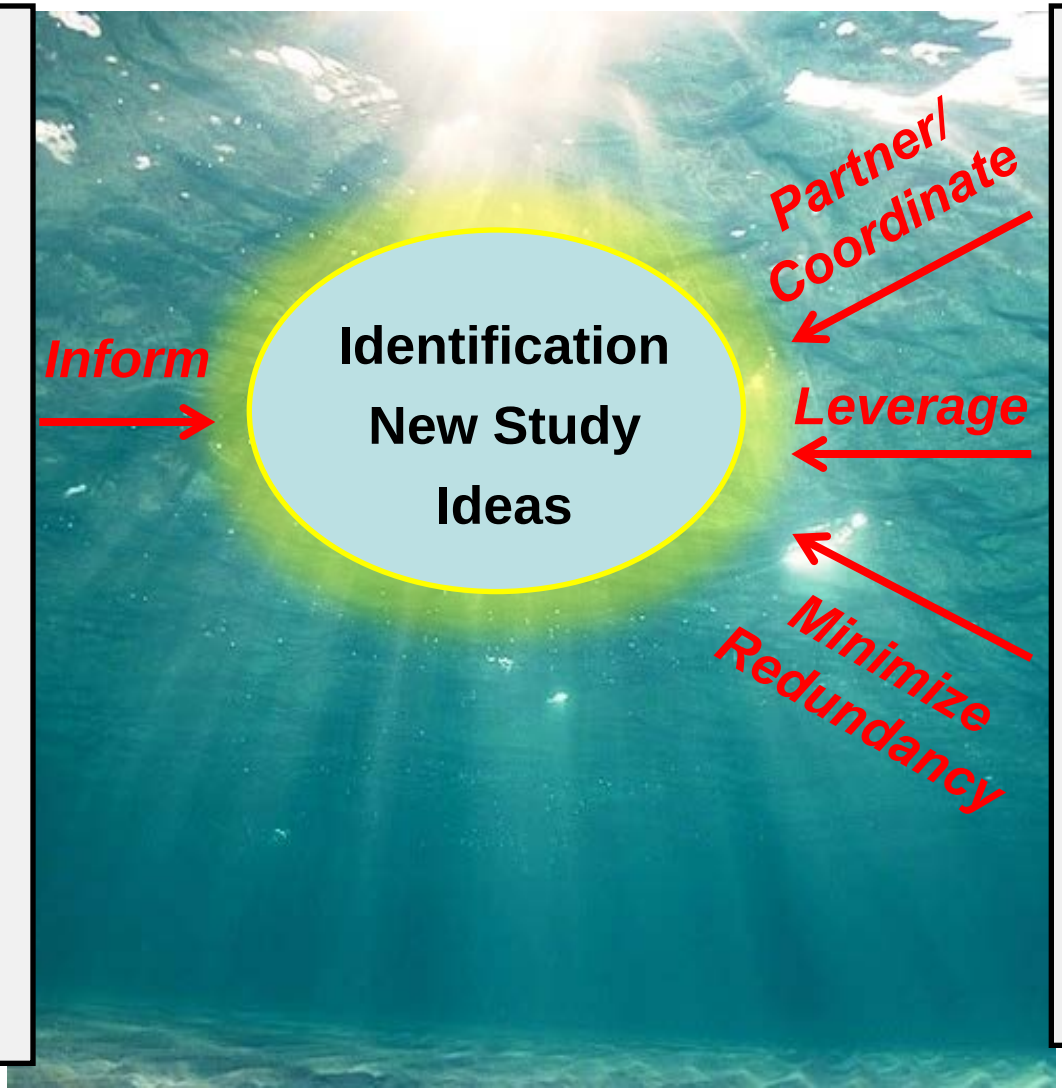
– Public Comments

– Rulemaking

– NTL's

– Lawsuits

– Nat. Ocean Policy



External Science Programs

Examples:

