



Photos taken by Mary Baker, NOAA 2012

**North Slope Borough Oil Spill Workshop:
Natural Resource Damage Assessment (NRDA) & Environmental
Response Management Application (ERMA[®])**

November 8 - 9, 2012

National Oceanic and Atmospheric Administration

Coastal Response Research Center



Executive Summary

On November 8 - 9, 2012, at the invitation of the North Slope Borough (NSB), the Coastal Response Research Center (CRRC) and NOAA's Office of Response and Restoration (ORR) hosted an oil spill workshop in Barrow, Alaska. More than 60 participants from all 7 communities in the NSB, including about 20 agency or non-governmental (NGO) representatives, attended the workshop.

The goals of this meeting were to:

- Discuss community involvement in oil spill response, natural resource damage assessment (NRDA) and restoration/recovery;
- Integrate local community and Inupiaq traditional knowledge into the Arctic Environmental Response Management Application (Arctic ERMA[®]); and
- Enhance relationships between local communities and government agencies regarding planning and preparation for potential oil spill response, NRDA and restoration/recovery.

During a series of breakout groups, participants articulated their concerns about potential oil spills in the region and developed ideas and recommendations for conducting NRDA, planning restoration, and improving Arctic ERMA (<https://www.erma.unh.edu/arctic/erma.html>). This report presents the results of the discussions, including the breadth and diversity of opinion, articulated at the workshop. The summary of the discussions describes priority concerns of community members and general recommendations to address some of the concerns.

Priority Concerns:

- Implications of harsh environmental conditions (ice and severe weather) on spill response, restoration and recovery
- Delays in response (e.g., travel distances for spill response equipment)
- Limitations in spill infrastructure and logistical support (e.g., vessels, fuel, boom and other supplies, equipment maintenance; food, housing, waste management) as well as ports, harbors and USCG facilities and effectiveness of removing oil from ice environments
- Increased disruption to subsistence practices and food security. The subsistence lifestyle on the north slope is essential for human health, spirituality, and maintenance of Inupiaq culture
- Ecological and long term effects of oil on local populations, migratory species and sensitive habitats (e.g., lagoons, river mouths, hunting areas)
- Lack of training and infrastructure (e.g., equipment) for villages and existing local spill response teams, especially with respect to off-shore response methods
- Lack of community inclusion in decision- making for response, including use of local and traditional knowledge.

General Recommendations:

- Build local spill response capability and involve locals in NRDA process
- Share plans and educate local communities and agencies on spill issues

- Incorporate local community and Inupiaq traditional knowledge (subsistence and ecological status) into tools and ensure community oversight in its uses
- Expand public communication mechanisms during spill response and assessment
- Determine baseline conditions of species and habitats likely to be affected by oil spills
- Begin restoration planning now; involve local community members in developing specific project ideas.

These concerns and recommendations will be provided to the State of Alaska and the U.S. Coast Guard (USCG) for their use in planning oil spill response in the region. The report findings will be used by NOAA and other agencies to establish priorities for NRDA and restoration. NOAA will also use the report to establish priorities for data to augment in Arctic ERMA.

Acknowledgements

The CRRC and NOAA gratefully acknowledge the Organizing Committee (OC) members and breakout group facilitators for playing a crucial role in the success of the workshop.

The OC members included:

Mary Baker, NOAA ORR, Assessment and Restoration Division
George Edwardson, Inupiat Community of the Arctic Slope (ICAS)
Randy Hoffbeck, North Slope Borough Mayor's Office
Nancy Kinner, Coastal Response Research Center
Amy Merten, NOAA ORR, Spatial Data Branch
W. Scott Pegau, Oil Spill Recovery Institute
Cheryl Rosa, U.S. Arctic Research Commission
Jennifer Schorr, State of Alaska, Attorney General's Office
Todd Sformo, North Slope Borough, Wildlife Management
Gary Shigenaka, NOAA ORR, Emergency Response Division

The Group Leads were: Sarah Allan, Mary Baker, Cheryl Rosa, Gary Shigenaka, and Robert Taylor. The Group Recorders were: Rachel Aronson, Allison Bailey, Joe Inslee, Jessica McGrath, and Zach Winters-Staszak.

The CRRC also gratefully acknowledges the hard work and dedication of all 63 participants (Appendix B). More information is available at www.crrc.unh.edu.

This workshop was sponsored by: NOAA ORR, CRRC and OSRI.

Introduction

Changing conditions are increasing the likelihood of spills and accidents in the Arctic. The loss of sea ice, increasing demand for energy, and development of offshore oil and gas and other natural resources will increase ship traffic and other human activities that will increase the risk of spills. Oil spills can result from incidents/accidents from many sources, including: vessels, pipelines and platforms. In the period 2000-2011, National Response Center data indicates that vessels and platforms accounted for 43.7% and 13.3%, respectively, of all the incidents (Table 1). The oil released into the environment during an incident can undergo many natural processes such as evaporation into the atmosphere, dispersion into the water column, and biodegradation (Bishop, 1982, 1983). Response measures can also impact the fate of the oil. For example, mechanical recovery such as use of booms and skimmers can collect oil and remove it from the water. Typically, this accounts for $\leq 25\%$ of the oil released (Pond, 20?? & Oil Spill Dispersant Research Workshop, 2013) and is very dependent on the type of oil spilled as well as environmental conditions (e.g., wind, waves, presence of ice). In the Deepwater Horizon incident (Figure 1), 2-4% of the oil discharged was recovered by skimming.

Table 1: Incident Types

Incident Type	Number of Incidences (average 2000-2011) (National Response Center 2011)	
	Number	%
All vessels	4486	43.7
Pipelines (offshore and onshore)	1547	15.1
Platforms (offshore and onshore)	1372	13.3
Railroads	2859	27.9
Total	10264	100.0

Source: National Response Center <http://www.nrc.uscg.mil/stats.html>

Figure 1: Response Effectiveness. Estimates of response effectiveness are expressed as percentages of the cumulative volume of oil discharged through July 10, 2010, in the best, expected, and worst cases. These estimates served solely as a guide for the national response to the Deepwater Horizon MC252 Gulf Incident. "Other oil" refers to oil that forms tarballs, surface slicks, sinks, enters the surf zone, or contacts the shoreline (oil that hits the shoreline may be collected as debris).

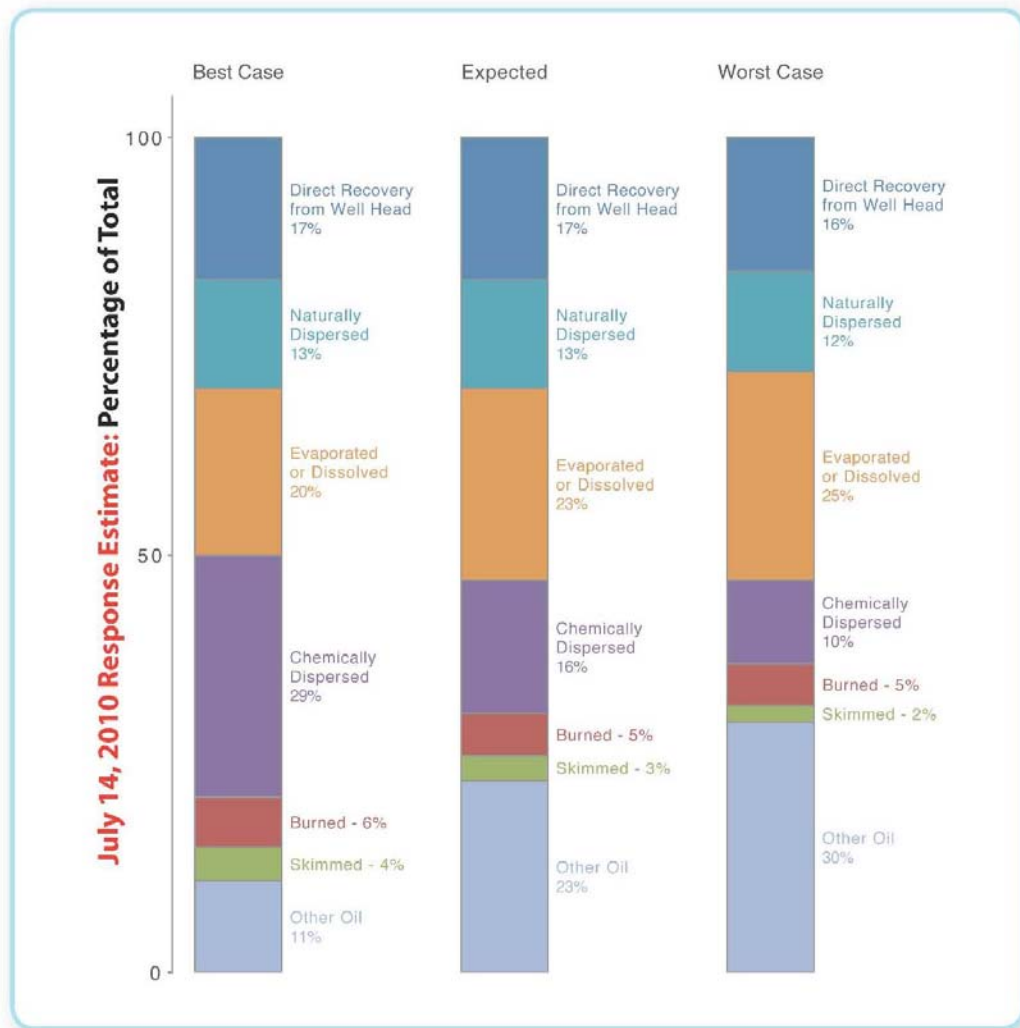


Figure 13: Response estimates expressed as percentages of the cumulative volume of oil discharged through July 14, 2010, in the best, expected, and worst cases. These estimates served solely as a guide for the national response to the Deepwater Horizon MC252 Gulf Incident.

(Source: Oil Budget Calculator, Deepwater Horizon. Technical Document November 2010. The Federal Interagency Solutions Group, Oil Budget Calculator Science and Engineering Team.)

Arctic communities rely on natural resources for cultural and subsistence use. These resources will be affected in the event of a spill. The rapid changes in physical and biological systems that are occurring in the Arctic provide a challenging backdrop for evaluating the ecological effects of spilled oil. Early planning for spill response and natural resource damage assessment (NRDA) requires coordination with local communities to ensure that: protection priorities are correctly identified, appropriate baseline data for a NRDA are collected, ephemeral data collection is planned, and natural resources and their services are evaluated and restored.

As a follow-up to two earlier CRRC workshops (Arctic ERMA Workshop April 5-6, 2011 Anchorage, Alaska and NRDA in Arctic Waters: The Dialogue Begins April 20-22, 2010 Anchorage, Alaska), representatives from the Northwest Arctic Borough (NWAB) and the North Slope Borough (NSB) invited NOAA and CRRC to host workshops on these topics in their communities. The priority of the workshops in Kotzebue, AK (May 22-23, 2012) and Barrow, AK (November 8-9, 2012) was to discuss local involvement in NRDA and incorporation of local and traditional knowledge into Arctic ERMA. This document provides a summary of the discussions at the November 2012 NSB Oil Spill Workshop.

The goals of the workshop were to:

- Discuss community involvement in spill response, NRDA, and restoration/recovery;
- Integrate local community and Inupiaq traditional knowledge into Arctic ERMA; and
- Enhance relationships between local communities and government agencies regarding planning and preparation for potential oil spill response, NRDA and restoration/recovery.

Responding to and cleaning up oil spills is the responsibility of the U.S. Coast Guard (USCG), Alaska Department of Environmental Conservation (ADEC) and/or the U.S. Environmental Protection Agency (USEPA) (depending on the location and source of the spill). The USCG Captain of the Port (COTP) is the pre-designated Federal On-Scene Coordinator (FOSC) for oil spills in the coastal zone. Management of spill response is generally conducted using the Incident Command System (ICS), which is a standardized on-scene emergency management system to address complex incidents minimizing hindrances due to jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of equipment, people, and money during incidents. Response to oil spills is guided by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). ICS brings together the functions of the Federal government, state/local governments, and the responsible party (RP) in order to achieve an effective and efficient response.

For spills in Alaska, a Unified Spill Response Plan provides a comprehensive pollution response doctrine that defines the organizational and procedural framework for the oil spill response network. Ten Sub-Area Plans supplement the Unified Plan and describe geographic specific strategies for a coordinated Federal, state and local response. In addition, a Joint Marine Pollution Contingency Plan with Canada supplements the Unified Plan. The USCG maintains oil spill response equipment in Alaska (e.g., booms and skimming systems), as does the AKDEC and the U.S. Navy Supervisor of Salvage. Oil spill response organizations (OSROs) also maintain response capacity that can be accessed by the USCG.

Under the Oil Pollution Act of 1990, parties responsible for spilling oil are liable for the cost of responding to and cleaning up the spill. In addition to clean up, polluters are also liable for the cost of restoring public natural resources that are harmed by a spill. Natural resources are protected by the government under a long-standing common law tradition known as the Public Trust Doctrine, which dates back centuries even before the United States existed. Under the public trust doctrine, natural resources are to be managed for the benefit of all. When public resources are harmed by a spill, governments may seek compensation for the harm. This is done in two steps: (1) by assessing the harm; and (2) by determining how and what restoration will occur. Compensation for injury is intended to restore the natural resources to their condition before the spill and to compensate the public for the lost use of those resources. Because parties responsible for a spill are only liable for the harm from the oil (and for harm from response activities), it is extremely important to understand the condition of the natural resources in the absence of a spill (“baseline”). In a changing environment, agencies must be able to distinguish between harm to natural resources from oil, and harm from other causes.

NRDA is a legal process that results in the filing of a legal claim that is either resolved through a negotiated settlement or through a judicial process. Government agencies must demonstrate that there is a connection between the oil spill, a pathway for oil to reach the natural resources, exposure to animals or their habitat, and an ecological effect and/or loss to people using the resources. The outcome of a NRDA should be restoration that compensates for the losses that occurred as a result of the spill. This restoration is typically focused on improving the habitats, but also can address losses of resources used by humans.

ERMA is an online mapping tool that serves as a single point of access for environmental response information. It integrates both static and real-time data (e.g., Environmental Sensitivity Index (ESI) maps, ship locations, weather, and ocean currents) in a centralized, easy-to-use format. It provides environmental responders and decision-makers ready access to relevant data for oil spill drills, planning, response, assessment, and restoration, as well as for other incidents and natural disasters. The system incorporates data into a fast, user-friendly Geographic Information System (GIS) that is accessible via internet at a command post as well as to people in the field and at other locations. ERMA was developed by the National Oceanic and Atmospheric Administration (NOAA) and the University of New Hampshire (CRRC and the Research Computing and Instrumentation Center) along with USEPA, USCG, and the Department of the Interior in an academic partnership and a Federal cross-agency effort. Originally developed for the Portsmouth, NH region, the ERMA prototype was tested prior to the Deepwater Horizon oil spill during area response drills, where it proved to be effective at providing data transparency and easy operation for multiple users.

ERMA enables a user to quickly and securely upload, manipulate, export, and display spatial data, resulting in high-impact visualizations of information needed for solving complex environmental response and resource management issues. Non-GIS experts can use ERMA to view, manipulate, and analyze data on maps. The application is based on open source software (PostgreSQL/ PostGIS, MapServer, OpenLayers) that ensures compatibility with other commercial and open source GIS applications. Because the ERMA platform is web-based, it can easily bring together various types of information, providing a common operational picture for all individuals involved in incident response operations and improving communication and

coordination among responders and stakeholders. ERMA provides environmental resource managers with the information necessary to make informed decisions. The Arctic ERMA project grew out of a strong desire by NOAA and its interagency partners (especially the Department of the Interior) to focus on preparedness for Arctic emergency response due to changing ice conditions and increased energy and transportation activities.

Workshop Organization and Structure

The workshop was held at the Inupiat Heritage Center and the Tuzzy Library in Barrow, Alaska on November 8-9, 2012; consisted of plenary sessions where invited speakers gave presentations (Appendix F) on spill response, NRDA, and the ERMA tool. More than 60 participants from 7 communities in the NSB, including approximately 20 agency and NGO representatives attended the workshop. Five breakout groups discussed specific questions regarding: (1) concerns about spills and spill response; (2) approaches for NRDA (including how to assess baseline conditions in the changing Arctic environment); (3) ideas for restoring injured natural resources and affected human uses; and (4) ways of improving Arctic ERMA to incorporate local knowledge and make it more useful as a communication mechanism. The workshop agenda (Appendix A), participants (Appendix B), and breakout session questions (Appendix C) were identified and developed by an Organizing Committee representing local and Federal government entities and NGOs. The Organizing Committee identified participants from local communities, NGOs, industry, the private sector, response organizations, academia, natural resource trustee agencies, and state and local governmental entities who have a vested interest and experience in the Arctic and/or oil spills, and NRDA (Appendix B). The workshop was organized around three major topics: (1) spill response; (2) NRDA; and (3) Arctic ERMA. The workshop participants addressed questions relating to these topics in breakout groups (Appendix D). After breakout sessions, the groups came together in a plenary session and summarized their discussions for the larger group (Appendix E). These breakout group reports contain a summary of the groups' recommendations and ideas. On the final day of the workshop, participants convened to summarize their findings and conclusions. Several larger group sessions created the opportunity to share and discuss ideas. It should be noted that the NSB is not a monolithic community, and the conclusions and ideas presented here are not unanimous recommendations, but are an attempt to represent the breadth and diversity of opinion presented at the workshop.

Summary of Breakout Group Discussions

The two days of discussion highlighted recurring concerns related to oil and gas development, marine transportation, and the ecological and social/cultural implications of potential oil spills. Workshop attendees repeatedly mentioned the need to: improve actions to prevent spills and to increase trust, and include traditional knowledge in decision-making processes. Each breakout group discussed the same questions. Notes from each breakout group and the plenary session were synthesized to create this summary, which is organized by the general topics discussed.

1. Improving Spill Response

Workshop attendees discussed concerns regarding spill response. These concerns can be summarized as:

- Implications of the harsh and unique environmental conditions (e.g., ice, severe weather, combined influence of ice and river outflow during river ice breakup)
- Delays in response (e.g., long travel distances for spill response equipment and responders to get to the NSB, difficulty in quickly traveling over ice)
- Limitations in spill infrastructure and logistical support (e.g., availability of vessels, fuel, boom and other supplies, food, housing, waste management)
- Effectiveness of response methods for oil on and around ice
- Need for training at the village level (local expertise exists for on-shore spill response, but not off-shore response methods)
- Access to the most up-to-date information about spill response, especially for communicating information to the public and villages
- Need for local participation in response, since local communities should be involved in issues that directly affect them.

Breakout groups developed a variety of ideas and recommendations for maximizing the effectiveness of spill response to address these concerns. The highest priority and most significant recommendations related to creating local response capability for the first few days of a spill. There was a strong desire for local communities and villages to be more prepared for a spill. Specific ideas to build desired community spill response capacity include: establishing village or borough response teams and arrangements for use of vessels of opportunity. Enhanced partnerships between villages and Alaska Clean Seas (ACS) and USCG are desired.

Ideas for addressing logistics and infrastructure limitations include: storing and staging additional equipment locally; maintaining an inventory of what appropriate equipment and trained responders are already available in the community (what, who owns it, where); establishing plans and protocols for rehabilitation of oiled wildlife; establishing plans for a local incident command (to include housing and logistical support for responders); and establishing agreements to use assets of native corporations and Local Emergency Planning Committees (LEPCs). Improving and testing oil spill response methods for ice environments will increase effectiveness of response to spills in the Arctic.

Ideas and recommendations for improving spill response training include:

- Build on existing training for disaster response, search and rescue, and firefighting
- Provide training on the incident command system to village representatives (perhaps use FEMA training modules)
- Educate students and others to be responders
- Track who is trained
- Conduct training through LEPCs
- Include specific scenarios in training
- Include training on: regulations and cleanup practices; use of Arctic ERMA; effects of dispersants; oil persistence, fate and behavior; long term effects of dispersants; and basics of effects of oil on Arctic species

- Provide more drills (including NRDA) and include more time to provide local input
- Learn from other communities affected by spills, including those in Russia
- Summarize research findings to educate NSB residents on spill issues, especially fate of oil and effects of dispersants.

Ideas and recommendations for access to updated information include:

- Provide a directory of spill response contacts, and which agencies have specific responsibilities
- Provide environmental sensitivity information (ESI) for open water areas
- Prepare seasonal response plans
- Share all contingency plans
- Provide daily information/updates about the spill response to the community via Arctic ERMA and other mechanisms
- Include more local representation in protection strategy development and prioritization
- Create a public health plan for spill response (include hospital staff)
- Use traditional knowledge of currents in trajectories and planning
- Publish guidelines and information on the rehabilitation and release of oiled wildlife.

2. Protection/Response and NRDA Priorities

Workshop attendees had lengthy discussions of their concerns regarding the environmental and cultural effects of oil spills. These concerns can inform protection priorities for spill response, and help identify important NRDA metrics. The highest priority and most significant concern seemed to be for the potential for injury to food supply and subsistence food practices (food security), including the need to trade and share food with other villages. Protection of bowhead whales, walrus, and other marine mammals were highlighted. The subsistence lifestyle on the North Slope is essential for human health, spirituality, and maintenance of Inupiaq culture. Even the perception of contamination will keep people from hunting, and this aversion may last a long time. Other human health issues are also of concern including health effects of eating contaminated or sick marine mammals and exposure to oil fumes or smoke from *in situ* burning.

The possibility of effects to important biota and plants is also of concern. Some key species and effects mentioned during the workshop include:

- Lowland plants, including berries and medicinal and other plants
- Caribou and other land mammals
- Birds and eggs (eider, geese, swans, raptors, owls, seagulls, ducks, swans, and other sea and shorebirds) (including migration behavior changes)
- Krill, plankton, and microorganisms
- Direct effects on whales (gray, beluga and bowhead), seals (spotted, ringed, bearded), walrus, porpoise, dolphins, and killer whales (Orca) - including disease, feeding behavior, pregnancy rates
- Whale and seal migration in Hanna Shoal, Barrow Canyon, and along ice edges
- Fish (salmon, pike, whitefish, herring, trout, smelt, grayling)
- Crabs

- Shellfish
- Polar bear
- Energy transfer between ecosystem components; disruption of food web relationships, especially the ice-based food web and nutrient cycling
- Effects of noise and light from response operations and increased vessel traffic.

The possibility of contamination of specific sensitive habitats was also of concern to workshop participants. Key habitats of concern include:

- Benthos
- Lagoon systems
- River mouths
- Lowlands/tundra, especially caribou feeding and calving areas
- Erosion of coastal habitat
- Hunting and camping areas
- Bird nesting areas.

In addition to food security and ecological effects, there were numerous social and cultural impacts of concern. These include:

- Maintaining native language proficiency
- Maintaining hunting and fishing practices from generation to generation
- Cascading effects on inland communities that share coastal natural resources
- Impacts on summer fish camps and food storage (ice cellars)
- Educating young people about traditions
- Employment opportunities
- Disturbance of archaeological sites.

3. Coordinating NRDA Activities

Agencies that are responsible for NRDA are very interested in developing and maintaining relationships with NSB communities and their representatives. The conversations at the workshop brought forth a number of considerations in developing a productive and mutually beneficial relationship between the agencies and communities of the NSB. One of the core suggestions made by community members was that communication flow be enduring and two-way. Community members and officials want to learn more about NRDA and associated activities. Suggested mechanisms to facilitate this communication include: radio, face-to-face meetings, television, Twitter, and Facebook. Coordination with co-management groups; planning, public safety, and cultural committees; tribal and municipal governments; the regional Elders Council; and other regional entities will enhance communications and facilitate building trust between agencies and communities. Formal consultations with tribal entities are also required.

Representatives expressed concern about implications of placing monetary value on subsistence species and on a way of life. It is likely that there would be no way to adequately compensate for some losses from oil spills. Communities may be willing to share subsistence and traditional

information, but there is a need to protect this because it is sensitive. This need must be respected. The extensive environmental and cultural knowledge of elders is especially valued.

Other suggestions for improving collaborations between agencies and the communities include: establishing community liaison positions and agency points of contact; spending more time in communities to build long term relationships; and synthesizing and sharing relevant information on spills.

Conducting NRDA in the Arctic will be challenging because of the remoteness of locations that may be affected, severity of weather, and limitations in infrastructure and equipment available locally. Logistics of sampling are of special concern including a lack of storage space for samples. Providing food, housing, and waste management during response and NRDA activities are also concerns for local officials. Community members (e.g., LEPC members and hunters) may be willing to participate in NRDA sampling activities, but would require training.

4. Determining Baseline Condition of Natural Resources

Since the goal of NRDA is to restore the condition of natural resources to “baseline” status and compensate for lost use and services; identification of the health and status of Arctic natural resources in the absence of the spill (i.e., baseline) is important. Determining and quantifying injury from a spill requires documentation of a connection between: the release, a pathway to receptors, exposure to oil, and adverse effects. The Arctic is a rapidly changing environment. The workshop attendees recognized that climate change has the potential to affect many of the priority assessment metrics listed above. Local observations of indicators of climate change reported by workshop attendees include: changing ice cover and thickness; increased coastal erosion; more rain; faster snow melt; and new plants, insects, birds, and small mammals.

Recommendations and ideas for evaluating baseline for NRDA purposes include:

- Incorporate traditional knowledge into baseline assessments
- Fund a collaboration project to work with subsistence hunters to document, track and report changes over time in location, migration and health of animals
- Conduct baseline studies seasonally and over several years (especially annual whale censuses)
- Determine status of health, feeding behavior and populations of priority species
- Incorporate biological changes being seen in hunted species
- Identify locations of culturally important sites
- Evaluate current subsistence use
- Synthesize relevant existing and historical data
- Document natural oil seeps, develop capabilities to determine source of polycyclic aromatic hydrocarbons (PAHs) observed after spills
- Evaluate baseline contamination in key species
- Evaluate migration routes of sea mammals (including birthing areas).

5. Ideas for Restoring Arctic Resources and Services

The outcome of any NRDA process is a suite of restoration projects that compensate the public for injuries to natural resources and the services they provide. For most of the attendees, restoration to compensate for oil spill injuries was a new concept. Indeed, it was expressed repeatedly that the “best form” of restoration is to ensure a spill does not happen. Workshop attendees discussed the issues associated with restoration and provided some feedback on general considerations for such planning.

- Use councils and existing groups to share information and educate the public on restoration options (N.B., NRDA information should be public, if possible)
- Provide examples of restoration from other spills, including international ones, as well as those in Alaska and the Gulf of Mexico, to learn what has not recovered and why
- Identify sources of plants for transplantation to restore lowland environments and tundra
- Establish an advance restoration fund to address impacts of drilling including for subsistence impacts
- Evaluate unintended consequences of restoration
- Include multiple villages in soliciting restoration ideas
- Partner with co-management groups and the Alaska Coastal Management Program to identify restoration projects
- Include biocultural resiliency as a restoration goal—improve the resilient nature of connections between people and the ecosystem
- Apply traditional restoration methods (e.g., placing whale jawbones in the ocean)
- Incorporate traditional knowledge in selecting sites for restoration that are important for subsistence and maintenance of human health
- Improve resiliency/adaptability/biodiversity.

In addition to providing some general recommendations and advice, the breakout groups developed specific suggestions to consider when developing restoration projects that would compensate for the *ecological injuries* to natural resources, depending on which environments or species were affected. Habitat restoration and methods of enhancing affected species will be challenging in the changing Arctic environment.

Specific ideas for addressing ecological injuries include:

- Develop artificial ice-floating platforms or rock haulouts for seals and walrus
- Improve protection and management of subsistence hunting and fishing areas and species
- Protect and conserve affected species or areas (e.g., Teshakpuk Lake)
- Control other sources of contaminants: human waste, waste oil, bilge water, air and CO₂ emissions, spills around tank farms (groundwater contamination), drilling fluid, old military sites.

Natural resources and humans are inextricably connected in Arctic communities. Improving the condition of natural resources will help communities recover from the effects of oil spills. There are also many ongoing activities and projects that could be expanded to compensate for lost *cultural use* of natural resources. Selection of individual projects would need to be tailored to address specific losses resulting from particular spills. Ideas and recommendations include:

- Teach subsistence practices, traditional knowledge (e.g., currents, ice behavior and survival techniques)
- Support school or community field trips
- Expand science education
- Learn from restoration experiences of other subsistence communities
- Provide funding to sustain culture (e.g., more language immersion schools, culture camps)
- Maintain and transfer hunting knowledge: educate young people as to proper marine mammal (i.e., whales, seals, and walrus) hunting methods (prepare “virtual hunt” curriculum materials).

Workshop attendees also had concerns about maintaining and enhancing *subsistence harvest and hunting*, and providing for a replacement food supply during times when contamination prevents use of the resources. Supporting *economic activity* in the communities may also provide benefits to offset losses. Specific project or activity possibilities to address these concerns include:

- Provide replacement food supplies based on traditional and subsistence diet components
- Enhance ability to trade and share resources between communities
- Suspend the quota system
- Transport hunters to other areas to maintain food supplies
- Address coastal erosion
- Develop sustainable ecotourism options
- Monitor and evaluate health impacts of changing diets.

6. Improving Arctic ERMA

Breakout groups discussed the utility of the ERMA tool in the context of providing and sharing information during spill response and in support of NRDA activities. The consensus of the workshop attendees seemed to be that Arctic ERMA has potential to improve communications and information sharing among and between communities and agencies. Local people and Inupiaq leaders are interested in contributing to ERMA and other planning efforts because it helps protect their communities and subsistence way of life. Attendees provided feedback on how the Arctic ERMA project could be useful for their participation in spill response and NRDA. A low band-width or stand-alone (desktop) version of Arctic ERMA for community use would be beneficial since local web access is neither reliable nor robust. Coordinating with existing and prior mapping efforts could make the project more efficient and useful. Mechanisms for protecting proprietary data are needed. Local and traditional knowledge on other topics should also be included in ERMA. Providing peer review, perhaps through village advisory committees, would also improve accuracy of information. The display of metadata and the ability to upload and report observations were also of interest to community members. Recommendations and ideas related to Arctic ERMA outreach include conducting training at the village level including in schools, and working with multiple existing committees, councils, and meetings including co-management groups.

Further, it was suggested that NOAA should better communicate what Arctic ERMA is. Perhaps NOAA can work with village representatives and schools to develop and deliver training on Arctic ERMA specific to the interests of the community.

Specific information and data to add to Arctic ERMA include:

- Land ownership
- Access points and staging locations, including airfield information
- Shelter locations
- Small boat routes
- Snow machine routes
- Traditional use areas, historical and archaeological information
- Inupiaq place names
- Russian data
- BOEM and industry data (including real-time high resolution ice observations)
- Concentrations of contaminants in sediment and biota
- Historical ice observations
- Real-time marine mammal migrations/animal telemetry
- Geographic response strategies
- Locations of staged response equipment
- Real-time currents and weather
- Conceptual models, spill scenarios, restoration concept visualizations.

Workshop Summary Conclusions and Recommendations

Priority Concerns:

- Implications of harsh environmental conditions (ice and severe weather) on spill response, restoration and recovery
- Delays in response (e.g., travel distances for spill response equipment)
- Limitations in spill infrastructure and logistical support (e.g., vessels, fuel, boom and other supplies, equipment maintenance; food, housing, waste management) as well as ports, harbors and USCG facilities and effectiveness of removing oil from ice environments
- Increased disruption to subsistence practices and food security. The subsistence lifestyle on the north slope is essential for human health, spirituality, and maintenance of Inupiaq culture
- Ecological and long term effects of oil on local populations, migratory species and sensitive habitats (e.g., lagoons, river mouths, hunting areas)
- Lack of training and infrastructure (e.g., equipment) for villages and existing local spill response teams, especially with respect to off-shore response methods
- Lack of community inclusion in decision-making for response, including use of local knowledge.

General Recommendations:

- Build local spill response capability and involve locals in NRDA process
- Share plans and educate local communities and agencies on spill issues
- Incorporate local community and Inupiaq traditional knowledge (subsistence and ecological status) into tools and ensure community oversight in its uses
- Expand public communication mechanisms during spill response and assessment
- Determine baseline conditions of species and habitats likely to be affected by oil spills
- Begin restoration planning now, involve locals in developing specific project ideas.

Next Steps

This report and its conclusions will be provided to the State of Alaska and U.S. Coast Guard for their use in planning oil spill response in the region. It will be distributed to NGOs as well as elected officials and Sea Grant agents. The NSB will also disseminate the report. The report findings will be used by NOAA and other agencies to establish priorities for NRDA and restoration. NOAA will also use the report to establish priorities for data to include in Arctic ERMA. The delivery of the workshop report will serve as one mechanism to continue and further develop the relationship between agencies and the North Slope Arctic communities.

Appendix

- A: Workshop Agenda
- B: Participant List
- C: Breakout Questions
- D: Breakout Groups
- E: Breakout Group Notes and Report Outs
- F: Presentations

Appendix A

North Slope Borough: An Oil Spill Workshop

Inupiat Heritage Center

Barrow, AK

November 8-9, 2012

Goals:

To discuss community involvement in spill response, natural resource damage assessment (NRDA) and restoration/recovery

- To integrate local community knowledge into Environmental Response Management Application (Arctic ERMA®)
- To enhance relationships between local communities & government agencies regarding planning and preparation for potential oil spill response, NRDA and restoration/recovery

AGENDA - DAY 1

- 9:00 AM **Opening Prayer**
Welcome - North Slope Borough
- 9:05 AM **Welcome, Overview and Goals of Meeting**
Nancy E. Kinner, *UNH Director, Coastal Response Research Center*
- 9:25 AM **Report on the Northwest Arctic Borough Oil Spill Workshop**
Ukallaysaaq Tom Okleasik, *Northwest Arctic Borough*
- 9:40 AM **Participant Introductions & Expectations**
- 10:20 AM **Break**
- 10:30 AM **Overview of Spill Response**
Dale Gardner, *Alaska Dept. of Environmental Conservation, Division of Spill Prevention & Response*
- Overview of Alaska Department of Environmental Conservation's Role in Spill Response**
Thomas DeRuyter, *Alaska Department of Environmental Conservation*
- Overview of North Slope Borough's Role in Spill Response**
Gordon Brower, *North Slope Borough, Community Planning Division*
- 11:15 AM **Introduction to Arctic ERMA®**
Amy Merten, *NOAA, Assessment and Restoration Division, Spatial Data Team*
- 12:00 PM **Lunch (provided)**
- 1:30 PM **Small Group Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA®**
Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA® can help
- Breakout Group Questions:**
- What specific concerns do you have relative to planning and preparation for spill response?
 - What specific concerns do you have relative to spill response implementation and management?
 - What are best practices for community involvement in spill response, planning, and preparation?
 - What are your initial reactions to Arctic ERMA®?
 - How could the tool be useful for community involvement in spill response?
 - What information would you like to see included in the tool to support response decisions?
- 2:30 PM **Break**
- 2:45 PM **Group Reports to Plenary Session**
- 4:30 PM **Adjourn meeting**
- 5:00 PM **Presentation: "How can science improve decision-making in the Arctic?"**
Fran Ulmer, *U.S. Arctic Research Commission*
(Reception to follow—Library)

AGENDA - DAY 2

- 8:30 AM **Opening Prayer and Announcements**
Nancy Kinner
- 8:45 AM **Introduction to Natural Resource Damage Assessment (NRDA), Restoration/Recovery**
Mary Baker, *NOAA, Assessment & Restoration Division*
- Arctic ERMA® in NRDA and Restoration/Recovery**
Amy Merten, Mary Baker
- 10:15 AM **Small Group Breakout Session II: Discussion of NRDA and ERMA®**
Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA® can help
- Breakout Group Questions:**
- What effects of oil spills most concern you (for example, health and use of natural resources)?
 - ◊ Marine mammals
 - ◊ Birds
 - ◊ Fish
 - ◊ Crab or other shellfish
 - ◊ Land mammals
 - ◊ Other cultural concerns (for example, education, language, arts)
 - Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)
 - Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?
 - How could the ERMA® tool be useful for evaluating effects of spills?
 - What information would you like to see included in the tool to support evaluation of effects?
 - What are best practices for community involvement in evaluating effects?
- 11:45 AM **Lunch (provided)**
- 12:45 PM **Small Group Breakout Session III: Discussion of Restoration & Recovery and ERMA®**
Theme: Exploring restoration options and how ERMA® can help
- Breakout Group Questions:**
- What specific concerns do you have relative to restoration and recovery?
 - Are there examples of habitat areas that could be improved?
 - Are there other sources of contamination that could be controlled?
 - What traditional methods of restoration and recovery are practiced?
 - What could be done to sustain cultural and subsistence practices that might be affected by oil?
 - What are best practices for community involvement in restoration and recovery?
 - How could the ERMA tool be useful for planning restoration?
 - What information would you like to see included in the tool to support restoration planning?
- 2:45 PM **Group Reports to Plenary Session**
- 3:15 PM **Wrap Up**
- 4:00 PM **Adjourn**

Appendix B

North Slope Borough:

An Oil Spill Workshop

November 8-9, 2012

Participant List

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Appendix C

North Slope Borough:

An Oil Spill Workshop

Inupiat Heritage Center

Barrow, AK

November 8-9, 2012

Breakout Group Questions

Small Group Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA®

1. What specific concerns do you have relative to planning and preparation for spill response?
2. What specific concerns do you have relative to spill response implementation and management?
3. What are best practices for community involvement in spill response, planning, and preparation?
4. What are your initial reactions to Arctic ERMA®?
5. How could the tool be useful for community involvement in spill response?
6. What information would you like to see included in the tool to support response decisions?

Small Group Breakout Session II: Discussion of NRDA and ERMA®

1. What effects of oil spills most concern you (for example, health and use of natural resources)?
 - Marine mammals
 - Birds
 - Fish
 - Crab or other shellfish
 - Land mammals
 - Other cultural concerns (for example, education, language, arts)
2. Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)
3. Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?
4. How could the ERMA® tool be useful for evaluating effects of spills?
5. What information would you like to see included in the tool to support evaluation of effects?
6. What are best practices for community involvement in evaluating effects?

Small Group Breakout Session III: Discussion of Restoration & Recovery and ERMA®

1. What specific concerns do you have relative to restoration and recovery?
2. Are there examples of habitat areas that could be improved?
3. Are there other sources of contamination that could be controlled?
4. What traditional methods of restoration and recovery are practiced?
5. What could be done to sustain cultural and subsistence practices that might be affected by oil?
6. What are best practices for community involvement in restoration and recovery?
7. How could the ERMA® tool be useful for planning restoration?
8. What information would you like to see included in the tool to support restoration planning?