– NOAA

– USGS

– RESTORE

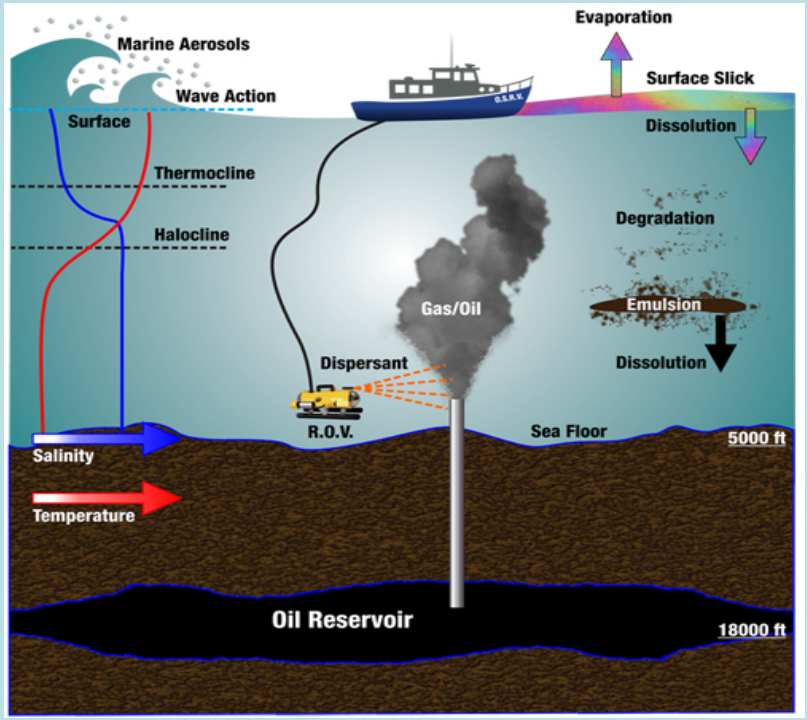
– GOMRI

– NRDA

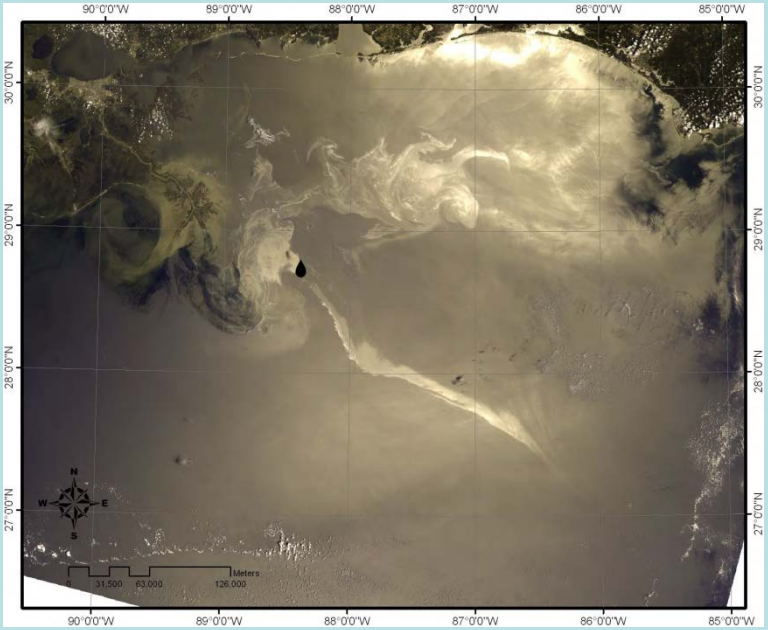
Studies Example #1 – *Oil Spill Research*

- **Need:** Post-DWH, environmental analyses required improved 3D spill modeling and understanding of sub-sea dispersant injection.
- **Application:** OSRA, NEPA, National Historic Preservation Act, …

Study GM-11-02: Next-Generation Spill Model & Scenario Runs



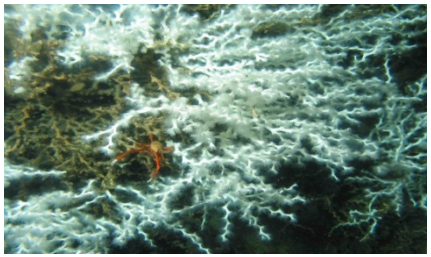
Study GM-12-02: Remote Sensing of Surface Oil Transport and Fate



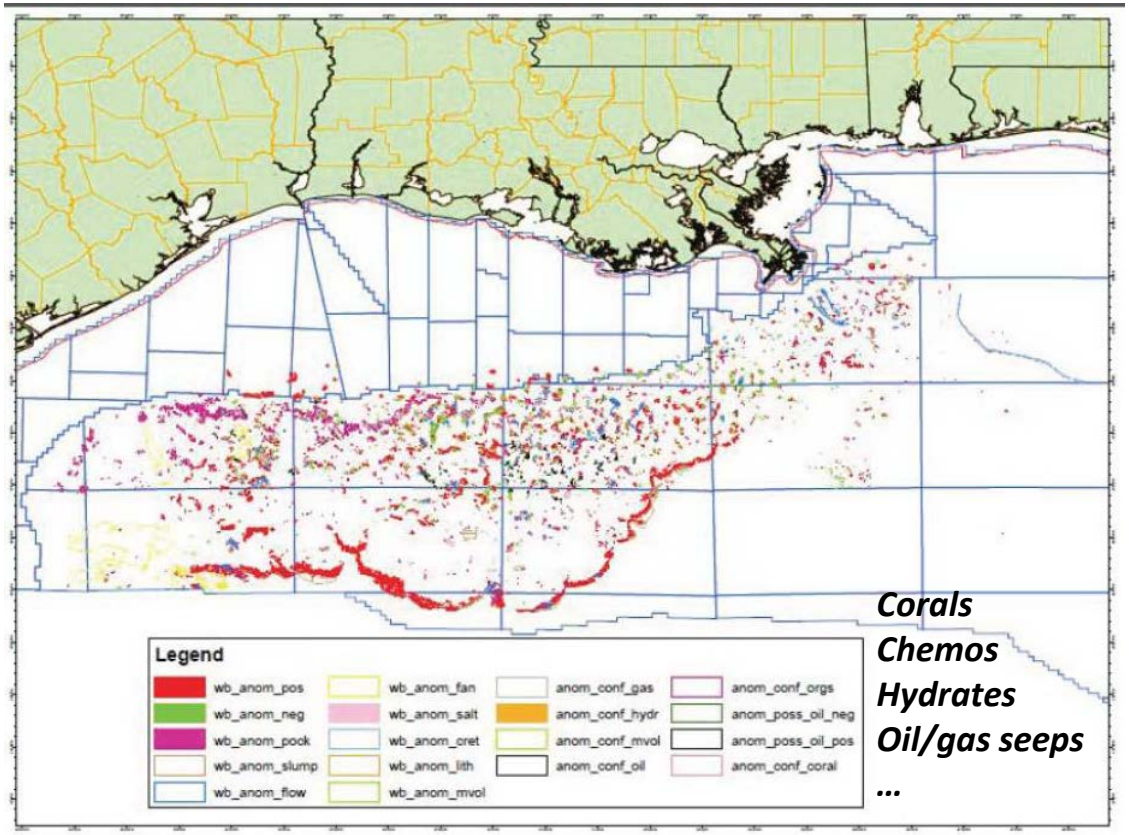
Studies Example #2 – *Benthic Habitat*

Studies Mapping and Characterizing Benthic Habitat

→ 1984 MMS Study Discovered Gulf Deepwater Chemos



→ Numerous Studies Since have Provided Ground-Truthing of Seismic Water Bottom Anomalies (e.g., *Lophelia* I & II)