Appendix D

North Slope Borough:

An Oil Spill Workshop

Inupiat Heritage Center

Barrow, AK

November 8-9, 2012

Group A Heritage Center	Group B Heritage Center	Group C Library - Classroom
Group Lead: Tom DeRuyter (or Mary Baker or Dale Gardner)	Group Lead: Robert Taylor	Group Lead: Cheryl Rosa
<i>Recorder: Jessica McGrath</i>	<i>Recorder: Rachel Aronson</i>	<i>Recorder: Allison Bailey</i>
Ray Atos Mary Baker Lauren Berdow Rusty Brown Ethel Burke Doreen Lampe Robert Miller George Olemaun Lloyd Paningona Fran Ulmer	Harry Brower, Jr Price Brower Sarah Coburn Jennifer Dushane Theresa Imm Amy Merten Billy Blair Patkotak Emma Pokon Joe Sage Neesha Stellrecht	Erika Amman Richard Camilleri Elle Ede Dale Gardner Lee Kayotuk Clark Lane Joseph LoScuito Tom Okleasik Thomas Olemaun Todd Sformo

Group D Library - Director's Office	Group E Library - Video Conference Room
Group Lead: Gary Shigenaka	Group Lead: Sarah Allan
<i>Recorder: Zach Winters Staszak</i>	<i>Recorder: Joe Inslee</i>
Rhoda Ahmaogak Lilly Aveoganna Johnny Aiken Charlie Brower Eleanor Huffines Ernest Nageak, Jr Jonah Nukapigak Vernon Rexford Chris Smith Veronica Varela	Martha Awalin Gordon Brower Craig Gerlach Martha Grabowski Barkley Lloyd George Noongwook Crawford Patkotak Teri Rowles Robert Suydam Vera Williams

Appendix E

Group A Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA[®]

Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA[®] can help.

Breakout Group Questions:

- **What specific concerns do you have relative to planning and preparation for spill response?**
- **What specific concerns do you have relative to spill response implementation and management?**
- Public awareness on roles and responsibilities for planning. Want to highlight specific roles and responsibilities. How do everyone's plans fit in together?
- Want a one-page for local resources, knowing who all the contacts are/individuals who are properly trained. Links that could come up on the website for resources in the area and what they could bring to the table. A point of reference for the North Slope Borough.
- Educating our communities
- Communication between city and small village leadership
- Lack of leadership, make our residents aware of what might happen whenever there is an oil spill. If we have a major disaster, were not ready.
- Do we have local people to help with the response?
- Training of villagers
- Availability of trained people, issue with employees that aren't working for long periods of time and have to have a UA (urinary analysis) before they can come back to work or to help.
- The government does not own up to develop an actual plan. Concerned the plan isn't adequate and there is no enforcement, communication, accountability, or ownership on the government's part. "Zero" Plan. Plan is not adequate, no communication. What is the plan?
- What is it that is already in place for planning and preparation and to what extent has that been looked at, utilized as a tool for practice purposes in real case scenarios? You are looking at "pristine" conditions. What do you have in place for preparation for the conditions that change by season? The plans should reflect the differences of the seasons. Is the plan adequate? Is anyone practicing the plan? Concern with seasonal variation and change over time? Comparing to the Gulf: open water. It took so long for them to "cap" that. Concerned with hazards and obstacles in this region.
- Why isn't Shell here?

Group A – Session I

- How do ERMA and Shell interact?
- Requirement of funding and manpower, response of manpower. What do we have for training up the man power that is needed? How can you be prepared for something if you aren't even prepared to house the equipment needed for this? We are going to need to get manpower from outside sources and where are we going to put them?
- Need information for potential housing availability for outside manpower.
- Infrastructure for manpower, fuel, water, waste treatment, all the things people need to aid in response, and not adversely affect community.
- Who makes evaluation calls? How do we get that information from the industry when they hide information from us? Lack of trust that information will be provided. Uncertainty about who makes a call and how for public health and safety. It was never safety/community first. Need communication. It is that there was no communication in the past, and concerned with not having a plan for the safety of the community.
- Professionals for response to spills on land, not for offshore. Equipment failures on ice. Worried about the small baby snow layer that clogged up holes on equipment. Shell has ice breakers to take care of the larger pieces of ice. Slush ice stopped all the equipment during a drill. Same thing will happen to Shell, they haven't prepared for the slush ice. We know how to respond to spills on tundra. We haven't seen Shell's equipment? They have been tested in warm water, not in our waters. We haven't seen the equipment.
- Shell says they have this equipment, they should still be out there testing, to train them for real conditions.
- Haven't proved their "readiness." BOEM and BSSE have enforcement power and should be out there with the oilrigs. When the current is moving, nothing will stop it.
- Even Coast Guard has had issues with their equipment. I'm more concerned with fuel barges, little ships doing shipping.
 - What are best practices for community involvement in spill response, planning, and preparation?
- Some money from the lease sales should come to the borough for offshore response equipment. We have been left out from the governments for so long. We have highly trained people with no jobs; some of the money should be designated for that. We could do a better job; we are used to the climate. We need to be recognized more for what we do. We are the Masters of the Arctic. Most of the Arctic policy being written today is by people in DC who have never been to the Arctic.

Group A – Session I

- What are your initial reactions to Arctic ERMA®?
- The data is there and available, it's the challenge of getting to it. Scientists, industries are hesitant to sharing their data.
- Would be helpful to get baseline data (i.e. Contamination, chemical).
- Data from Shell is for municipalities not Tribal. Stephen Braun-independent contractor has collected data.
- Is it directly correlated to the NOAA website?
- For years, I have talked to the government to study the multiple currents up here. Need additional real-time data collections of the currents from ERMA.
- You are 20 years too late. Need to speed things up, way behind the game. Nothing is realistic in anything you have presented so far. Need to have plans tested. A key to turn them off since they aren't ready. Want to see Shell testing more frequently (Jan, Feb, etc).
- Knowing how the equipment works, knowing how to operate the equipment, having the man power here. Every community should have training with the equipment and be ready with funding for training locally. All the things you want to address are all here. Need to have a key number of individuals train for a speedy response. Give equipment so everyone can be involved.
- Conoco: are you ready?
 - Getting ready for 2014, currently none of our permits are ready.
- We never got the chance to operate those vessels. How can you expect to have individuals aide in response without training of the vessels and equipment? Without training, more prone to injuries and slower responses.
 - How could the tool be useful for community involvement in spill response?
 - What information would you like to see included in the tool to support response decisions?
- Recap to the group/Summary:
 - Everything.
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Group A Breakout Session II: Discussion of NRDA, Restoration/Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA® can help

Breakout Group Questions:

1) What effects of oil spills most concern you (for example, health and use of natural resources)?

- Marine mammals
- Birds
- Fish
- Crab or other shellfish
- Land mammals
- Other cultural concerns (for example, education, language, arts)
- Plants-medicinal, edible, local, berries
- Food security. Big concern with cancer up here.
- Medical facilities, resources, availability, knowledge, need education with our medical issues.
- Preventative health and education specifically with cancer from contaminants.
- Risk assessments, good baseline information based on typical diets to measure changes in contamination levels.
- Diseases from seals
- Caribou go out for salt every spring, so if something happens it will also affect the land animals.
- Oil spill/Algae bloom (12 miles long, 2009) scare example demonstrating the borough's response time.
- Shellfish or benthic exposure initially wouldn't worry me, but overtime when it isn't cleaned up, you won't be able to keep it contained with the currents we have. Burning residue and encountering sediments in the near shore.
- Concerned with plankton, bottom of the food chain.
- Critical habitats: entire coast line, lagoon system, migrating fish through the rivers (Mead River), changing migrating routes, we get a lot of salmon now, other species taking over the habitats of local fish, major spill will change everything.

Group A - Session II

- White fish, smelt
- Prudhoe Bay was the same before anything happened; now it has changed. Everything has to go to the ocean.
- All the currents circumpolar, is always constant, will ultimately affect entire Arctic region.
- This is the nursery ground for the fish.

2) Are there special habitats or specific areas that you are most concerned about? (For example, sensitive areas, historical sites, camp areas)

- See other answers (#1).

3) Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?

- We know what changes have happened, we know our history.
- The river has changed a lot due to erosion, looks like it won't be around in the future. Lakes have dried up. Plants and flowers that we have never seen before and small birds that an elder has never seen before. Insects are showing up that usually aren't seen up here.
- Sea ice usually protects our coast. The slush ice dampens the waves too. We aren't able to get the same formation for protection. 1 degree increase in sea temperature change will affect us greatly; a small change is all it takes. There are tools that give us some hope that the ice is coming or the temperature is going to change. The main pack ice used to be here in the spring, after years of driving through there you see spots of the blue-baby ice, so it isn't as safe. I don't go spring whaling anymore due to that lack of safety.
- We grew up playing on the ice; we instinctively know which areas are safe due to the thickness.
- First thing I do every morning when I walk out; the air tells me I am in a healthier place. It is unlike anywhere else you go. It's peaceful out here.
- The snow has changed, it is soft. Not as solid as it used to be, not hard-packed. Used to be able to hear people walking on the packed snow, can't hear them anymore.
- We are getting ground squirrels up here now.
- When I see Caribou across the river, it tells me everything is fine. I haven't seen that many Caribou in that area recently. When they aren't seen you know something is wrong.
- Having a lot of lesions in Caribou livers, and odd bone growth. It doesn't look the same or healthy. We still have seagulls and some birds around our area.
- Our ocean is wide open, years ago it wouldn't be.

Group A - Session II

- Because of the open water, we are losing at least 10-20ft of beach each year (erosion).
- Road to summer camp is eroded.
- The waves are hitting the cliffs now.

4) How could the ERMA tool be useful for evaluating effects of spills?

- ERMA should be used to measure erosion.
- Current issue now is erosion, there is no way to stop it. Worried about the damage of the next big storms.
- 35ft of ice-IVU

5) What information would you like to see included in the tool to support evaluation of effects?

6) What are best practices for community involvement in evaluating effects?

- Instead of the forums, there needs to be some action taken from some of the data that has already been compiled. Throwing so much money towards more and more studies. Take some knowledge from the elders and use that to be proactive. Need action for coastal protection and erosion. Actually put your boots to the ground and do something.
- Need to gather everything that is pertinent to the Arctic. Need real-time, table-top scenarios and examples so people can actually see the effects and take action.
- NOAA workshop last May, it was good to hear the scientific side. Opens your eyes to the affects of oil spills. Information on Aquafina water bottles showing how much oil may be in there.
- Noise from the sonic boom which affects out plankton. No real study has been done on how that affects the plankton. Needs research.
- Effects of seismic exploration/operations on zooplankton
- Need to look closer at the water to really see the damaging effects. There is a lot of stuff in the water, wind mixing up the sediment for example.
- We always have volunteer search and rescue in Borough and villages. We have local risk management.
- Public needs to better understand our emergency response plans. Have been handing out pamphlets and telling information to smaller villages to inform them.

Group A - Session II

- The locals will be involved when anything happens. We act through search and rescue. Every community on the North Slope is ready. We're trying to expand our LEPC, which is based out of Barrow. The LEPC is a group that should be able to help. I'm trying to work with our native corporations so it isn't only Barrow. Trying to get representatives from everybody. Trying to make it a more organized structure. Our LEPC is volunteer-based. Trying to bring in someone from each village as a representative. Our meetings are usually broadcasted through public notice. They can call in to the meetings from the Fire Department. LEPC and search and rescue teams could collect and document evidence – oiled birds, samples.
- When we had an emergency, we had an elder that needed medical attention, and our land lines and internet has been down. We need improved communication when normal lines of communications are down. Most villages aren't aware of available sources of communications in during emergencies. Communication between villages and Barrow is really important. To me, I don't think we are ready. We need involvement.

Group A Breakout Session III: Discussion of NRDA, Restoration & Recovery

Theme: Exploring restoration options and how ERMA® can help

Breakout Group Questions:

1) What specific concerns do you have relative to restoration and recovery?

- It's not just oil exploration
- Some of the cultural losses will not be able to be compensated for.
- Disparate risk is being assumed by the communities.
- Food security and cultural integrity was central to many concerns.

2) Are there examples of habitat areas that could be improved?

- There was no environmental control back then, with erosion, things are starting to show up. Example: Point Lay, they know something is there but don't know who will take care of it.
- Preservation.
- The drums where the Navy traveled, we are starting to see a lot of those due to erosion. Before the oil exploration starts, there are a number of historical sites that need to be recognized and protected.
- Point Lonely/Umiat are places where barrels are washing out that contain toxic materials.
- We have sites that are eroded and people go there to dig.
- Moving whaling crews/long distance whaling is a possible alternative. There is some mobility. The delta is being explored.
- Protection for Teshakpuk Lake
- Support whaling in remote areas

3) Are there other sources of contamination that could be controlled?

- We have a lagoon less than 50 feet to the ocean. One good flood and it would be rushed out to the ocean. They built an experimental sea wall that has been there for a long time. Need to put it into play where we current really need it.
- Lack of funding. Point Hope and Kaktovik are eroding away. Need to move seawall.

- Tank farms on the slope. Some fuel stations are right on the coast in jeopardy if something happens. We are trying to improve our secondary containment. Here in the north slope if we have an accident we will have to pump out everything.

4) What traditional methods of restoration and recovery are practiced?

- Take whale meat to their relatives. Villages are inter-linked via trade. Berries are getting closer.
- If one of our subsistence species is not available/able to be consumed, it is possible to switch to another one- though this is not a long-term solution. When there was a shortage of caribou, we have depended on other sources such as seals. We depend on the ocean.
- We have the abundance, if something happens and we lose it here, there is a change we can get it from an alternative location. Possibility of Russia, Canada, or Greenland providing trade opportunities.

5) What could be done to sustain cultural and subsistence practices that might be affected by oil?

- Trading, changing sites of whaling.
- Language immersion programs, need more of that teaching with the youth here.
- Elders and youth partnership program.
- Learning and teaching through family generations. We need to know the wind direction, current, ice. We know by just looking at the sky, water, currents, we know what to expect or how to act (ie leave location).
- If something happens we will move with animals (to hunt). We are people but we are (similar to the) animals. We will go where the food is.
- It has affected our ability to dry meat. It has been raining so much we haven't been able to actually dry the meat. Mold is an issue.

6) What are best practices for community involvement in restoration and recovery?

- See answers above.

7) How could the ERMA tool be useful for planning restoration?

- Projection of restoration appearance/project benefits (picture worth a thousand words).

- Looking at potential injuries, and what it would look like cleaned up.

8) What information would you like to see included in the tool to support restoration planning?

- Want everyone to be aware that this will affect all of us (in all the villages). Communication is always very important. Need communication to all villages. Need real-time, table-top exercises.

Group B Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA®

Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA® can help

Breakout Group Questions:

1) What specific concerns do you have relative to planning and preparation for spill response?

- For oil spills, the current contractor is Clean Seas and they have certified local employees. They are one of the first groups on the scene. More locals could be certified for clean-up.
- The training for cleanup has all been on-shore except for a few MAD drills at Prudhoe.
- Response time. From Barrow it is 100 mi to drill sites. You can get stuck somewhere.
- The amount of manpower for cleanup. Who is responsible for bringing in enough manpower to do the clean up? How do they get there in tough conditions?
- Any amount of drilling brings risk. So does shipping.
- Many of the shipping and drilling companies are international or far from the North Slope. They have nothing to lose and do not know about how people here are connected to the environment.
- Response can get delayed or prevented by the weather.
- Ice is thinning up, which means that it moves more than it ever did.
- No one has drilled here before. Companies do not understand what they are getting into.
- Once development starts, it is hard to stop.
- Drilling and shipping companies won't take care of the consequences of losing subsistence.
- Increased traffic this past summer has already affected subsistence.
- Caribou have moved away from town because of traffic.
- Oil on the ground is easier to control than oil in the water.
- We need stricter permitting and enforcement of industrial activities, and better tools for cleanup.
- There is a history of different parts of the government doing clean-ups out of sync with each other. Funding doesn't always arrive at the same time. Some sort of super-agency

coordination that goes above jurisdictional boundaries is necessary. Somebody like a watch dog.

- Marine mammals: identify who would be doing the response. What kind of a response would communities condone? Collecting and releasing oiled animals? Who will do it and how will they be trained? How do we get equipment in place before a spill? Deterrents, etc. We're not where we need to be in terms of preparedness. Can we have every community equipped and trained? NMFS has not published guidelines for marine mammals after a spill.
- Food security: are animals ok to eat after a spill?
- Equipment: do you have enough equipment to contain the spill, or keep it out of rivers, etc.? Is too much equipment bad?

2) What specific concerns do you have relative to spill response implementation and management?

- Currents don't stop even when the ice is frozen. We can monitor it with instruments, but we can only work on the spill in open season.
- Canada and Russia are ahead of the United States in the Arctic. If there was a spill, are we ready and able to collaborate with Russia?
- The ocean is the source of food here and there is a deep knowledge of hunting. The food and the knowledge both need to be protected from spills.
- Ships need to be educated on garbage, etc.
- There is no command post for a spill. Could the Coast Guard leave a boat here as a permanent spill headquarters? They need to have a base here, not Kodiak.
- You could have the best plan, gear and management in the world, but we still don't know what to expect in a real accident. You have to be prepared for the unexpected. The flexibility to deal with uncertainty might be better than just having a very detailed plan.

3) What are best practices for community involvement in spill response, planning, and preparation?

- Teach kids what to do with educational materials. Involve youth in science.
- Oil spill preparedness should go hand in hand with prevention of spills.
- There are great local guys who respond to onshore oil spills. Start with them and build outwards.

- Keep consulting local experts in the community who really know currents, ice, etc. Keep experts from Barrow in the room with industry and agency experts. Get the elders from the community who can help, who are trusted.
- Visiting the communities and staying for longer periods of time. More extended interaction than a workshop. Then you can get down to specifics in a plan. You can't do it from Anchorage or Seattle or far away.
- The native corporations should be the contractees for spill response.
- People will be devastated after a spill and will want a just response. The spillers should be held responsible, and everyone should take a hard look at prevention of another spill.
- To clean up somebody's mistake for the sake of money would mean rejecting your own values. Why is money so important that we have to drill and ship in the Arctic?
- It seems like the law treats the communities and companies unfairly differently. Legal rules need to be more consistent.
- You need gas to go hunt, and money to get gas. But not everyone fits into a job. How do we take care of people who do subsistence in a spill? Can state and federal rules change to extend the areas where people hunt?
- Do these meetings result in change?
- There's a lot of research fatigue.

4) What are your initial reactions to Arctic ERMA®?

- It can be helpful. ERMA proved itself in the Gulf. "Put a parka on it!" (Adapt it to the Arctic.) Have the local people be shepherds of the project, not just as flora and fauna. People here can be respondents and experts, especially elders, and they will try to make things better.
- The demo today helped show how much information is in there, especially the AIS. Incorporating local priorities into GIS is important.

5) How could the tool be useful for community involvement in spill response?

- If teachers could use ERMA, kids would get involved and familiar with it.
- It will benefit response time and make response more efficient.
- Every little bit helps. More information means better decisions.
- You can track things in real time instead of waiting for the next announcement at a meeting. This is especially good for spills far away.

6) What information would you like to see included in the tool to support response decisions?

- Ocean currents
- Real-time observations
- Habitat migrations
- Bringing science that gets done locally back home, and making sure that the same study doesn't get done over and over again.
- Trust local knowledge.

Group B Breakout Session II: Discussion of NRDA, Restoration/Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA® can help

Breakout Group Questions:

1) What effects of oil spills most concern you (for example, health and use of natural resources)?

- Krill and animals that are important food-chain links
- Subsistence
- Fish habitats
- Food security for people
- Migratory or travelling animals
- Stress from increased boat/helicopter noise
- More artificial lights

2) Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)

- Hanna Shoal. It is a critical habitat for all the species in the ecosystem.
- Ice. Ice supports a lot of species.
- Currents that are biological hotspots.

3) Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?

- Migratory patterns that are already changing because of light pollution, buildings, pipelines, etc.
- Sound levels increasing animal stress

4) How could the ERMA tool be useful for evaluating effects of spills?

5) What information would you like to see included in the tool to support evaluation of effects?

- ADF&G has subsistence surveys.

Group B – Session II

- Other food security projects in AK
- North Slope Borough Wildlife Information
- Animal tags
- Other local research
- The oil company data from the MOU, via AOOS

6) What are best practices for community involvement in evaluating effects?

- First, ask. Any directed NRDA process is going to rely on local and indigenous groups.
- Roundtable discussions
- Communication, especially about food security.
- Local hire
- Have a rep from each village, preferably the experts in wildlife
- The FEMA online courses on Unified Command are useful and free. FEMAstudy.com

Group B Breakout Session III: Discussion of NRDA, Restoration & Recovery

Theme: Exploring restoration options and how ERMA® can help

Breakout Group Questions:

1) What specific concerns do you have relative to restoration and recovery?

- The distance to travel to offload recovered oil, especially under hazardous conditions
- Vessels that are sound enough to recover oil, or do restoration without themselves failing
- We don't have the equipment, the knowledge, or the manpower for response or NRDA
- Corporations have too much motivation to hinder the process, not help it

2) Are there examples of habitat areas that could be improved?

3) Are there other sources of contamination that could be controlled?

- Light pollution
- Helicopter traffic (it is controlled by permit, but there are violators)
- Sound pollution
- Work towards limiting shipping in the Arctic
- A vessel management plan that coordinates offshore traffic
- Make oil companies share equipment to limit their physical impact
- Boat traffic (especially in spots where the traffic is like a wall that blocks species)

4) What traditional methods of restoration and recovery are practiced?

5) What could be done to sustain cultural and subsistence practices that might be affected by oil?

- Sustainable ecotourism as an alternative economic development to oil
- Funding for the young hunters program
- Boat ramp
- Funding for sharing whales between communities
- Hire people to be educators to the industry
- Whale census every year, not every other
- Put in a time of marine mammal take moratorium (even for science)

6) What are best practices for community involvement in restoration and recovery?

- Regional corporations could focus on the process
- Investing in education ahead of a spill, help steer youth towards STEM fields to be North Slope scientists
- Listen to traditional knowledge (example of the whale count in 1977)
- Ask the co-management groups for their needs, not just their knowledge

7) How could the ERMA tool be useful for planning restoration?

- It can assimilate and analyze existing data

8) What information would you like to see included in the tool to support restoration planning?

- North Slope Borough harvest data
- ADF&G Harvest data
- Synthesis of Arctic Research (SOAR)
- Unusual mortality event data

Small Group C Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA®

Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA® can help

Breakout Group Questions:

We were taking into account a worst case scenario for many of these comments

1) What specific concerns do you have relative to planning and preparation for spill response?

- How do local community people help out in a response?
- Safety concerns – for example, low temperatures; Safety prep for toxic materials that could affect people
- Communication issues?
 - Most people use VHF radios. Tell other folks what is going on – ice conditions. (Range is 30-60 miles away).
 - Satellite phones and cell phones could fill in the gaps
 - Pre-establish channels to use for spill communication
 - Establish phone tree for communication/coordination
 - Speaker to share information with local people.
 - Make sure people don't go into hazardous areas. (Map air hazards)
 - What about communication with industry and Coast Guard?
 - Concerns about low internet bandwidth and high user traffic during incident
- Does ERMA have local response plans?
- Mapping of command centers.
- Weather info – wind, current conditions
- Identify information about animal migration locations and seasons
- Local asset assessment
 - Skiff availability
 - Find out list of who has 6-pack license?
 - Places to stay; base camp, other lodging

2) What specific concerns do you have relative to spill response implementation and management?

- State/industry has thought of a worst case scenario, but has community thought about and gone through exercise to codify this information? How is this different from state/industry worst case scenario? Plan ahead of time where you would go for spill response.
Prioritization
- Integrate elders into prioritization process

- Keep in mind that these tools/maps/etc. are a virtual environment. They are not on the ground.
- Potential issues with band width. Internet and phone not as reliable
- Local solutions and external solutions may not match, even if using same info
- Don't have equipment to respond to spill
- If spill is on sea ice, have to break trail to get there could take days.
- Don't have infrastructure to support large equipment being brought in
- Logistics issues, especially in smaller villages.
- How can you get food if you can't fly it in? Will locals have to provide caribou nose?
- Fuel and water availability? Cost of fuel during incident relative to cost to replace it.

3) What are best practices for community involvement in spill response, planning, and preparation?

- Radio – KBRW (communications)
- Village Response Teams - Knowing who the trained people are
- Raise community awareness of VRT activities
- Training of VRT and others in ICS, response, first aid
- Village, city, and Borough could get ICS training
- Include local, Inupiaq place names (IHLC)
- Tap into warnings about health issues --- share information widely (radio, etc)
- List of experts in local conditions (sea ice)
- Facebook/social media
- Might need to use schools and health clinics for central locations to access internet and communications

4) What are your initial reactions to Arctic ERMA®?

- First time people have heard of it
- Looks helpful
- If accessible online, people could use it and become more familiar with it
- How could it be used for ground-truthing during a situation
- We need to do some testing at some lower band-widths
 - Test with lots of users at once
- Not duplicative – specifically designed for Emergency Response. New technology that will be helpful
- Concerns:
 - How accurate is information
 - How much control would ERMA have if it came down to a court case? (Even if password protected information).
 - Unintended use of information

5) How could the tool be useful for community involvement in spill response?

- Want to make sure community has ability to ground-truth the information that is in ERMA.
- Community ability to give digital photos off smartphones with GPS position/time/date
- Helps to have info centralized
- Low-bandwidth version for community access
- Would like a locally-aimed ERMA tutorial. (Not emergency tutorial). Builds local capacity

6) What information would you like to see included in the tool to support response decisions?

- Liked example of subsistence info in NWAB
- Information is more important to local community than to others
- Information about who flies, flight times and frequency
- Topography
- Wetlands, lakes, rivers
- Locations of drums for markers on the land – close to trails/landmarks
- Trail maps – winter and summer
- Does ERMA have local response plans?
- Mapping of command centers.
- Weather info – wind, current conditions
- Identify information about animal migration locations and seasons
- Local asset assessment
 - Skiff availability
 - Find out list of who has 6-pack license?
- Places to stay; base camp, other lodging
- Consider having updates and notices in ERMA – because it would be all in one place.

Small Group C Breakout Session II: Discussion of NRDA, Restoration/Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA® can help

Breakout Group Questions:

1) What effects of oil spills most concern you (for example, health and use of natural resources)?

- Marine mammals
- Birds
- Fish
- Crab or other shellfish
- Land mammals
- Other cultural concerns (for example, education, language, arts)
- All of the above; it's a chain of reaction lifestyle
- Cultural impact is a big concern
- Concern about animals dying off due what they eat (what was impacted from spill)
- The whale is celebrated all year long. It has a cultural importance.
- Bearded seals in summer
- Caribou – summer, fall, winter
- Need to get information directly from the villages – this is only part of the true information from this meeting
- Vegetation, including roots used for tea –
 - masu
 - Ipiq – greens
- Sea worms
- Razor clams
- Lichen – food for caribou
- Salmonberries
- Blueberries
- Blackberries
- Cranberries
- Rhubarb – kuoq, qungulik (??)
- Tundra for sod houses for meat cache
- Marine mammals – whales, seals, walrus, beluga, bowhead, bearded seal, spotted seal, ringed seal; grey whales
- occasional killer whales (not hunted – sacred)
- polar bears
- porpoise, dolphin – rare, not hunted
- trout,
- king, silver, pink chum salmon,
- pikes, whitefish (several types), graylings, tomcods, smelt, burbot

- 3 or 4 known by Inupiat names only:
- Humpback whitefish
- Geese, common eider, king eider, spectacled eider*, stellar eider*, snow geese, swans, snowy owls, cranes, falcons*, ravens*, hawks*, golden eagles*, ptarmigan, pintails, auklets, kittiwakes, seagulls (* = not hunted)
- Eggs – murre, geese, swans,
- Sandpipers (eaten long ago, but not today)
- Snow birds – tell us when springtime is here
- Interdependence among all creatures – big circle
- Green seaweed

2) Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)

- Habitats – all are linked together; all provide life
- Nomadic people – lots of graveyards
- Native allotments
- Rivers and small creeks that go into the lakes and ocean
- River deltas
- High tide goes up into river
- Lots of camp areas and family owned lands
- Ice cellars – underground freezers
- Caribou feeding grounds
- Bird nesting areas
- Fish spawning areas
- Caribou calving areas – born in June
- Point Barrow – culturally important; every village and community will have a burial site or sites;
- Put whale jawbones back in the ocean

3) ~~Given the changing Arctic environment~~, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?

- How rich the environment is with life
- Aerial photo and/or photo/video on-site to show what is in the area – burial sites, historically significant sites
- Finding areas to get new sod for re-sodding an oiled area. Mapping of coastal or riverbank areas with sod that is being sloughed off
- Everything

4) How could the ERMA tool be useful for evaluating effects of spills?

- Would like to evaluate ERMA, but couldn't do it in the breakout room (technological reality)

5) What information would you like to see included in the tool to support evaluation of effects?

- Information on currents, especially real-time information
- Slush formation in the fall; Show different ice conditions
- Ice Conditions of lagoons and rivers in addition to the oceans
- Fresh water resources – drinking water on sea ice
- Need info at a finer scale. Some general information, but not detailed enough for some purposes.
- Need to show the scale of the information – how far can you zoom in
- Historical comparisons of year to year information and trends in ice – detailed info on ice thickness
- More efforts to involve people in the villages in the research. Do research with us – create complementary jobs with researchers at the village level/location
- Fresh and saltwater mixing information
- Dynamics of freshwater on sea ice

6) What are best practices for community involvement in evaluating effects?

- More efforts to involve people in the villages in the research. Do research with us – create complementary jobs with researchers at the village level/location
- Have community plan ahead; Preparing in January for hunt in spring. Need preparation for involvement
- Each village has their own methods – wildlife departments; archives of village and Borough
- Elders have a lot of knowledge – experts; some may be shared and some may not. Trust is not there because of past experience.
- Speak the truth
- Use the structures of the existing organizations:
 - Commissions – Planning, Public Safety, Culture
 - Board members
 - Tribal and city governments
- Teamwork with knowledgeable locals

Small Group C Breakout Session III: Discussion of NRDA, Restoration & Recovery

Theme: Exploring restoration options and how ERMA® can help

Breakout Group Questions:

1) What specific concerns do you have relative to restoration and recovery?

- Whales are priceless
- Concerned about the need to prove that the damage has happened
- Burden of proof is on the community that is taking the biggest risk
- Long-term effects; eating sick whales (for example)
- Definition of restoration and recovery is not really clear
- Disruption of culture and traditional ways
- Restoration and recovery does not compensate for traditional ways
- Genocide is a harsh word, but....it's a reality

2) Are there examples of habitat areas that could be improved?

3) Are there other sources of contamination that could be controlled?

- Bilge water from commercial shipping
- Leaks from fuel barges for community delivery
- Spills from onshore oil and gas industry
- Used oil from vehicle use

4) What traditional methods of restoration and recovery are practiced?

- Re-sodding
- Re-planting
- Traditional way of leaving no trace – no impact on the land; No need for restoration

5) What could be done to sustain cultural and subsistence practices that might be affected by oil?

- Don't do it – prevention
- Each community would have their own ideas
- Must be directed from the individual villages
- Companies could have a bond to support subsistence use changes/impacts if there is some impact. Example AEW (Alaska Eskimo Whaling Commission), CAA (Conflict Avoidance Agreement)

6) What are best practices for community involvement in restoration and recovery?

- Borough planning commissions are involved in permitting
- Alaska Coastal Management program

7) How could the ERMA tool be useful for planning restoration?

8) What information would you like to see included in the tool to support restoration planning?

North Slope Borough: An Oil Spill Response Workshop Discussion Questions

Group D Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA®

Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA® can help

Breakout Group Questions:

- **What specific concerns do you have relative to planning and preparation for spill response?**
 - Biggest concern is assets on the ground (readily avail) and timing. Borough not ready for response. Don't have the assets or the time (mobilizing in time).
 - Lots of material unavailable in event of spill (infrastructure, access, resources).
 - Pie chart. Budget chart not effective at showing effectiveness/efficiencies of pieces. Not granular.
 - Ice and conditions will change the game of typical oil removal techniques. Need better testing in real life scenarios (seasonally as well). Doesn't take in to account variability of environmental conditions.
 - After drilling season, hold assets and run field tests later in the yr when conditions are different (not calm). Hoses freezing, etc. Planning for unexpected.
 - Need to be as realistic as you can be for planning, prep and response. Oil Budget chart was a real eye-opener. Community needs to know worst-case scenarios. Startling that community didn't know the inefficiencies at play in oil recovery. Then think about the challenges assoc in Arctic. Exxon was <20%
 - Can we compare terrestrial recovery rates to aquatic? What are the averages? Also comparing differences at play, many dynamics involves.
 - Dispersants, not pre-approved in Arctic, but first option being put on table if spill happens. What are the effects? Would responders use them? Summary info on dispersants – need for community education/input.
- **What specific concerns do you have relative to spill response implementation and management?**
- **What are best practices for community involvement in spill response, planning, and preparation?**

- **What are your initial reactions to Arctic ERMA®?**
 - Still some limitations. Public vs. protected. Couldn't public data (ice, wind, etc) just be avail on Google? Could get better utilization
 - Good intentions, but seasonality isn't considered, spring vs. summer, etc. factor in biological data against assets. Fall slush is more complicated than open water.
 - Info provided in computer needs to be accurate. Need to know exact time of migrations, all seasons. Bigger whales and calves in the fall time.
 - Erma vs. Google, being able to track teams in the field, highly valuable.
 - Seasonality is important, animals may show diff vulnerability during diff seasons, full bellies vs. not.
 - Proprietary data is highly important, separate permissions a good utility.
 - Internet access system is an issue on the North Slope, especially considering the people needed/infrastructure needed for a large response. Data flow.
 - Help a lot if oil spill of Chukchi or Beaufort. Are we able to have staging areas?
 - Are we able to come to villages and engage with communities? Planning time and if a response is needed. Would all agencies need to come as well (EPA, GINA, etc.)
 - Info can come from the permitting office as well.
 - Nearshore ESI is understood, what about open water? What about wildlife data? Can it be tracked during a time of response?
 - For scenarios, are we including community to know if it is an appropriate drill or response? To what extent are boroughs asked to participate in drills? Whaling commission/elders should be included. MAD Drill – NSB Planning participated, but not sure who else was included. Police, state, but unsure of subsistence hunters involvement.
 - Building relationships with whaling commission could establish trust. Real need for community involvement.
 - Kate Clarke communicating with various commissions would be advantages to coordinate with 1 POC.
 - Community members guide NSB (Wildlife Dept) in making decisions. Connections can be made now, would serve everyone better in the future (if spill happens) – building trust
 - Important for people to know each other, key to understanding what each org

does. Participatory meetings, collaboration.

- Data flow back and forth, can't be one ended.
- Focus of data and requests, data is shared, but decisions made didn't represent the hunters/users of resource.
- Access of data in general to support non-response activities, (tracking, ice conditions), if tool is available to communities, would be a greater incentive to use now and in the event of a spill. Having a dedicated "ERMA Computer" need for outreach to get eyes on it.
- BOEM GIS tool is supposed to include subsistence use areas, will start going out to communities to create new data.
- Real need for data assimilation as far as descriptions across platforms.
- **How could the tool be useful for community involvement in spill response?**
- **What information would you like to see included in the tool to support response decisions?**

Group D Breakout Session II: Discussion of NRDA, Restoration/Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help

Breakout Group Questions:

- **What effects of oil spills most concern you (for example, health and use of natural resources)?**
 - Marine mammals
 - Some mammals are too large to handle if oiled, there has been info on just killing the animal, nothing you can do...
 - Logistically, very hard to clean a bear or walrus.
 - Some concern about releasing oiled and cleaned animals, is it safe? Will locals deem it safe? Tranquilizer chemical still in the animal. Tagging the animal after, may be a way to flag the animal & designate as recently cleaned.
 - How do you deal with an oiled whale?
 - Birds
 - Even with birds, there are similar issues as with larger mammals.
 - Ducks use a wide area, could be coming from many areas. After cleaned would most likely fly back to extended range.
 - Eider egg, toxicity. fec
 - 90% of pac brant molt north of Teshepuk Lake
 - Stellars and eider go to sea for a week before flying south. What if there is oil there?
 - Fish
 - Crab or other shellfish
 - Oil could affect krill/copepods/macro-inverts, then be eaten by seals or whales (oiled baleen).
 - Real need for food source data in ERMA – zooplankton, etc. Stomach contents could be helpful, if available. Spatial element?
 - Land mammals
 - Other cultural concerns (for example, education, language, arts)
 - Five Commissions (Polar Bear, Beluga (committee), Ice Seals, Walrus, Whaling.
 - Arctic Cisco Panel, Migratory Bird Committee
 - How would responders deal with oil spill clean-up each season?
 - What if oil can't be fingerprinted/RP identified? USCG or NRDA can potentially release funds to assess.
 - Funds before the spill, for preparedness? Baseline tissue samples are sometimes taken, but not analyzed.

Off NRDA topic:

- If spill, other leases would be shut down? Lost revenue during moratorium to any stakeholder involved.
- All dots not connected for spill response and damage assessment. Oil companies having non-profits (Prudhoe Bay example), fee to enter into non-profit, as of 2010, billions of dollars in fund. BP paid out lost revenue to AK due to moratorium.
- North Slope has a heightened state of exhaustion with drilling topic, more experience, more pressure.

- Responsibility to assess and fix, not enough prevention. Not letting a spill happen. Human error always present. Norway much more careful (two blow-out preventers), but StatOil would only comply with US standards if drilling here.
 - No backbone in policy to address these issues.
 - Boat traffic another huge issue, if double-hulled ships were required that would be huge step in terms of accountability to prevent.
 - Agreement from some that development should not be pursued due to lack of readiness to prevent/respond.
 - So many shifting baselines, climate change controlling many, it's a bad time to pursue development. Cannot predict, only probability. Should wait ten years.
-
- **Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)**
 - **Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?**
 - **How could the ERMA tool be useful for evaluating effects of spills?**
 - **What information would you like to see included in the tool to support evaluation of effects?**
 - **What are best practices for community involvement in evaluating effects?**

Group D Breakout Session III: Discussion of NRDA, Restoration & Recovery

Theme: Exploring restoration options and how ERMA[®] can help

Breakout Group Questions:

- **What specific concerns do you have relative to restoration and recovery?**
 - Icebergs covered in oil, how to deal/restore?
 - If you burn the iceberg, how do you mitigate the habitat loss for seals? Could use manmade platforms/hull-outs...
 - To compensate for lost trips (whaling, hunting) develop a video game to replace the experience...
 - Whaling in ice, majority was glacier ice (strong/stable), now ice is hard to find, young ice, unsafe.
 - Changes to migration because of pollution. Animals being diverted. No end in sight, will go on forever.
 - Blow out occurred and community all came to meeting, they are most impacted.
 - Lessons learned from oil companies (maintenance, etc.). Oil companies getting closer to villages, habitats. Seen a lot of change. Caribou getting sick. No research is done. Only studying certain types of species, not ecosystem. Subsistence depends on diversity.
- **Are there examples of habitat areas that could be improved?**
- **Are there other sources of contamination that could be controlled?**
- **What traditional methods of restoration and recovery are practiced?**
- **What could be done to sustain cultural and subsistence practices that might be affected by oil?**
 - If coastline is destroyed, village may have to be moved. Been done during Indian re-distribution.
 - Tsunamis have also controlled this activity.
 - During Exxon, clean-up crews caused more damage, local boats were more effective
 - Regulations eased in other areas not affected, and hunting rights could be given.
 - Repsol site not fully clean-up, legacy sites. Could cleaning those up mitigate a damaged resource?
 - Ex in WA. Piping plover was oiled, restoration created areas excluding predators so they could recover.