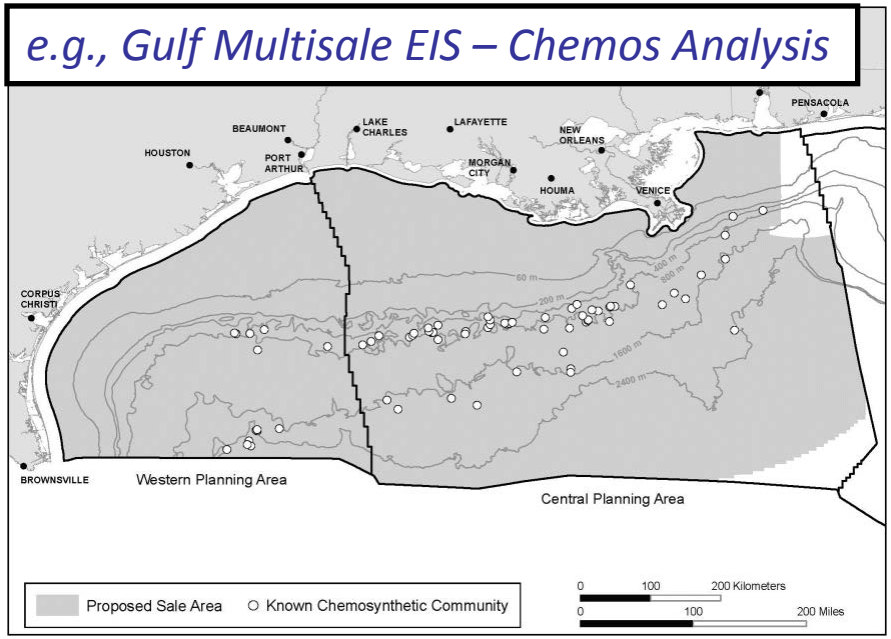
Studies Example #2 – *Benthic Habitat*

(cont'd.)

→ Directly Relevant to Environmental Analyses:

1) Inform pre-lease NEPA reviews regarding proposed activities.

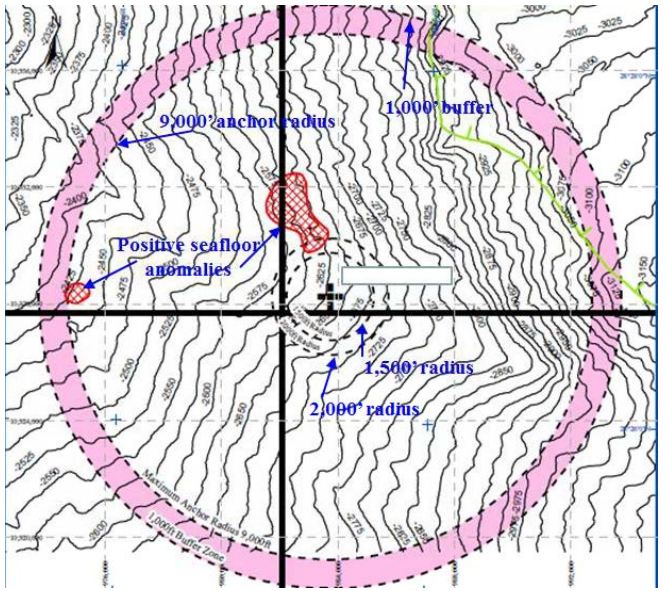
e.g., Gulf Multisale EIS – Chemos Analysis



2) Resulted in NTL guidelines:

NTL 2000-G20 "DW Chemos"
NTL 2009-G40 "DW Benthos"

3) Provide datasets for Biological Seafloor Plan Reviews.



Studies Example #3 – *Marine Sound*

Studies of Anthropogenic Noise Impacts on Protected Species

- 2004 Sperm Whale Seismic Study in GoM
- 2008 Seismic Survey Mitigation Measures and Marine Mammal Observer Reports
- 2009 Characterization & Potential Impacts of Noise Producing Construction and Operation Activities on the OCS
- 2013 Pressure Wave & Acoustic Properties Generated by Explosive Structure Removals

Informed NEPA, MMPA Consultations, Rulemaking, & NTL 2012-G02 "Seismic Survey Mitigation Measures & Protected Species Observer Program"