- Resource use is shifting back and forth, migrating past boundaries (Canada taking Belugas usually used by natives). Is this defensible?
 - Listing Ice seals as endangered, putting restrictions on subsistence.
 - Multiple impacts being listed in addition to oil spills UME (unexplained mortality event)
 - Entire coastline of AK is under erosion. To prevent this as a stipulation as a restoration measure. Install a seawall before drilling occurs.
 - During DWH/Katrina similar measures as restoration were created to prevent further degradation.
 - Conservation “banking” ex: BP invests in bird habitat, beforehand. Agreement on credit is made. If bird dies, this project would mitigate the potential future losses.
 - Erosion is a large scale coastal issue. How do you restore a dynamic environ?
 - Restoring prey-base. Fish passage restoration. Contaminated site affecting a stream. Provide other food source to predator.
 - Spill in marine environ. Shut down areas of use after so species could bounce back. Buffer to reduce stressors.
 - Compensating the human side (health care, infrastructure, energy sources). Improving quality of life.
 - Subsistence loss can't be replaced, going to the store is not an option/prices too much
 - Global warming is happening in villages. Ice cellars are thawing.
 - Comes down to \$\$\$\$. Would a post office suffice? How is that different to money?
 - There is recognition that subsistence is not replaceable.
 - Reduced prices of grocery/transport, RP would fund. Need to calculate compensation amount and how long.
 - Faster Internet paid for. Bigger/better airports.
 - Then becomes the question, are villages a ward of the state. Loss of culture. Tracing families and historical movements. Would it be an option to move back to historical village?
 - Thinking of it more multi-faceted, augmenting caribou herds and some examples above?
- **What are best practices for community involvement in restoration and recovery?**

Group D

- **How could the ERMA tool be useful for planning restoration?**
- **What information would you like to see included in the tool to support restoration planning?**

2nd Report Out (Session II & III) – Additional Comments:

Incomplete clean-up on Colville River (Near Nuiqsut & Alpine) by Army Corps, who will continue to clean-up?

Today and yesterday was kind of depressing. The subject matter and topics are hard to discuss. We barely scratched the surface of the conversation. Thankful for the time everyone spent together. Looking forward to continued conversation. People coming into the community learned a great deal from the community. Thanks to Nancy, brings an objective stance to the conversation, which is vital.

Thanks to the NSB Wildlife Dept for inviting CRRC, NOAA.

Group E Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA®

Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA® can help

Breakout Group Questions:

1) What specific concerns do you have relative to planning and preparation for spill response?

- Logistics – major issue. Does ERMA have information regarding these issues (i.e.: runways lengths, hotel rooms etc)?
- Survey has been conducted in Barrow regarding possible room for responders – conducted by industry. Has this info been shared?
- Issues of movement of people – moving responders, camps are already full. Extra trailers and housing is very limited.
- Supplies and equipment – it is limited, issues of sharing it among industry and communities. Overall they would like to see more storage of response equipment. Borough should not have to be in situation of having to figure out who/if who should get response material.
- Equipment tracking and inventory must be maintained. Challenge of keeping it current.
- With drilling offshore there will be an increase of spill response.
- ERMA needs to document what spill response material/machines etc is available. How many of a type of response material can be staged where? Where are the potential bottlenecks? Capacity of airports? Villages (food, beds, fuel, waste capacity)? How do airports and other places change with the seasons? Overall a community by community evaluation.
- Right now Villages do not have the capacity to take on the potential influx of people for a spill.
- Seasonal weather conditions with airports need to be known, (i.e.: mud etc). This type of information should go into the community profile. ERMA should be able to take this data in via real times (like ice forecast). Can we get a plane in there today? This information is going out to pilots, can we get this into ERMA.
- Have oil companies done possible impacts to the communities about possible spill logistics impacts? Shell has announced that they are going to do this.
- Does ERMA track information about potential spills from a ship based or other source spill? Their spill response equipment incorporated into ERMA?

- ERMA has to track equipment and capacity to respond to a ship based spill
- Having an idea in the community can actually respond? (HAZWOP training) – needs to be in ERMA
- ERMA needs to have a list of response priority – which resources have priority needs to clearly listed.
- Challenge of response materials is keeping the information current.
- Number and VOO's can crew availability in the area---an asset map

2) What specific concerns do you have relative to spill response implementation and management?

- Management and leadership training, especially at the village level. Those in ICS system need to know their role, also a level of HAZWOPER training.
- Trained personal - current levels of trained response personal in the North Slope could be quickly expanding via training efforts (AK Clean Seas). Set up training and you can quickly expand local response capacity. Can also be done in VOO's

3) What are best practices for community involvement in spill response, planning, and preparation?

- Communication from the ICS to the villages. Why are decisions being made and why? This information should be able to be explained in ERMA. Show that decisions are not being made on the fly, pre-planning is being implemented.
- Keep local people in the picture
- Use a wide range of methods to inform the community about why ICS is making decisions. Use community meetings, radio, CB. Educating the locals – they need to be kept informed – to also prevent misinformation and panic.
- Community can hire consultant to work with community members to map out resources, they wanted to identify what was important to the community. This information has potential sites for response efforts
- Rarely is there compensation for the community members who par in community meetings. Maybe the government should figure out a way to compensate these communities for their efforts. Hence door prizes are so valuable to get people to the meetings. Got perhaps should hire people to help collect information from villages about resource use, this would provide a POC for response efforts.

- Government is collecting funds from leases etc but limited funds are coming back into the communities
- The companies and organizations that work best in the community are those that are routinely in the community
- Should these discussions about community communication occur more often? The Borough is a good resource for efforts to work on these issues regarding how to work with communities in emergency response efforts. The LEPC is a great start.
- A good follow up from this meeting is how to build improved communication with the communities
- Could there be a funding mechanism to fund a consistent POC in the villages regarding spill response issues (perhaps use of the LEPC). Network with what already exists... perhaps DHS grant funding.

4) What are your initial reactions to Arctic ERMA®?

- It has potential. Needs more information about ERMA to fully judge it's potential.
- It's good to see such efforts
- How long before BOEM datasets can be uploaded into ERMA? Knowing when information will be loaded will help gauge when we should view the information.
- Wainwright is the center for Shell activities; more weather information should be applied for such locations as Point Lay.
- ERMA interface – might be nice to have a way for ERMA to ask the user what type of information they are most interested in (perhaps a pick list that has grouping of layers). Then the user can drill down from there.
- Internet limitation is very important to plan for – standalone ERMA is important.
- Education is very important...

5) How could the tool be useful for community involvement in spill response?

- Put it out to where folks can get it. Put it out on facebook; display it out on the local TV networks. Allow access in homes. Social media including twitter. Need to plan for those not on social media so plan for use of TV.
- VHF radio is a good method to dispense information.
- Use leadership in villages to keep the public informed, including the schools.

6) What information would you like to see included in the tool to support response decisions?

- See answers from question 1
- Historical and archeological information, traditional land use inventory (North Slope Borough Planning, need to work out agreement to use this information they have, and protection of this information). Cultural and sensitivity information.
- Land owner information and contact information is key
- Other research data about seasonal resource information. Most of this information is in GINA, Bering Area Information Database.
- Oil companies are going to share baseline information but are not going to share it all; this would be helpful to include this additional research.

Group E Breakout Session II: Discussion of NRDA, Restoration/Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA® can help

Breakout Group Questions:

1) What effects of oil spills most concern you (for example, health and use of natural resources)?

- Marine mammals
- Birds
- Fish
- Crab or other shellfish
- Land mammals
- Other cultural concerns (for example, education, language, arts)
- Question – if there was a spill where would you be able to clean them? We need to have conversation with the community about which species should be cleaned and released. Communities have expressed concerns regarding rehabbing the species and then released. This is a huge discussion point. There are plans for cleaning polar bears. If an animal is oiled then released there is human health concerns if the animal is harvested.—this is kind of stuff that the public needs to know. Some may accept these plans while others will not.
- Looking back at Exxon, what do studies show about animals that went into rehab? What do they say? (Some evidence about long term issues with otters, these studies are being used to form plans about animal rehab).
- In the Arctic NOAA does not have a position regarding what is most appropriate for that situation (regarding animal rehab), it requires consultation with the community. Plans are currently to rehab animal at site of incident and avoid transport of species. There are existing relationships which will allow ACS to share rehab equipment to non-members.
- Areas of particular concern – everything, communities take a holistic view.
- Food chain affects, what is the chain of passing that contamination to humans?
- Who is going to be responsible for setting up rehab facilities, do we have enough in the NSB?
- NSB does not have the lab space to deal with high volume of samples (from sediment to fish etc)

- Injury assessment has a higher volume of sample than response efforts; NSB does not have the capacity to deal with such sample volumes.
- This questions has been asked over and over again, encourage NRDA to go over public comments that have been given in past public comment periods. The same things have been said over and over again.
- Tribal corporation when to AK elected Senators and spoke to them about potential site
- Supplies to clean animals and respond. Materials where shipped from AK to the Gulf. Why did they go to such extremes to gather materials?
- I was surprised how many other clean up other clean up companies existed in AK
- With the drilling now occurring I am surprised that our communities are not more prepared, why don't we see enough supplies here? Need to outfit ourselves, of course it all comes down to money.
- Felt 'black balled' from federal government regarding preparation so went out and are being proactive in their own community. We are drilling on very sensitive area we need to work together, we don't know much.
- Knowing that the data has been there and the fact that no action has been taken is troubling, regarding lack of supplies.
- There is a need to synthesize with information is available in terms of what data is needed to take the next step (i.e. NRDA). Industry and government would be better off having synthesized resource of what information is exist. Such a resource needs to be shared with the communities; this would empower people to make informed decisions.
- Once the data is gathered regarding what information exists what is the best practices to share with community: tap into school district regarding potential impacts of spills, do community town forums.
 - Because there is already so many meetings how do we get still get community members to attend?
 - It is about the way you present it and target community members (whalers) who would be interested
 - Scientists need to use common and plain language about the findings of the research. Easy and enjoyable to read. Share these results through PSA's, TV. Share videos with community, share with school children.

2) Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)

3) Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?

4) How could the ERMA tool be useful for evaluating effects of spills?

5) What information would you like to see included in the tool to support evaluation of effects?

6) What are best practices for community involvement in evaluating effects?

- Hunters have much greater health of marine mammals than scientists; they know the animal, taking advantage of this traditional knowledge.
- Hunters can take pictures of species, equipment them with technology so they can capture what they are seeing, provide technology. This will allow this information to be shared. BOEM equipped boats with GPS, so some technology is still out there which can be very valuable. Pictures can be uploaded in ERMA
- Education is key to ensure that hunters, if they are going to collect information for NRDA, they need to be trained in the correct protocol; they will also need to be compensated for their efforts.
- You have to come up and show them and provide follow up.
- Smell is also very important. Maybe helping people learn about how smell can help determine the health/impact to the species. It could be very valuable for hunters to be aware/trained in these smell issues. To get this information from the hunters for NRDA they will need to be trained and have avenues to pass along information to govt. Voice recorders to capture notes/data about the species. Or use of simple forms. Or perhaps teaming up a hunter with a biologist.
- Shell has a subsistence advisor who leading efforts to try and capture information.
- Hunters will educate others not to get certain animals during certain times of the year.

Group E Breakout Session III: Discussion of NRDA, Restoration & Recovery

Theme: Exploring restoration options and how ERMA® can help

Breakout Group Questions:

1) What specific concerns do you have relative to restoration and recovery?

- Having good baseline information is key. We learned the value of this in Exxon Valdez. Understanding what is going on now is vital to be able to address restoration. There may be other factors that may be occurring outside of the oil spill, some species have natural cycles.
- Communities need access to information regarding what is out there (i.e. population numbers), it would be nice to see what the ocean bottom is comprised of.
- If the balance is not restored there is the potential for the food chain becoming unbalanced, what are the impacts of that?
- Agencies need to think of options and share them with the communities. Reduction in hunting of species is not a good option

2) Are there examples of habitat areas that could be improved?

- Climate change – no effort to confront this issue, the communities are having to deal with its impacts. How could we reduce the emissions? It seems more likely the government is going to say stop hunting polar bears rather than going after the root of the problem (emissions).
- Communities are the ones having to deal with impacts (and potential impacts), but yet they have limited access to information.
- For large species, it can be about replacing the number of lost species (getting population numbers back up).
- Trying to quantify and restore certain numbers of a species is not realistic, there are large ecosystem impacts.
- So how would NOAA go about trying to restore a system or specific cod stocks?
- Exxon Valdez should be a model, there should be a lot of information about history of the oil.
- Communities need to be educated about types and successes of restoration

- How to fix an environment that has relative little existing impacts? Solutions of predator control may cause more problems.
- BP's good neighbor policy is a policy that has been used to try and deal with potential negative impacts on a community.
- If whales were impacted from a spill--Discussion of trying to get another quota for another species for whale, could this be possible, most likely not. Could you go to other whaling countries and asking for meat? Or perhaps going to Canada and working with them to gain access to whaling.
- Changing diet, what would be the human health impacts?

3) Are there other sources of contamination that could be controlled?

4) What traditional methods of restoration and recovery are practiced?

- When dealing with natural species population changes diets may change for a while. In the past people have had the capacity to move to be flexibility, this does no longer occur.
- There is no way to substitute for a species that was affected by the spill; it will be a change of diet or change of location of hunting (which present numerous challenges, hunting different species). Most of us would go without the species but they would not be able to afford this movement.

5) What could be done to sustain cultural and subsistence practices that might be affected by oil?

- Knowing what other tribes have done to deal with loss to resources – lessons from other tribes may help.
- Perhaps sustain is not the right term in the above questions, perhaps it should be more about what can be done to prepare the culture to not have access to traditional resources. Are they going to plan to have more councilors or more health experts to deal with a changing diet?
- Dialogue between groups (tribes), even if they have different situation would help. i.e., AK Native Knowledge Network.
- Building community cultural resilience would be helpful before a spill.
- Students recording elders and hunters traditional knowledge – perhaps additional funding could be used in these efforts (and to help spread results to communities – via dvds)

- Cultural camps are very valuable, continuing with these. Going the education route and the youth is really important. Tapping into existing database of traditional knowledge. – IHLC
- Are these cultural centers etc well received? It is depend on how it is done.
- Why are we waiting until an emergency to prepare and building response facilities?
- There are numerous existing projects that have already captured traditional ecological knowledge.

6) What are best practices for community involvement in restoration and recovery?

7) How could the ERMA tool be useful for planning restoration?

8) What information would you like to see included in the tool to support restoration planning?

Appendix E

WELCOME

North Slope Borough:
Oil Spill Workshop

November 8 - 9, 2012



Coastal Response Research Center

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North Slope Borough: Oil Spill Workshop

November 8 - 9, 2012

Nancy E. Kinner
University of New Hampshire



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Logistics

- Fire Exits
- Restrooms
- Shuttle buses to Top of the World
 - 8:15 and 8:30 AM
- Dining: breakfasts, lunches & snacks
- This evening
 - Fran Ulmer US Arctic Research Commission presentation & reception
 - In library at 5 PM
 - Open to all
- Logistical questions see Kathy Mandsager or me



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Thank You

- Thank you for warm welcome
- Thank you to North Slope Borough
- Thank You to National Oceanic and Atmospheric Administration (NOAA) and Oil Spill Recovery Institute (OSRI) for funding workshop
- Thank you to US Park Service and Tuzzy Library for facilities



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Thank You

- Thank you: Workshop Organizing Committee
 - North Slope Borough
 - Mayor's Office
 - Wildlife Management
 - Inupiat Council of Arctic Slope
 - Alaska Eskimo Whaling Commission
 - Oil Spill Recovery Institute
 - US Arctic Research Commission
 - State of Alaska Department of Environmental Conservation
 - National Oceanic and Atmospheric Administration



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THANK YOU Participants!



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Coastal Response Research Center (CRRC)

- Partnership between NOAA's Office of Response and Restoration and the University of New Hampshire
- Since 2004
 - UNH Co-Director - Nancy Kinner
 - NOAA Co-Director - Amy Merten



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Overall CRRC Mission

- Conduct and oversee basic and applied research and outreach on spill response and restoration
- Transform research results into practice
- Serve as hub for oil spill R&D
- Facilitate workshops bringing together **ALL STAKEHOLDERS** to discuss spill issues and concerns



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Arctic Marine Shipping Assessment (AMSA 2009)

- Less and less ice
- Increased shipping activity
- Increased drilling activity
- More activity/traffic = Higher risk of accidents
- Recommendation= Prepare for accidents
 - Oil spills
 - Prepare at national, state and local levels



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OIL SPILL (Offshore or Coastal)

Response

Natural Resource Damage Assessment (NRDA)

Restoration and Recovery



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Oil Spill Response

- **Natural weathering processes** = evaporation, natural dispersion, dissolution, biodegradation, settling, photolysis
- **Response methods** =
 - Oil removal processes (booms/skimbers, sorbents, chemical herders, burning, shoreline collection) **Usually \leq 20% of oil spilled**
 - Chemical dispersants

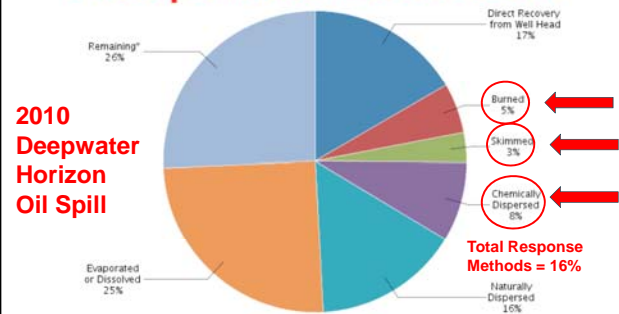


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Deepwater Horizon Oil Budget Through July 14 (Day 86)

Response Estimate



2010 Deepwater Horizon Oil Spill

Total Response Methods = 16%

Workshop Background

- **April 2010** - CRRC hosted **workshop** in Anchorage “**NRDA in Arctic Waters: The Dialogue Begins**”
 - Goal: initiate dialogue to identify data gaps for resources at risk from oil spill needed for NRDA
- **April 2011** - CRRC hosted **workshop** in Anchorage “**Arctic ERMA®**”
 - ERMA = web-based software provides information & tools to support planning, response and restoration decision-making
 - Goal: Gather data sets etc to make ERMA more useful



Workshop Background

- **April 2011**: Arctic Communities Organizing Committee formed
 - Have workshops in Arctic communities
 - Gather community input directly
- Northwest Arctic Borough workshop held in Kotzebue: May 2012
- North Slope Borough workshop in Barrow: Nov 2012
- **Continue collaborative discussions on NRDA and Arctic ERMA**



Specific Barrow Workshop Goals

- **Discuss community involvement** in spill response and natural resource damage assessment (NRDA)
- **Integrate local community information** into Arctic ERMA (Environmental Response Management Application)
- **Enhance relationships** between local communities & governmental agencies regarding planning and preparation for potential oil spill response & restoration



Thursday Morning

AGENDA - DAY 1

9:00 AM	Opening Prayer
	Welcome - North Slope Borough
9:05 AM	Welcome, Overview and Goals of Meeting Nancy E. Kinner, <i>UNH Director, Coastal Response Research Center</i>
9:25 AM	Report on the Northwest Arctic Borough Oil Spill Workshop Ukallaysaaq Tom Okleasik, <i>Northwest Arctic Borough</i>
9:40 AM	Participant Introductions & Expectations
10:20 AM	Break
10:30 AM	Overview of Spill Response Dale Gardner, <i>Alaska Dept. of Environmental Conservation, Division of Spill Prevention & Response</i>
	Overview of Alaska Department of Environmental Conservation's Role in Spill Response Thomas Delluyter, <i>Alaska Department of Environmental Conservation</i>
	Overview of North Slope Borough's Role in Spill Response Gordon Brower, <i>North Slope Borough, Community Planning Division</i>
11:15 AM	Introduction to Arctic ERMA® Amy Merten, <i>NOAA, Assessment and Restoration Division, Spatial Data Team</i>
12:00 PM	Lunch (provided)



Thursday Afternoon

1:30 PM	<p>Small Group Breakout Session I: Discussion of Oil Spill Response & Arctic ERMA® <i>Theme: Logistics of spill response, concerns and how local communities can most effectively participate and how ERMA® can help</i></p> <p>Breakout Group Questions:</p> <ul style="list-style-type: none"> • What specific concerns do you have relative to planning and preparation for spill response? • What specific concerns do you have relative to spill response implementation and management? • What are best practices for community involvement in spill response, planning, and preparation? • What are your initial reactions to Arctic ERMA®? • How could the tool be useful for community involvement in spill response? • What information would you like to see included in the tool to support response decisions?
2:30 PM	Break
2:45 PM	Group Reports to Plenary Session
4:30 PM	Adjourn meeting
5:00 PM	<p>Presentation: "How can science improve decision-making in the Arctic?" Fran Ulmer, <i>U.S. Arctic Research Commission</i> <i>(Reception to follow—Library)</i></p>



Breakout Group Questions

Session I: Discussion of Oil Spill Response & Arctic ERMA

Theme: Logistics of spill response, concerns, how local communities can most effectively participate, and how ERMA can help

- What specific concerns do you have relative to planning and preparation for spill response?
- What specific concerns do you have relative to spill response implementation & management?
- How could the tool be useful for community involvement in spill response?
- What are best practices for community involvement in spill response, planning, and preparation?
- What are your initial reactions to Arctic ERMA?
- What information would you like to see included in the tool to support response decisions?