U.S. Department of the Interior
Bureau of Ocean Energy Management

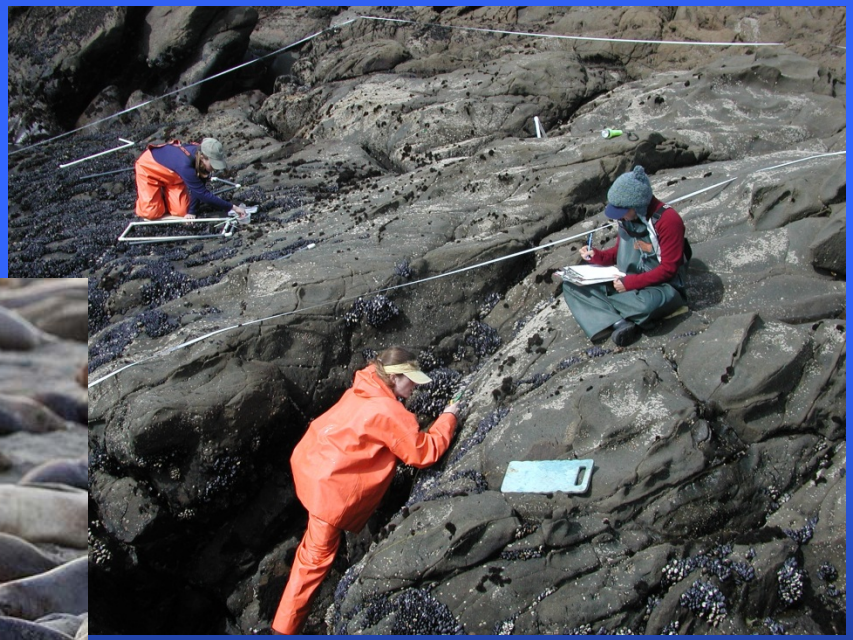
Science for Informed OCS Decisions

OCS Scientific Committee
May 2014

Rick Yarde
Regional Supervisor for Environment
Pacific OCS Region

Building a Solid Science Foundation for Renewable Energy Projects in Oregon

- Seabird and Marine Mammal Surveys off the Northern California, Oregon and Washington Coasts
- Survey of Benthic Communities in the Pacific Northwest
- Oregon OCS Seafloor Mapping



U.S. Department of the Interior
Bureau of Ocean Energy Management

Science for Informed OCS Decisions

OCS Scientific Committee
May 2014

Lisa Toussaint
Regional Supervisor for Environment
Alaska OCS Region

Practical Application of Studies

Marine Mammals

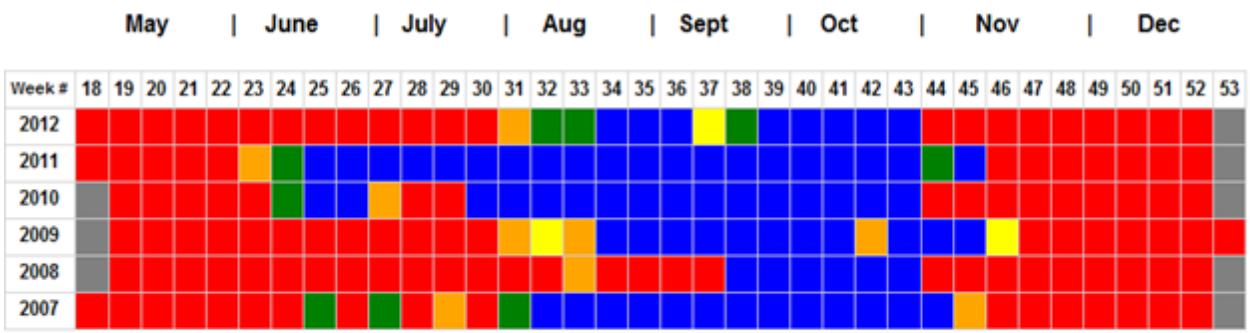
Source: NOA Fisheries Service (2009)

- Sea Ice Analysis
- Aerial Surveys of Arctic Marine Mammals
- Subsistence Mapping

- BOEM developed a mitigation measure for late season drilling operations in 2012 to address concerns about oil-spill clean up capabilities during hazardous ice conditions in the Chukchi Sea.
- The measure provided greater opportunity for oil spill cleanup and response time in ice-free conditions.
- BOEM used 2007-2011 interpreted data from the National Ice Center (NIC) in the BOEM Sea Ice Database to calculate a “trigger date”. The trigger date is an estimate of when the first ice could encroach on the drill site.
- Mitigation measure: drilling in hydrocarbon zone to cease 38 days before “trigger date” (e.g., Shell drilling in Chukchi had to be done by late Sept)

BOEM
Bureau of Ocean Energy Management

Ice Concentration within Twenty Kilometers of Proposed Drilling Activities in 2012



Weekly Max Percentage of Ice Incursion Into Input Polygon

- 0 Ice Free
- Between 1 and 24%
- Between 25 and 49%
- Between 50 and 74%
- Between 75 and 100%
- No Data

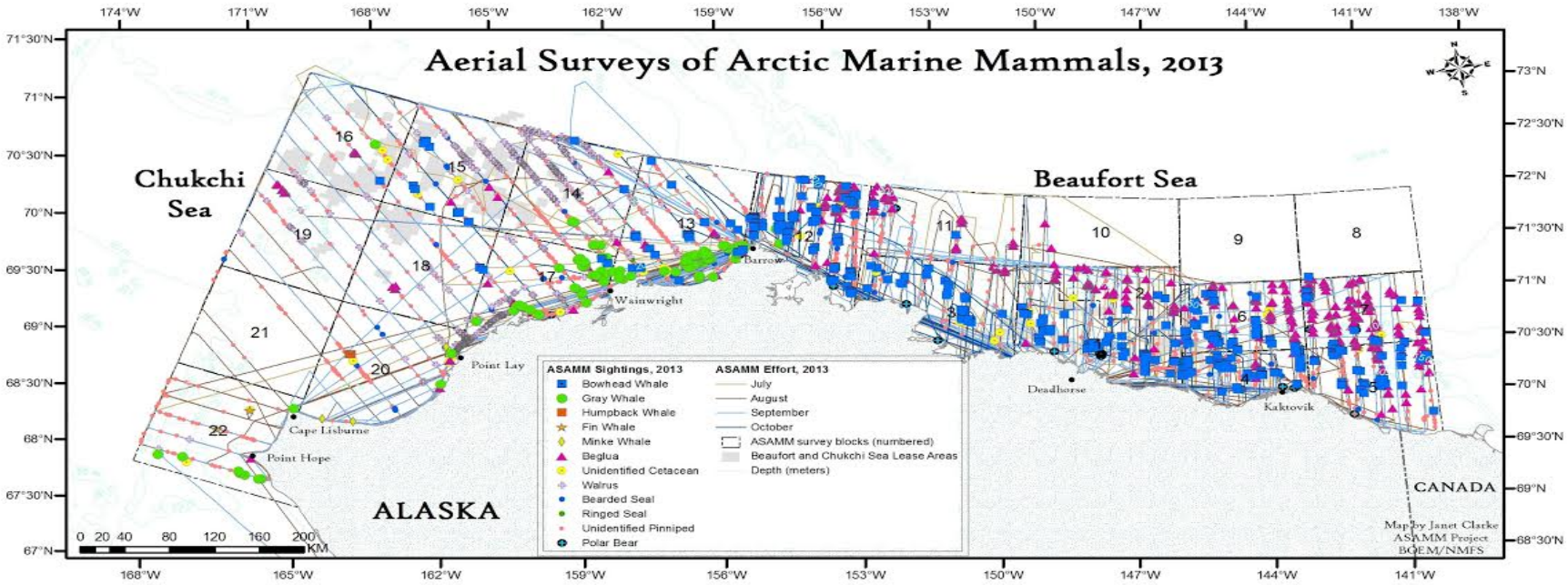
Centerpoint of Target Area = 71.294 N and -163.136 W
Radius = 20 Kilometers

Data Source: U.S. National Ice Center Archived Products

New Study to Enhance Analytical Capabilities of BOEM Sea Ice Database

- Incorporate additional variables that contribute to the melting and freezing of sea ice, such as:
  - Atmospheric wind speed/direction, air temperature and derived quantities
  - Oceanographic: current speed/direction, water column measurements, etc.
  - Sea Ice: concentration, thickness, speed, direction

Aerial Surveys of Marine Mammals in the Beaufort and Northeastern Chukchi Seas



- BOEM supported aerial surveys in Beaufort since 1979 & Chukchi 1982-91 & 2008 on
- Covers 230,000 km^2 using 2 twin engine aircraft
- Costs ~$2 M/year
- Info obtained:
  - Distribution & relative abundance of marine mammals from July through mid-Oct
  - Annual fall bowhead whale migration route
  - Identifies potential displacement of whales during oil & gas activities

BOEM
Bureau of Ocean Energy Management

Aerial Surveys of Arctic Marine Mammals in the Beaufort and Northeastern Chukchi Seas

This important study provides:

- Monitoring for MMPA & ESA compliance
- Information used in IHAs (abundance for “take”, population impact)
- Basis for Environmental Resources Areas for use in OSRA analysis
- Basis for Lease Sale Stipulations
  - Protection of Biological Resources
    - Monitor short- & long-term changes in numbers, distribution, migratory routes
    - Provide real-time data & maps of results
    - Relocate operations/alter times of operation to minimize impacts
  - Industry Site-Specific Monitoring of Subsistence Resources
    - Monitoring areas of oil & gas activities to minimize disruption to resources
  - Conflict Avoidance Mechanisms to Protect Subsistence Harvesting

U.S. Department of the Interior
Bureau of Ocean Energy Management

Science for Informed OCS Decisions

OCS Scientific Committee
May 2014

Michelle Morin, Chief
Environment Branch for Renewable Energy

Where in the environmental assessment process do we use environmental studies?

- Developing the proposed action and alternatives (Area Identification)
- Describing the affected environment (Site Assessment and Characterization)
- Analyzing impacts (Construction and Operations)
- Developing mitigation measures (Construction and Operations)

Planning and Analysis Stage

- Area Identification of Wind Energy Areas
  - Selection of area to reduce environmental and use conflicts
  - Identification of alternatives
- Environmental Assessments
  - Consider lease issuance, associated site characterization surveys and subsequent site assessment activities (met towers and buoys)

Example: North Carolina Visual Simulations

- 234 offshore wind turbine simulations were created.
- The simulations included:
  - 18 different locations (from Corolla Lighthouse to Sunset Beach);
  - Four lighting conditions (morning, afternoon, starlit night and misty nights);
  - Three distances (10, 15, and 20 nm from shore); and
  - Two turbine models (Siemens 3.6 MW and Vestas 7 MW).
- In cooperation with the National Park Service
- See http://www.boem.gov/Renewable-Energy-Program/State-Activities/NC/Offshore-North-Carolina-Visualization-Study.aspx

Stage: Site Assessment and Characterization

- Site Characterization Survey Guidelines
  - During this phase, a lessee conducts surveys to support submittal of plans
  - BOEM uses this information in the preparation of NEPA documents and consultations
  - Avian, fisheries, benthic habitat, marine mammals, sea turtles, geological, geophysical and archaeological
    See http://www.boem.gov/National-and-Regional-Guidelines-for-Renewable-Energy-Activities/
  - Example: February 2013, BOEM hosted a workshop that brought together European experts to discuss pre-construction information collection for avian, benthic habitat, and archaeological resources
    See http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5305.pdf

Example: Cooperative and Interagency Agreements

- Virginia – collection of geophysical and geological data with VA wind energy area
- North Carolina
  - Cooperative agreement between BOEM and UNC-Chapel Hill
  - Interagency Agreement between BOEM and NOAA
  - Meetings held with commercial and recreational fishermen, dive community, and ecotourism industry
  - Hard bottom habitat identification cruises in Call Area Wilmington East
  - Results will be used to inform BOEM planning efforts and environmental documents