Friday Morning

AGENDA - DAY 2	
8:30 AM	<p>Opening Prayer and Announcements Nancy Kinner</p>
8:45 AM	<p>Introduction to Natural Resource Damage Assessment (NRDA), Restoration/Recovery Mary Baker, <i>NOAA, Assessment & Restoration Division</i></p> <p>Arctic ERMA® in NRDA and Restoration/Recovery Amy Merten, Mary Baker</p>
10:15 AM	<p>Small Group Breakout Session II: Discussion of NRDA, Restoration/Recovery <i>Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help</i></p> <p>Breakout Group Questions:</p> <ul style="list-style-type: none"> • What effects of oil spills most concern you (for example, health and use of natural resources)? <ul style="list-style-type: none"> ◦ Marine mammals ◦ Birds ◦ Fish ◦ Crab or other shellfish ◦ Land mammals ◦ Other cultural concerns (for example, education, language, arts) • Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas) • Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs? • How could the ERMA tool be useful for evaluating effects of spills? • What information would you like to see included in the tool to support evaluation of effects? • What are best practices for community involvement in evaluating effects?
11:45 AM	Lunch (provided)



Breakout Group Questions

Session II: Discussion of NRDA, Restoration, and Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help

- What effects of oil spills most concern you (for example, health and use of natural resources)?
- Are there special habitats or specific areas that you are most concerned about? (sensitive areas, historical sites, camp areas)
- Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?
- How could the ERMA tool be useful for evaluating effects of spills?
- What information would you like to see included in the tool to support evaluation of effects?
- What are best practices for community involvement in evaluating effects?



Friday Afternoon

12:45 PM **Small Group Breakout Session III: Discussion of NRDA, Restoration & Recovery**
Theme: Exploring restoration options and how ERMA® can help

Breakout Group Questions:

- What specific concerns do you have relative to restoration and recovery?
- Are there examples of habitat areas that could be improved?
- Are there other sources of contamination that could be controlled?
- What traditional methods of restoration and recovery are practiced?
- What could be done to sustain cultural and subsistence practices that might be affected by oil?
- What are best practices for community involvement in restoration and recovery?
- How could the ERMA tool be useful for planning restoration?
- What information would you like to see included in the tool to support restoration planning?

2:45 PM **Group Reports to Plenary Session**

3:15 PM **Wrap Up**

4:00 PM **Adjourn**



Session III: Discussion of NRDA, Restoration, and Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help

- **What specific concerns do you have relative to restoration and recovery?**
- **Are there examples of habitat areas that could be improved?**
- **Are there other sources of contamination that could be controlled?**
- **What traditional methods of restoration and recovery are practiced?**
- **What could be done to sustain cultural and subsistence practices that might be affected by oil?**
- **What are best practices for community involvement in restoration and recovery?**
- **How could the ERMA tool be useful for planning restoration?**
- **What information would you like to see included in the tool to support restoration planning?**



Workshop Outcomes

- Report on workshop to be widely circulated
 - Federal and state agencies
 - Report from NWAB available today
- Improved Arctic ERMA®
- Enhanced relationships between communities & government agencies



Workshop Aspirations

- We will speak honestly
- We will listen to and hear one another
- We will respect each other's views
- We will have an open and fair forum
- We will have faith that we can find common ground
- All views will be documented and reflected in workshop report
- Workshop will provide benefit to all



Facilitation Pledge

- I will recognize and encourage everyone to speak
- I will discourage side conversations
- I commit to:
 - Being engaged in meeting
 - Keeping us on task and time
 - Being neutral, fair, kind, and faithful to the process
- **Stop me if I am not doing this!**



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Ukallaysaaq Tom Okleasik

Northwest Planning, Inc
Kotzebue, AK



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Participant Introductions

- Name
- Affiliation
- Community/organization representation
- What is your hope for this workshop?



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Dale Gardner

Alaska Dept. of Environmental Conservation
Division of Spill Prevention & Response



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Tom DeRuyter

Alaska Dept. of Environmental Conservation
Division of Spill Prevention & Response

State On-Scene Coordinator



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Gordon Brower

North Slope Borough
Dept of Planning & Community Services

Deputy Director



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Amy Merten

NOAA
Assessment and Restoration Division

Chief, Spatial Data Team



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Breakout Group Questions

Session I: Discussion of Oil Spill Response & Arctic ERMA

Theme: Logistics of spill response, concerns, how local communities can most effectively participate, and how ERMA can help

- What specific concerns do you have relative to planning and preparation for spill response?
- What specific concerns do you have relative to spill response implementation & management?
- How could the tool be useful for community involvement in spill response?
- What are best practices for community involvement in spill response, planning, and preparation?
- What are your initial reactions to Arctic ERMA?
- What information would you like to see included in the tool to support response decisions?



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Breakout Group Assignments

Group A Heritage Center	Group B Heritage Center	Group C Library - Commons
Group Lead: Tom DeRuyter (or Mary Baker or Dale Gardner)	Group Lead: Robert Taylor	Group Lead: Cheryl Rose
Recorder: Jessica McGloth	Recorder: Rachel Annonson	Recorder: Allison Bailey
Jay Ross Mary Baker Lauren Bendas Rusty Brown David Butler Doreen Lempke Robert Miller George Oleschun Hazel Pringone Fran Ulmer	Harry Brown, Jr Fritz Brown Sarah Coburn Jennifer Duchane Thomas Ince Amy Martin Billy Ray Peltola Emma Pickett Joe Sage Nevada Strubbe	Erika Amman Richard Cardwell Ella Lee Dale Gardner Lee Kuyback Chuck Lewis Joseph Licko Tom Olschak Thomas Oleschun Todd Shomo
Group D Library - Clerk's Office	Group E Library - Video Conference Room	
Group Lead: Gary Skigenaka	Group Lead: Sarah Allan	
Recorder: Zach Winters Staszak	Recorder: Joe Ingle	
Rhoda Abmwingak Lily Anungone Johnny Adams Charles Brown Thomas Haffner Ernest Hagmark, Jr Joseph Haldangak Vernon Redford Chris Smith Veronica Varela	Marsha Anakin Gordon Brown Craig Gerlach Marsha Gindroski Jeffrey Lloyd George Mungonook Crawford Peltola Ted Rowley Robert Savelle Vera Williams	





Report from the Northwest Arctic Borough Oil Spill Workshop

May 22-23, 2012
Kotzebue, AK

Prepared by Ukallaysaaq Tom Okleasik



Workshop Review

- * Organized in partnership with...
 - * Coastal Response and Research Center
 - * NOAA-Office of Response and Restoration
 - * Northwest Arctic Borough
- * First meeting in region with federal agencies regarding outer continental shelf (OCS)/offshore oil spill response and restoration



Workshop Review

- * First meeting including the following borough commissioners and committees
 - * Planning Commission
 - * Economic Development Commission
 - * Public Safety Commission
 - * Local Emergency Planning Committee (LEPC)

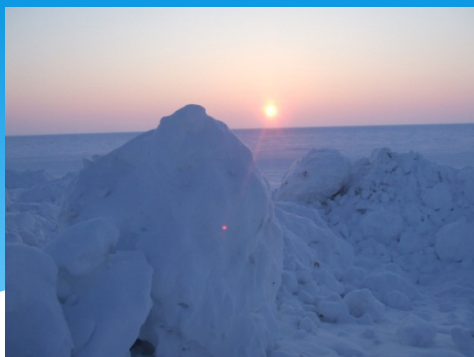


Workshop Review



* Workshop Goals

1. Discuss community **involvement** in oil spill response, natural resource damage assessment (NRDA) and restoration/recovery;
2. Integrate local community **knowledge** into the Arctic Environmental Response Management Application (Arctic ERMA®); and
3. Enhance **relationships** between local communities and government agencies regarding planning and preparation for potential oil spill response, NRDA and restoration/recovery.



Concerns

- * Implications of harsh environmental conditions (ice and severe weather) on spill response, restoration and recovery
- * Delays in Arctic response due to significant travel distances for spill response personnel and equipment
- * Limitations in spill infrastructure and logistical support including a lack of USCG stations in the Arctic
 - * E.g., vessels, fuel, boom and other supplies, equipment and maintenance, and personnel logistical support (food, housing, waste management)

Concerns



- * Potential disruption to subsistence practices and food security
 - * The subsistence way of life in the NWAB is essential for human and community health, spirituality, and culture.
- * Ecological effects of oil on migratory species and sensitive habitats
 - * E.g., lagoons, river mouths, hunting areas
- * Lack of trained local/village personnel to respond to oil spills and restore habitats/environment

Summary Recommendations



- * Build local spill response capability at the village level
- * Incorporate local/community knowledge into NRDA tools that reflect subsistence and ecological status
- * Determine baseline conditions of species and habitats likely to be affected by oil spills
- * Begin restoration planning now
 - * Need involvement now in developing specific project ideas
 - * Continue engagement of the NWAB Planning Commission, Economic Development Commission, Public Safety Commission and Local Emergency Planning Committee

Comments to Share



- * Arctic offshore resources, including oil and gas, need to be planned and developed with extreme caution and ensure that they can be done in harmony with our Inupiaq ways of life.
- * Subsistence is intertwined in our communities: it is our healthy way of life, a unique lifestyle, and proudly supports our people both economically and culturally.



Comments to Share



- * Ice covers the Chukchi, Beaufort and Arctic Ocean for up to $\frac{1}{2}$ the year
 - * Fall period ice formation, winter thickness, spring break up, and what each those conditions could mean to spill response efforts
- * Oil spills in coastal areas with tundra land conditions (clay and silt underlain with permafrost) and lagoon systems.

Comments to Share

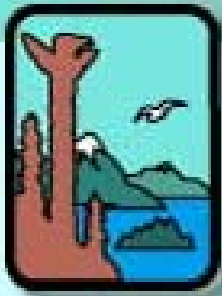


- * This is a great opportunity for dialogue to talk about our unique Arctic environment.
- * Encourage all to take advantage of this time to work together and put our concerns on the table for honest discussion.
- * Also encourage participants to share traditional knowledge and help identify the real life gaps that exist in the Arctic.

Closing

- * Quyaana for the time to review and share
- * Ukallaysaaq Tom Okleasik
 - * Past planning director for the NWAB – 2007 to 2012
- * Currently: consultant for Northwest Planning
- * www.nwplanning.net
- * E-mail ukallaysaaq@nwplanning.net





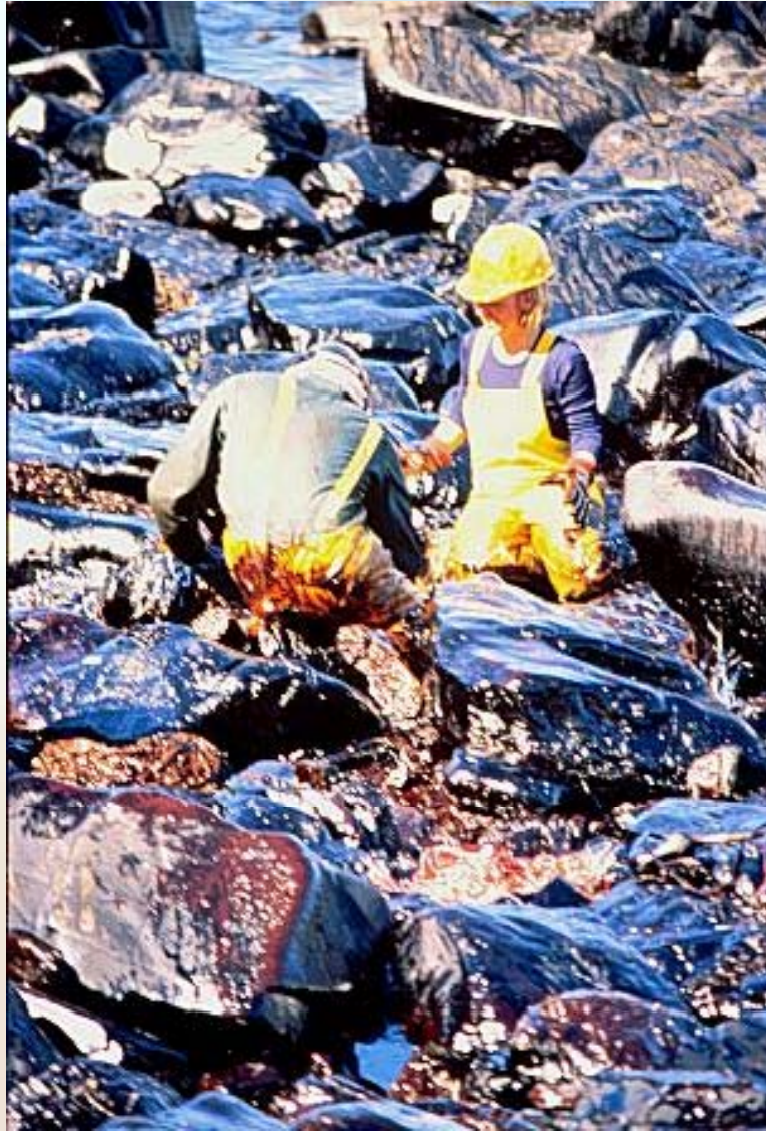
Alaska Department of Environmental Conservation



ALASKA INCIDENT MANAGEMENT SYSTEM for SPILL RESPONSE

**Dale Gardner, Regional Planner
ADEC, Division of Spill Prevention and Response**

Exxon Valdez Cleanup





GOVERNMENT PLANNING

Legal Mandates

- **Oil Pollution Act of 1990**
- **Clean Water Act – Section 311(j)(4)**
- **Alaska Statutes – AS 46.04.200**

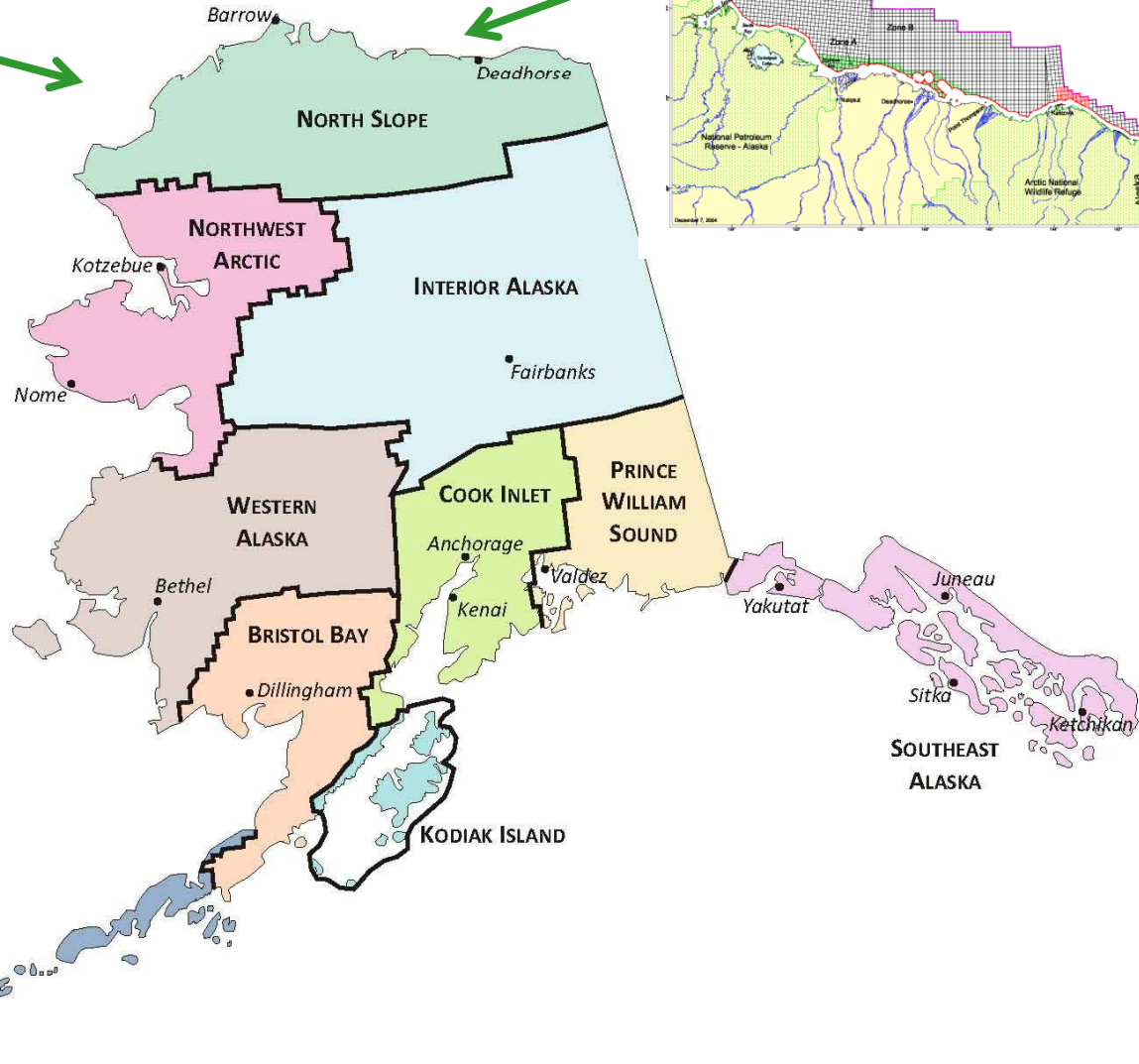
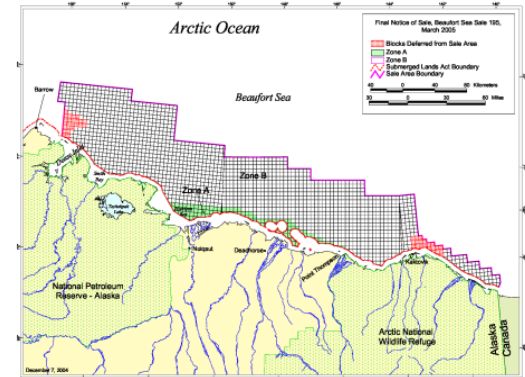
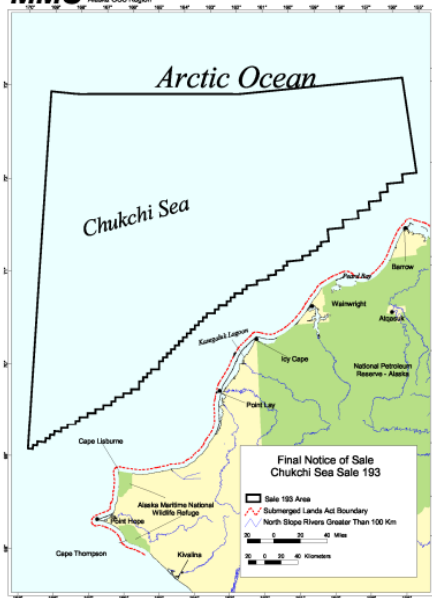
Jurisdictional Authority for Oil Spill Planning

- **OPA 90 requires USCG and EPA to create National Contingency Plan, plus Regional and Area Plans throughout the country**
- **Alaska Statute requires ADEC to develop spill response contingency plans for the ten “regions” of the state.**
- **Federal and state law require oil spill contingency plans for certain “regulated” facilities**

Alaskan Adaptation

- **Under OPA 90, the entire State of Alaska is one federal "Region," which requires its own plan. Three "Area" plans are required for the USCG and one "Area" plan for the EPA**
- **Under Alaska Statute, ADEC required to develop one State Master Plan and ten "Regional' Plans**
- **Working cooperatively, USCG, EPA, and State create a joint Unified Plan and ten "Subarea" plans that satisfy all federal and State planning requirements**
- **The USCG and the EPA agree to participate with ADEC in the State-required public review process**

Alaska's Arctic Subareas



Local Government and Tribal Roles in Federal/State Planning

- *Tribal & Local Government input is critically important to state and federal planning*
- *Input process includes Gov't to Gov't consultation, Subarea Committee outreach meetings and questionnaires, and the public review process.*

GOVERNMENT PLANNING

FEDERAL

NATIONAL CONTINGENCY PLAN

REGIONAL CONTINGENCY PLAN

AREA CONTINGENCY PLAN

STATE

STATE MASTER PLAN

REGIONAL MASTER PLANS

UNIFIED PLAN

SUBAREA PLANS

LOCAL

LOCAL EMERGENCY RESPONSE PLANS

"CZM" DISTRICT PLANS

INDUSTRY PLANNING

VESSEL C-PLANS

FACILITY C-PLANS

VESSEL C-PLANS

FACILITY C-PLANS

Who can be the Responsible Party?