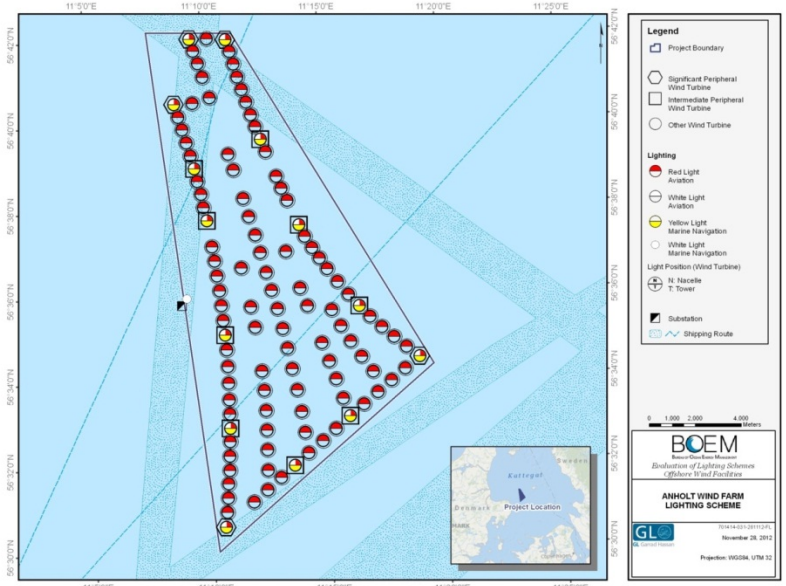
Stage: Construction and Operations

- Example: Development of Fisheries Best Management Practices
  - To address future conflicts between fishing and wind projects on the OCS, BOEM held eight workshops (October 2012 to February 2013)
  - Gathered input from commercial and recreational fishing industries, offshore renewable energy developers, as well as fisheries management agencies and scientists
  - Draft report available at: http://www.boem.gov/Fishing-Offshore-Wind-Mitigation-Measures-Development-Workshops/

Stage: Construction and Operations

- Example: Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments

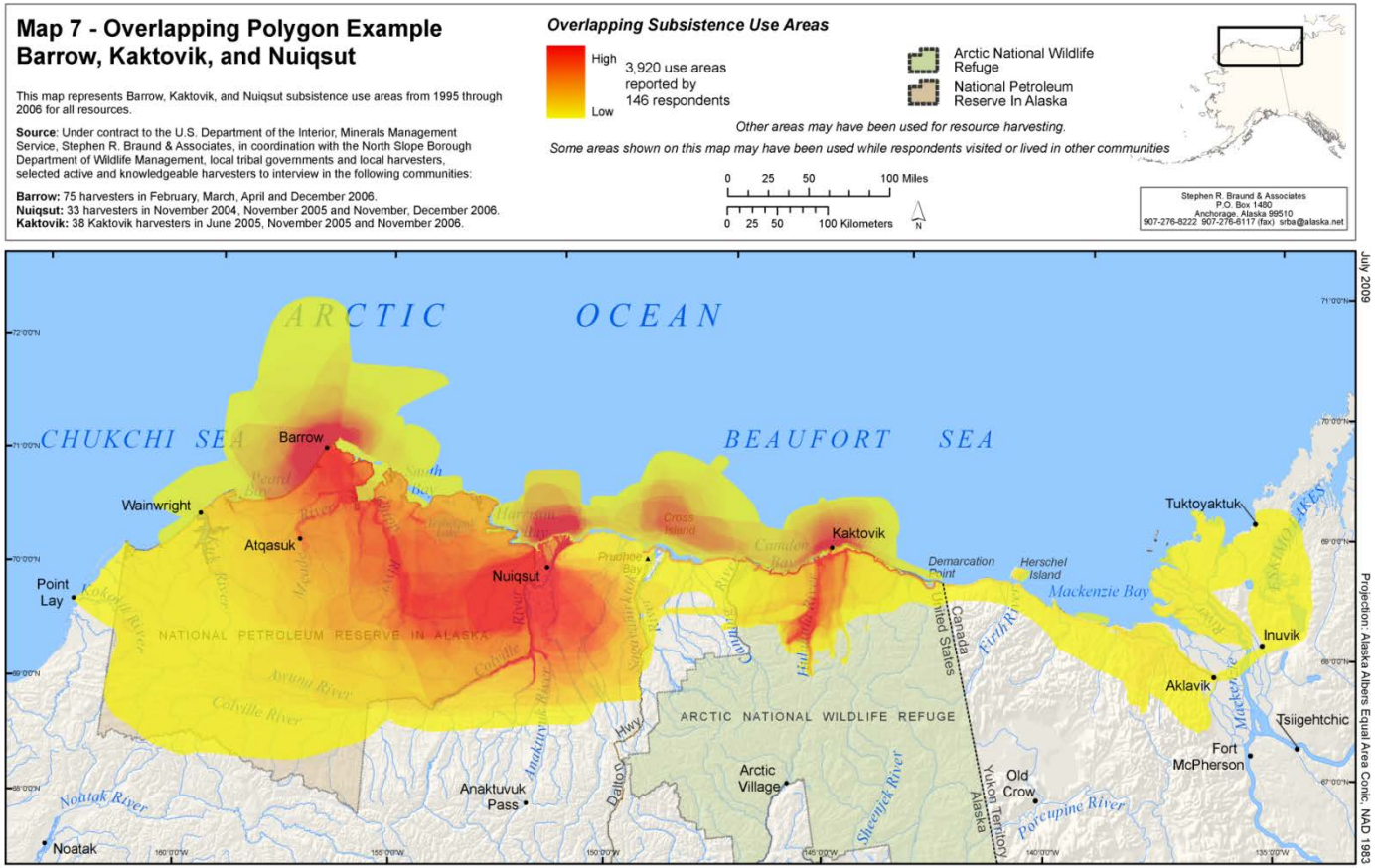
  - Review of regulations and lighting schemes currently in use
  - Evaluate how proposed lighting schemes for offshore wind facilities may impact local environments and offshore waters
  - Primary focus on impacts to birds, bats, fish, marine mammals and sea turtles
  - Results could also be used for future lighting mitigation measures



Questions?