- *The individual, business, tribe, native corporation, or government that owns or operates the facility or piece of equipment that causes the spill is responsible*
- *The EPA, U.S. Coast Guard, or ADEC may assist in cleaning up the spill, but will give a bill of payment due to the responsible party*

Owner/Operator Responsible Federal and State Required Plans

- ***Spill Prevention Control and Countermeasure Plan (SPCC Plan)***
- ***Facility/Vessel Response Plans***
- ***Industry Contingency Plans***

Government versus Industry Plans

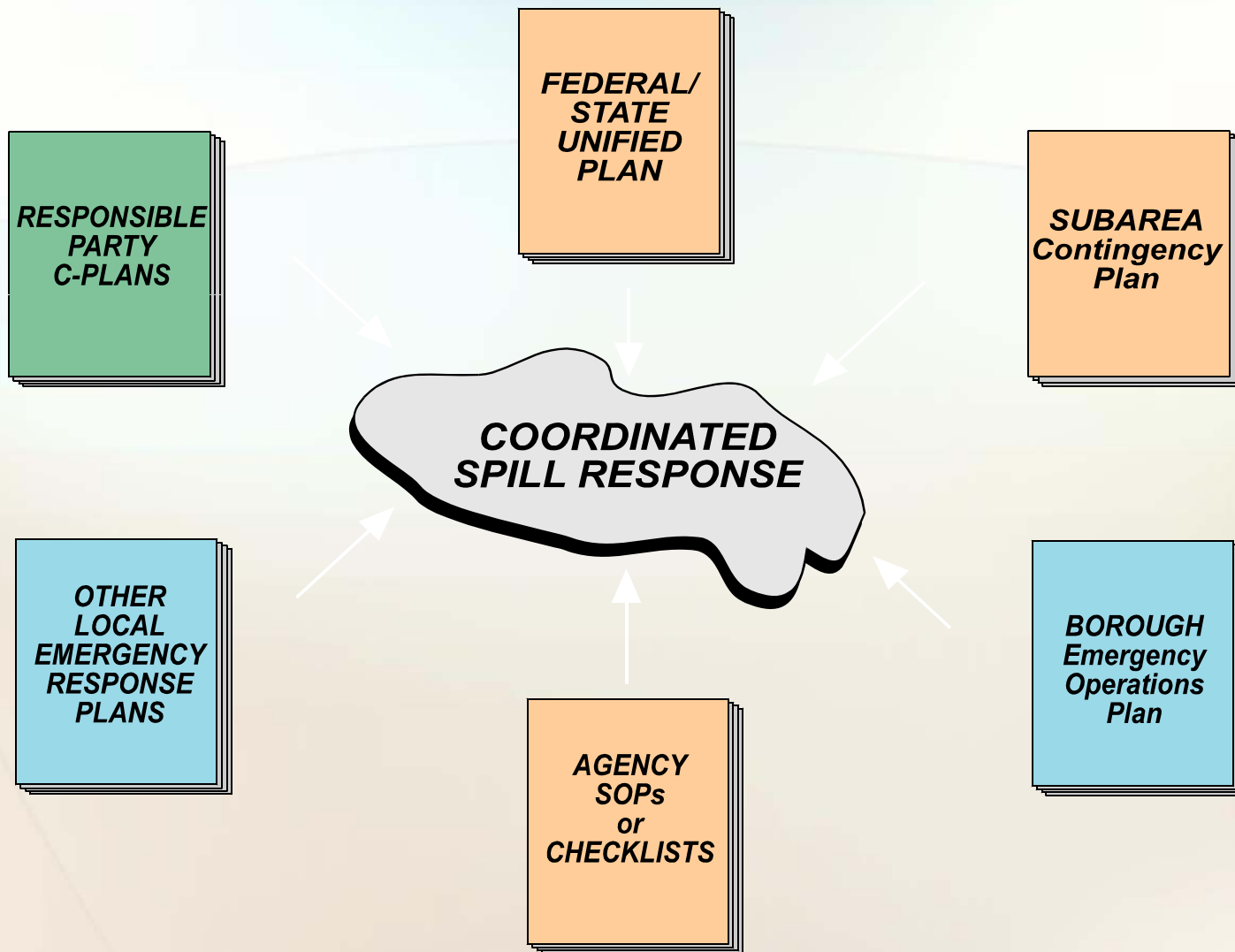
Government Plan

- Sensitive Areas Information
- Worst Case Discharge Scenario
- No equipment or resources to execute tactics and strategies
- Geographic Response Strategies
- Potential Places of Refuge
- Near shore response plans

Industry Plans

- Required for offshore exploration and production, vessels, tank farms and other regulated facilities
- Includes a Worst Case Discharge Scenario
- Include response planning standards
- Define equipment and response resources that must be available

Integrated Response



Unified Plan

- **Describes the strategy for a coordinated Federal, State, and local response to a discharge, or substantial threat of a discharge of oil or hazardous substance within Alaska.**
- **Provides information and guidance applicable to pollution responses within the entire State of Alaska, including emergency notification information, general emergency response procedures and organization, chemical countermeasures, wildlife protection guidelines, applicable MOUs, and more.**

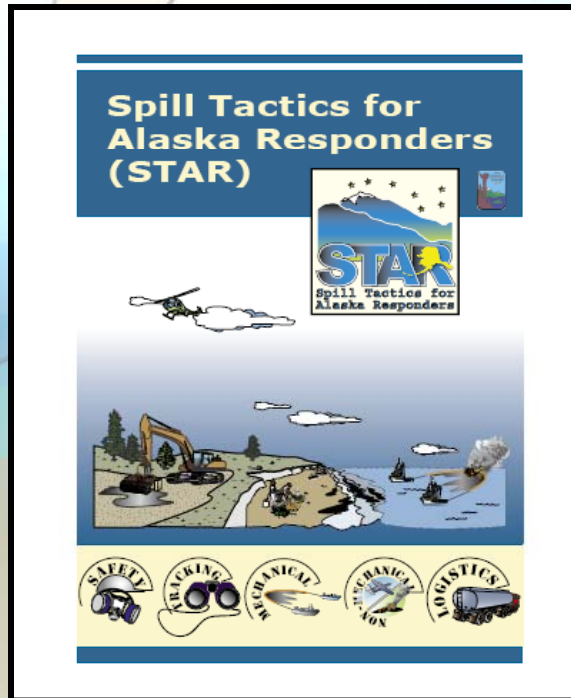
Subarea Plans



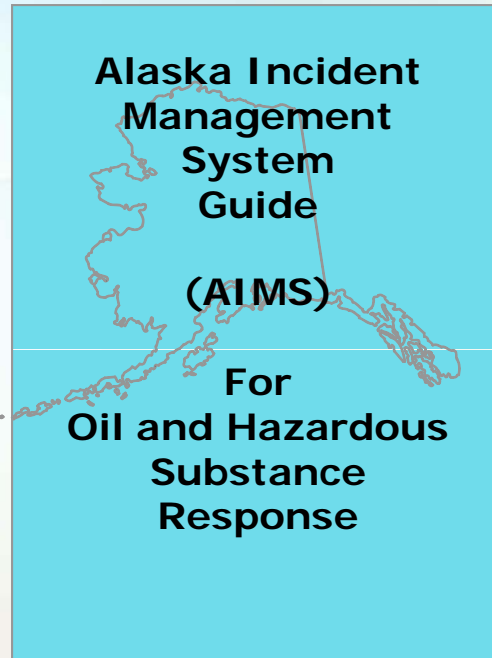
The North Slope Subarea Contingency Plan contains these eight sections.

- **A - Response**
- **B - Resources**
- **C - HazMat**
- **D - Sensitive Areas**
- **E - Background**
- **F - Scenarios**
- **G - Geographic Response Strategies**
- **H - Potential Places of Refuge**

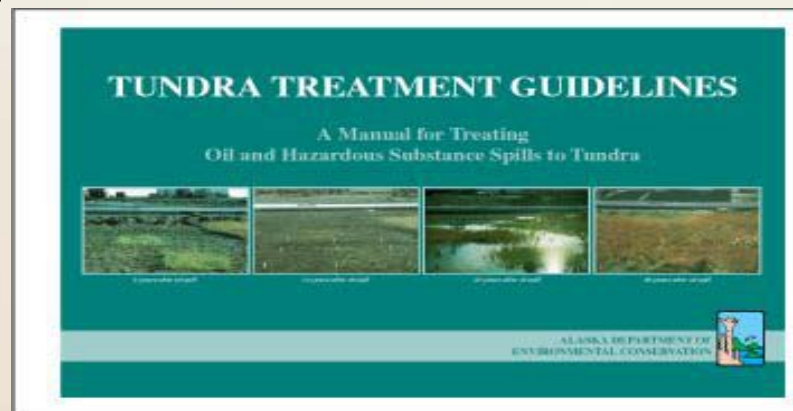
Supporting Documents



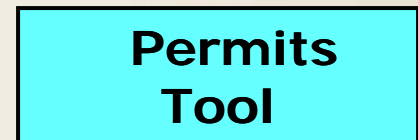
Response Tactics



**Fisheries/
Water Sampling**



Tundra Treatment Manual



**Permits
Tool**

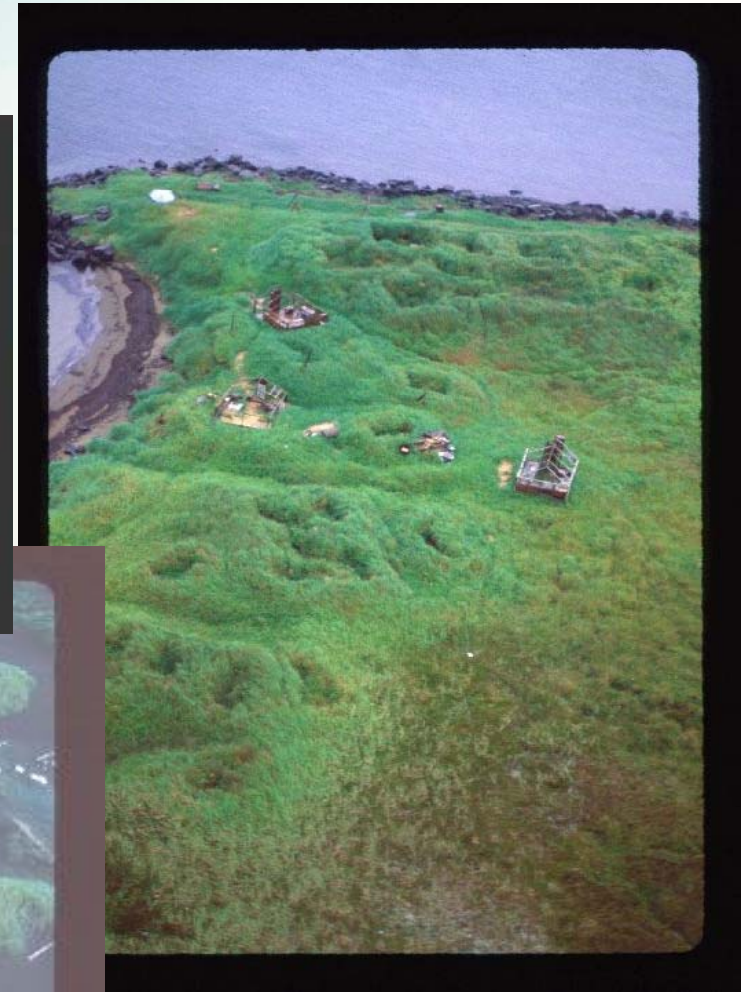
Protecting Sensitive Areas



and Resources at Risk



Sensitive areas include Cultural and Historical Sites



Accidents happen...



...or worse



Three Potential Roles for Government Agencies

- **Oversight**
- **Augmentation of RP's response**
- **As lead agency in the response**

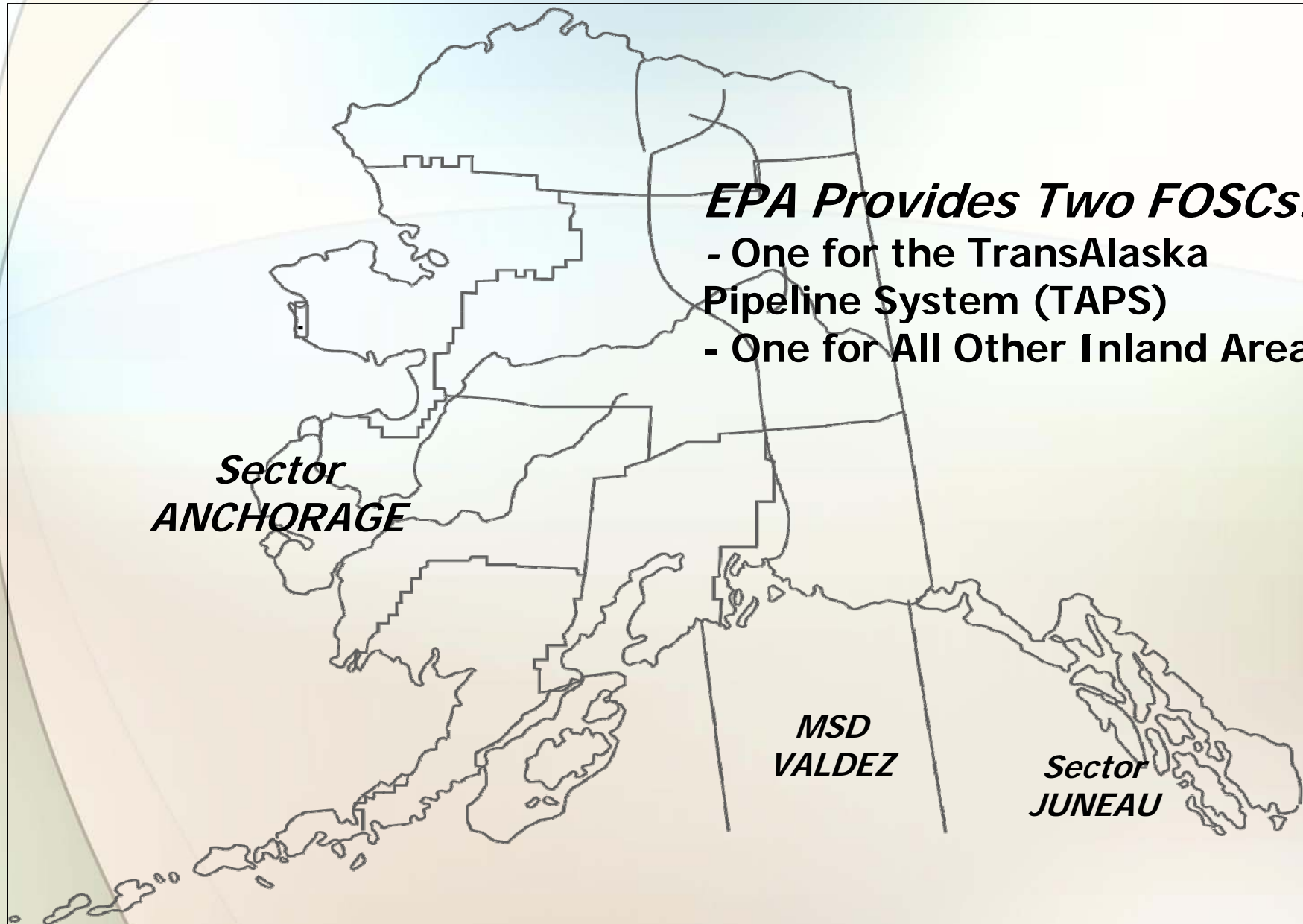
Government Roles – Oversight

- RP assumes responsibility
- RP activates their C-Plan
- Federal & State entities assume oversight role
- Agency personnel monitor adequacy of the RP's efforts

Government Roles – Augmented Response

- Lead federal and state agencies may augment RP efforts
- May fill ICS or technical specialty positions
- May provide equipment, personnel, communications, or term-contractors

Federal On-Scene Coordinators (FOSCs)



EPA Provides Two FOSCs:
- One for the TransAlaska Pipeline System (TAPS)
- One for All Other Inland Areas