Future Directions/Needs

- GOMR Oil and Gas Individual sale EIS's in progress (CPA 235, WPA 246, 241, and 226) … potential new studies needs.
- Atlantic G&G EIS Adaptive Management plan implementation – studies related to efficiency measures, mitigations measures, etc.
- GOM G&G EIS – In Early Stages; Alternative Development; Sound-Exposure Modeling Needs.
- Consultations in the GOMR are ongoing
- Atlantic Studies Needs if Exploration Proceeds


Map 7 - Overlapping Polygon Example
Barrow, Kaktovik, and Nuiqsut
This map represents Barrow, Kaktovik, and Nuiqsut subsistence use areas from 1995 through 2006 for all resources.
Source: Under contract to the U.S. Department of the Interior, Minerals Management Service, Stephen R. Braund & Associates, in coordination with the North Slope Borough Department of Wildlife Management, local tribal governments and local harvesters, selected active and knowledgeable harvesters to interview in the following communities:
Barrow: 75 harvesters in February, March, April and December 2006.
Nuiqsut: 33 harvesters in November 2004, November 2005 and November, December 2006.
Kaktovik: 38 Kaktovik harvesters in June 2005, November 2005 and November 2006.
Overlapping Subsistence Use Areas
High
Low
3,920 use areas reported by 146 respondents
Arctic National Wildlife Refuge
National Petroleum Reserve In Alaska
Other areas may have been used for resource harvesting.
Some areas shown on this map may have been used while respondents visited or lived in other communities
0 25 50 100 Miles
0 25 50 100 Kilometers
N
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
907-276-8222 907-276-8117 (fax) srba@alaska.net
ARCTIC OCEAN
CHUKCHI SEA
BEAUFORT SEA
Barrow
Wainwright
Atqasuk
Nuiqsut
Point Lay
Kaktovik
Tuktoyaktuk
Inuvik
Aklavik
Tsiigehtchic
Fort McPherson
Old Crow
Arctic Village
Anaktuvuk Pass
Noatak
NATIONAL PETROLEUM RESERVE IN ALASKA
ARCTIC NATIONAL WILDLIFE REFUGE
Demarcation Point
Herschel Island
Mackenzie Bay
Prudhoe Bay
Camden Bay
Cross Island
Harrison Bay
Colville River
Meade River
Kuparuk River
Sagavanirktok River
Dalton Hwy
Anaktuvuk River
Noatak River
Sheenjek River
Porcupine River
Yukon Territory
Alaska
Canada
United States
July 2009
Projection: Alaska Albers Equal Area Conic, NAD 1983

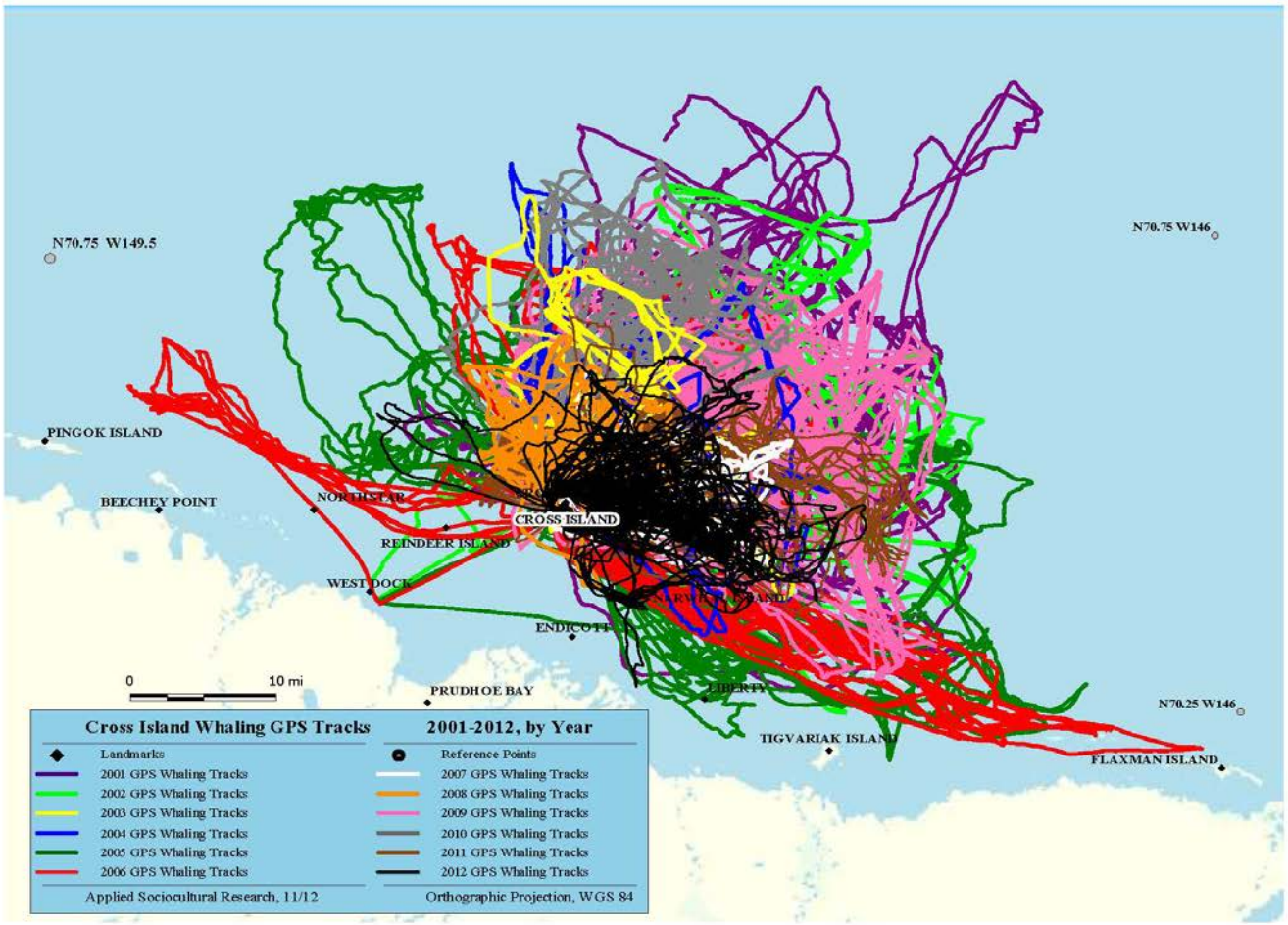
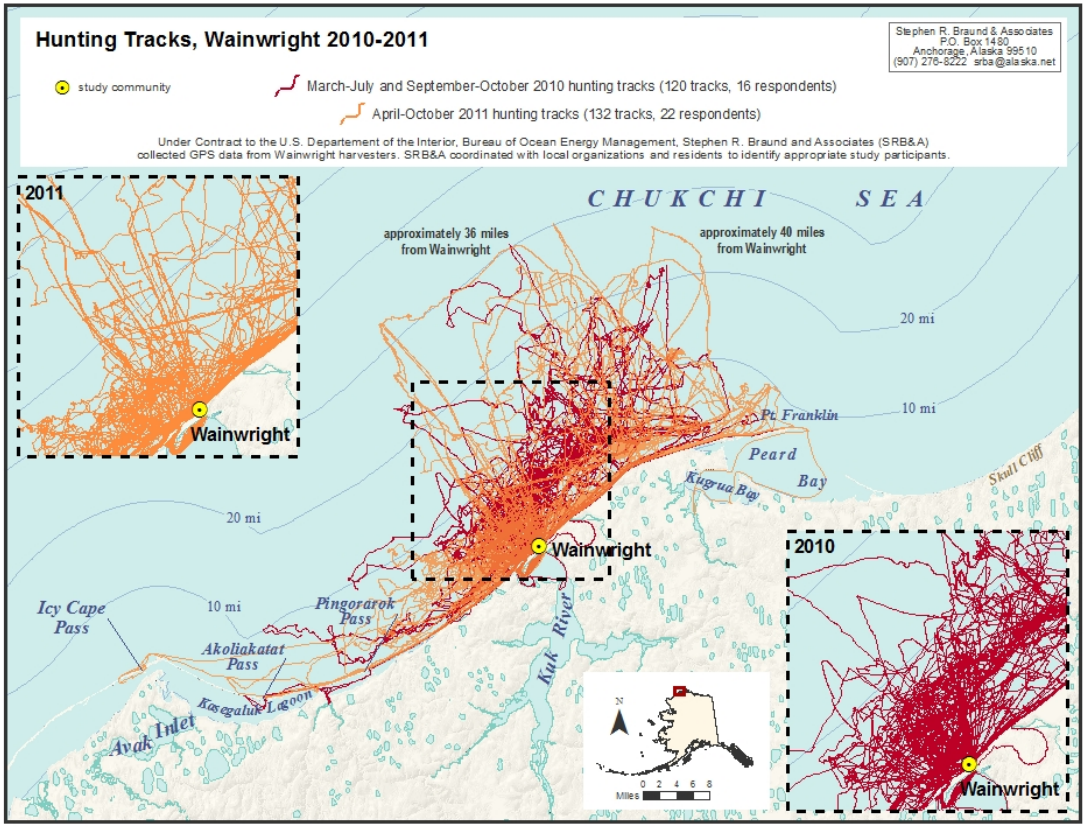


FIGURE 6. GPS tracks for Cross Island whaling by year, 2001–2012


Hunting Tracks, Wainwright 2010-2011
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net
study community
March-July and September-October 2010 hunting tracks (120 tracks, 16 respondents)
April-October 2011 hunting tracks (132 tracks, 22 respondents)
Under Contract to the U.S. Departement of the Interior, Bureau of Ocean Energy Management, Stephen R. Braund and Associates (SRB&A) collected GPS data from Wainwright harvesters. SRB&A coordinated with local organizations and residents to identify appropriate study participants.
2011
Wainwright
CHUKCHI SEA
approximately 36 miles from Wainwright
approximately 40 miles from Wainwright
20 mi
10 mi
Pt. Franklin
Peard Bay
Kugrua Bay
Skull Cliff
Wainwright
2010
Wainwright
Icy Cape Pass
Pingorarok Pass
Akoliakatat Pass
Kuk River
Kasegaluk Lagoon
Avak Inlet
N
0 2 4 6 8
Miles