***Sector
ANCHORAGE***

***MSD
VALDEZ***

***Sector
JUNEAU***

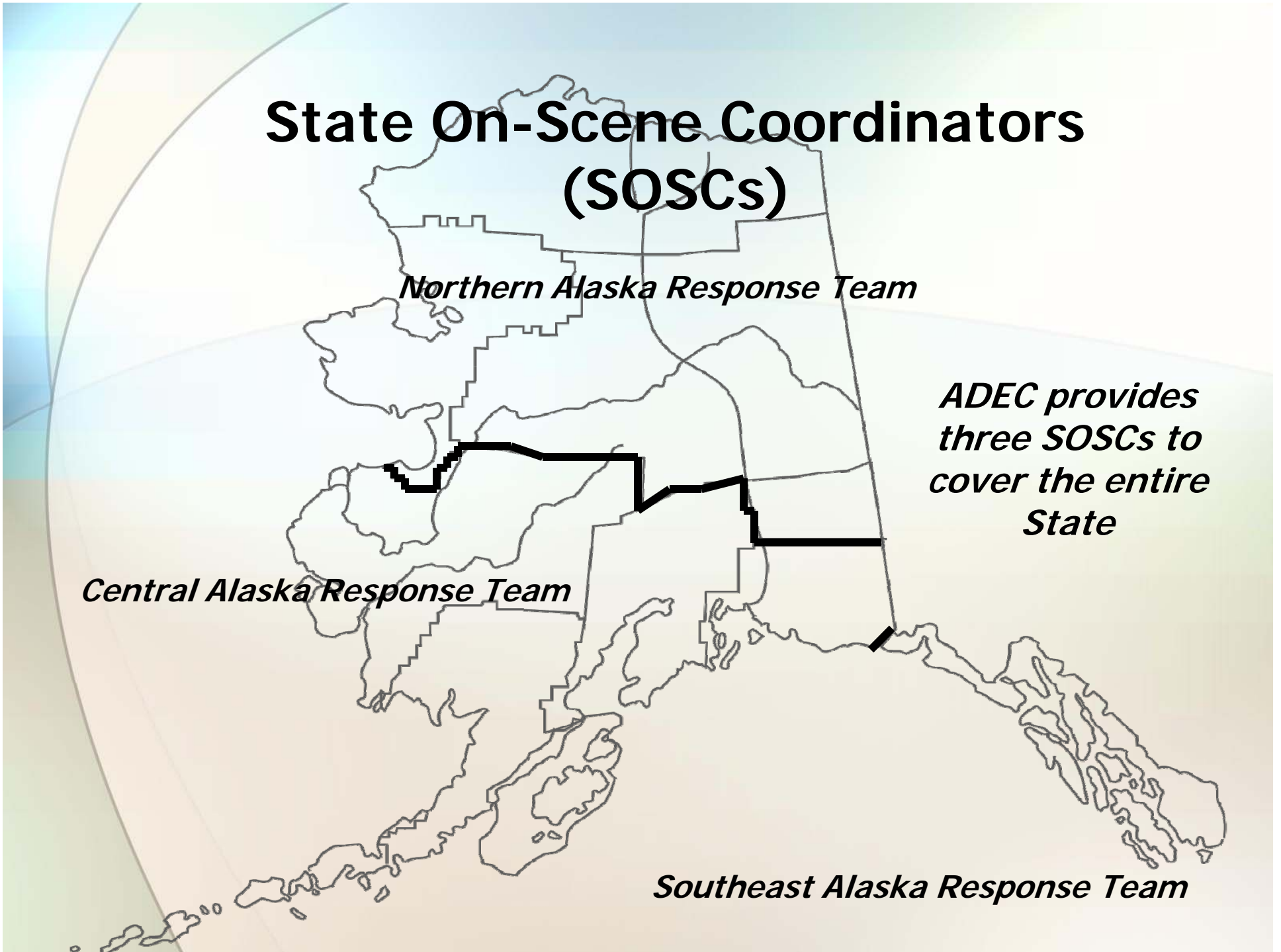
State On-Scene Coordinators (SOSCs)

Northern Alaska Response Team

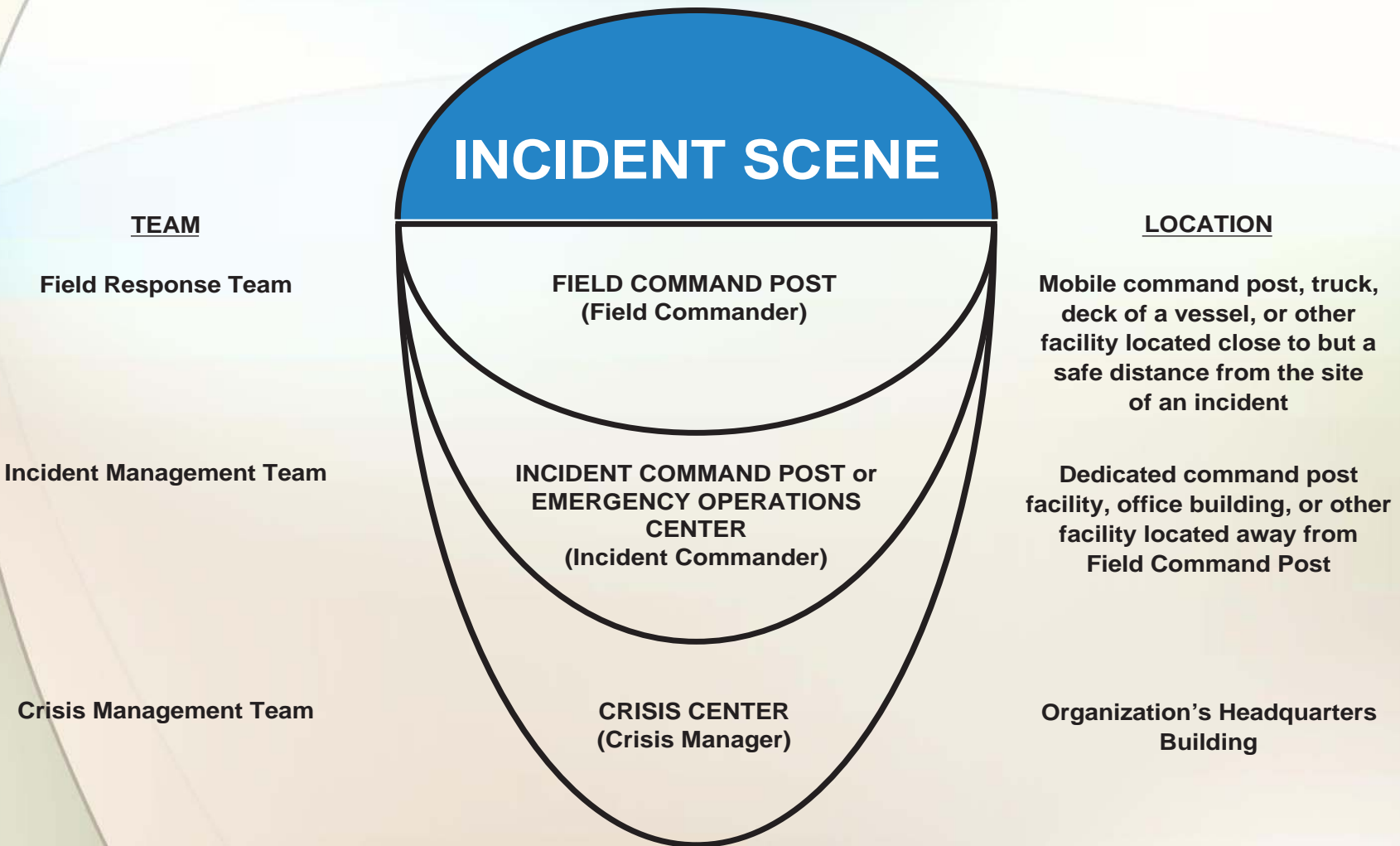
*ADEC provides
three SOSCs to
cover the entire
State*

Central Alaska Response Team

Southeast Alaska Response Team



INCIDENT RESPONSE AND CRISIS MANAGEMENT ORGANIZATION AND LOCATIONS OF RESPONSE



Federal directives and State law mandate the use of the Incident Command System (ICS) by their agencies as the emergency management system for oil and hazardous substance spill response.

ICS OVERVIEW

- Command – sets objectives
- Planning – develops response plan
- Operations – carries out the plan
- Logistics – makes purchases and moves resources
- Finance – tracks cost & pays bills

Unified Command

Federal On-Scene Coordinator
FOSC
Represents all federal agencies and interests

State On-Scene Coordinator
SOSC
Represents all State agencies and interests

Responsible Party's On-Scene Coordinator
RPOSC
Represents the Responsible Party

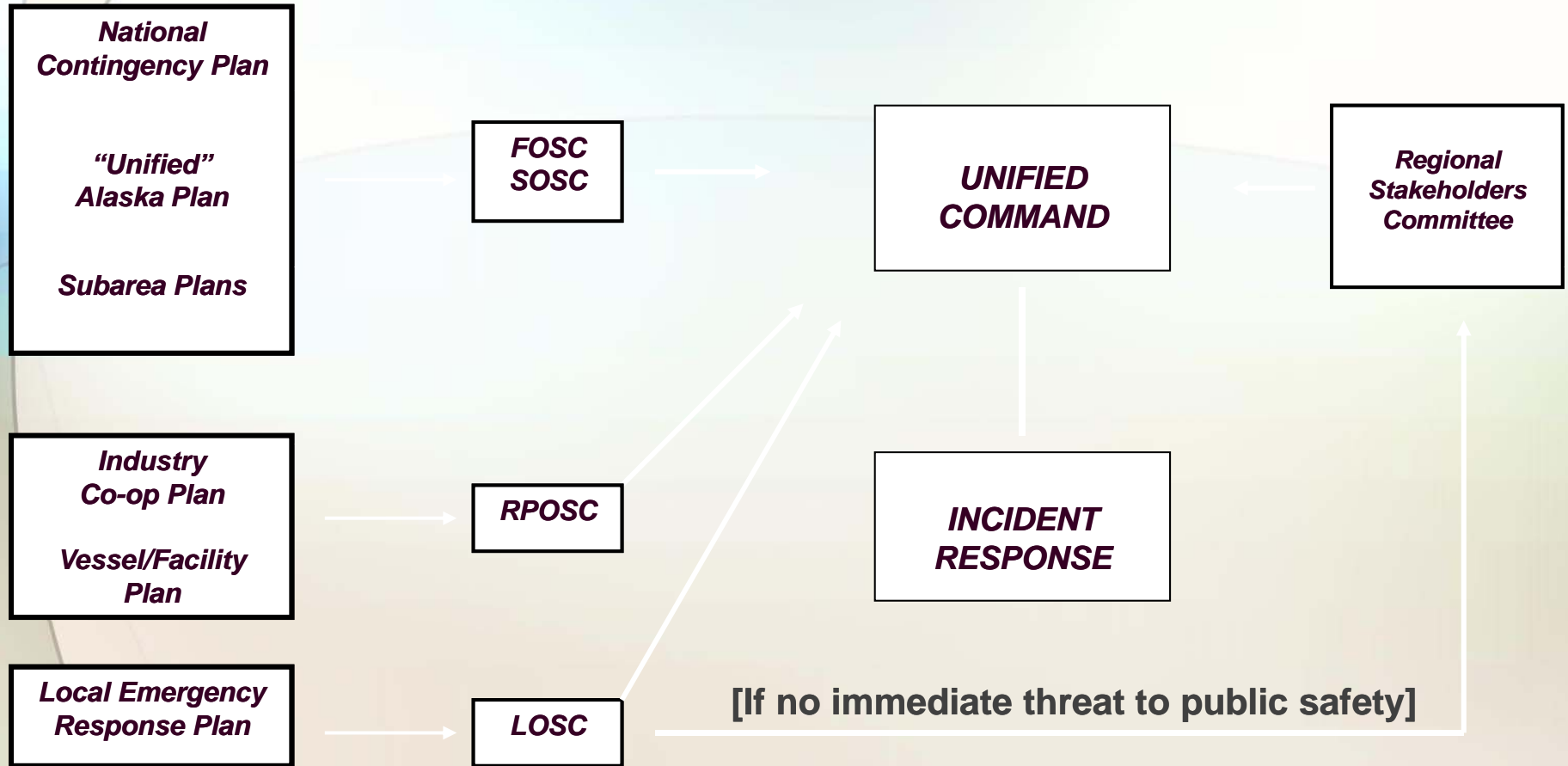
Local On-Scene Coordinator
LOSC
Represents the local government

**UNIFIED
COMMAND**

**INCIDENT
RESPONSE**

FOSC: Federal On-Scene Coordinator (US Coast Guard/EPA)
SOSC: State On-Scene Coordinator (ADEC)
LOSC: Local On-Scene Coordinator (while immediate threat to public safety exists)
RPOSC: Responsible Party On-Scene Coordinator (Spiller Designee)

On-Scene Coordinator's Relationship to Plans



*FOSC: Federal On-Scene Coordinator (US Coast Guard/EPA)
SOSC: State On-Scene Coordinator (ADEC)
LOSC: Local On-Scene Coordinator (while immediate threat to public safety exists)
RPOSC: Responsible Party On-Scene Coordinator (Spiller Designee)*

Typical ICS Response Organization

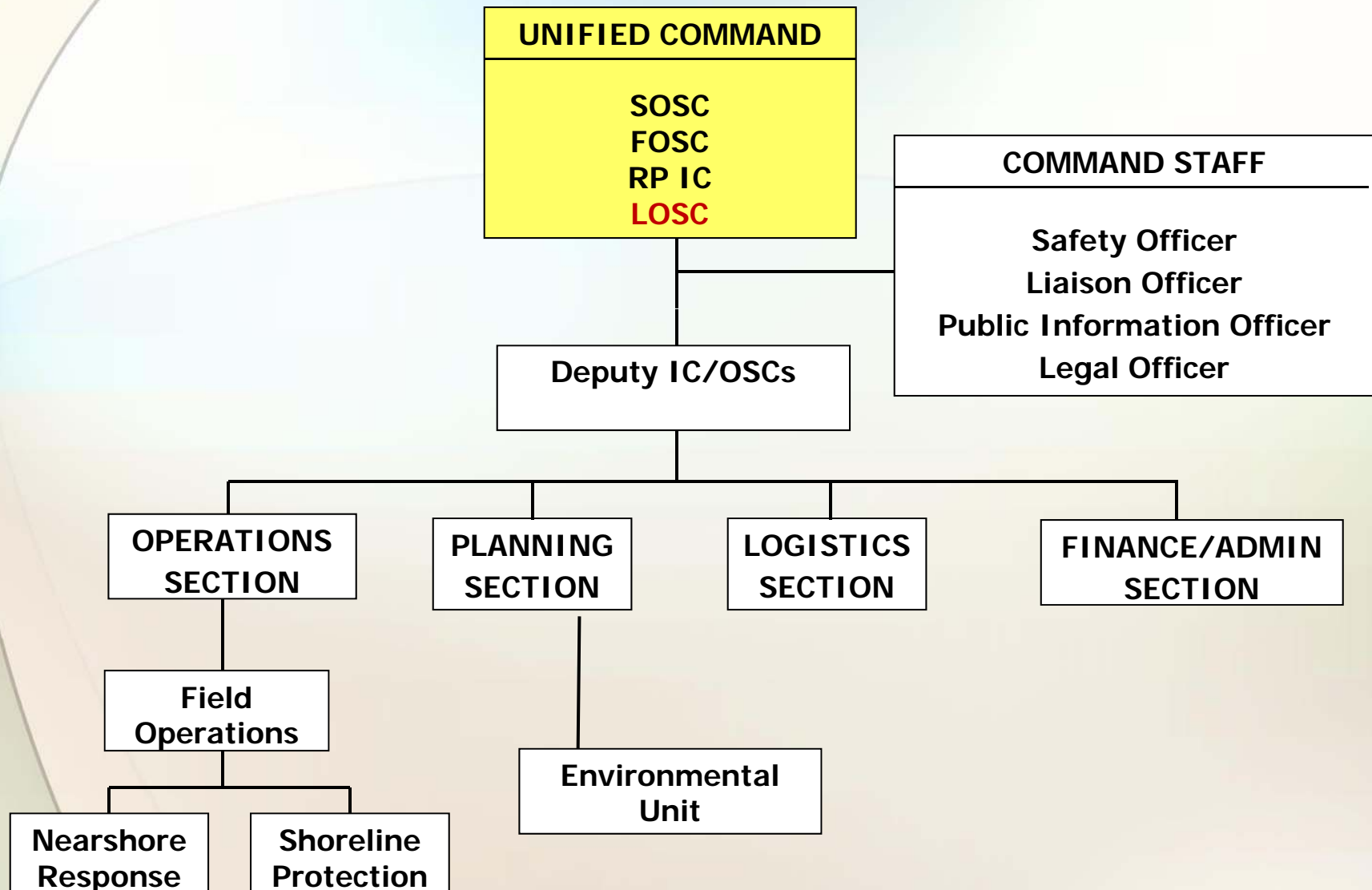



Figure A-1: ALASKA ICS STRUCTURE FOR OIL AND HAZARDOUS SUBSTANCE RELEASES

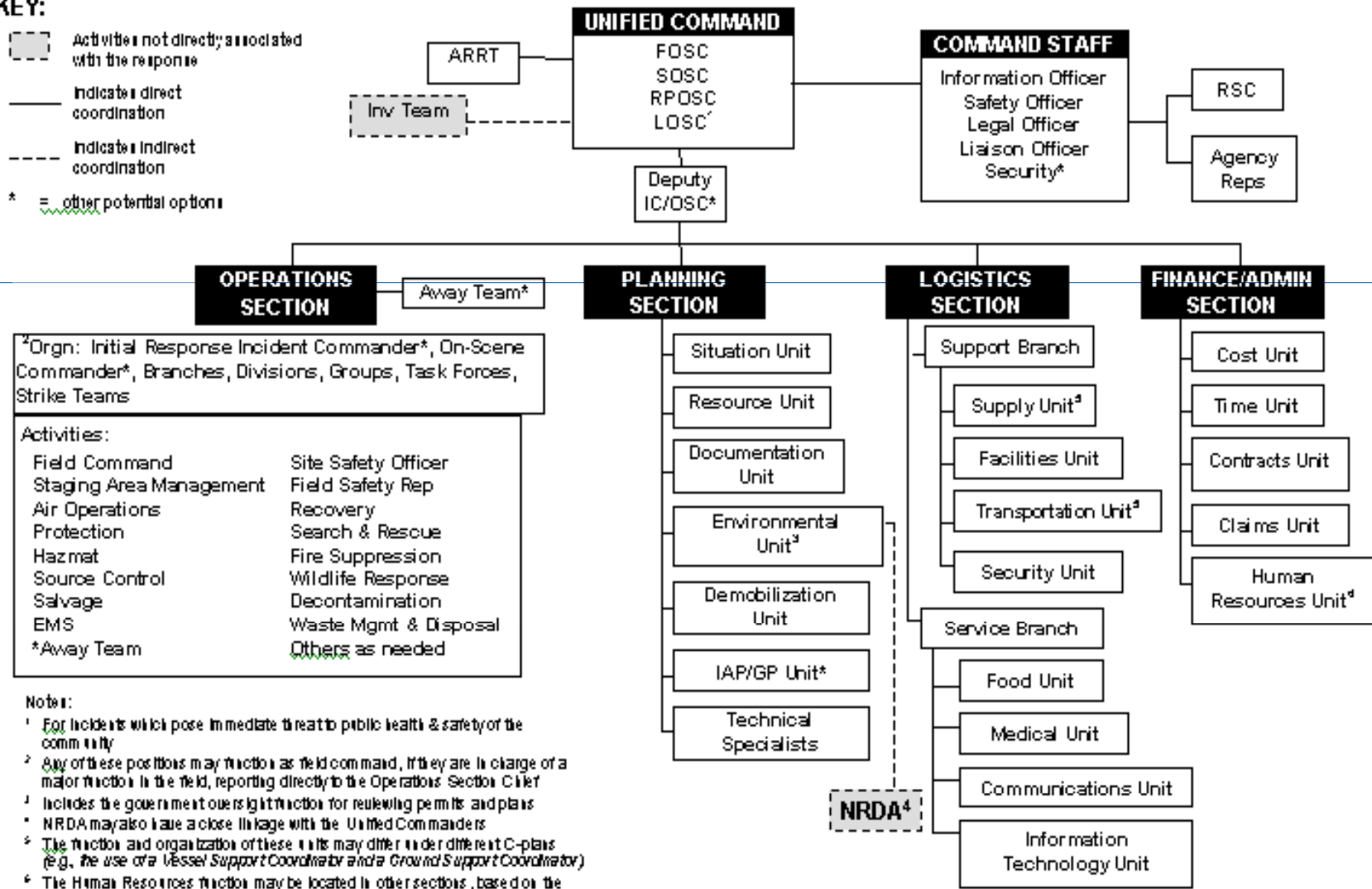
KEY:

 Activities not directly associated with the response

 Indicate direct coordination

 Indicate indirect coordination

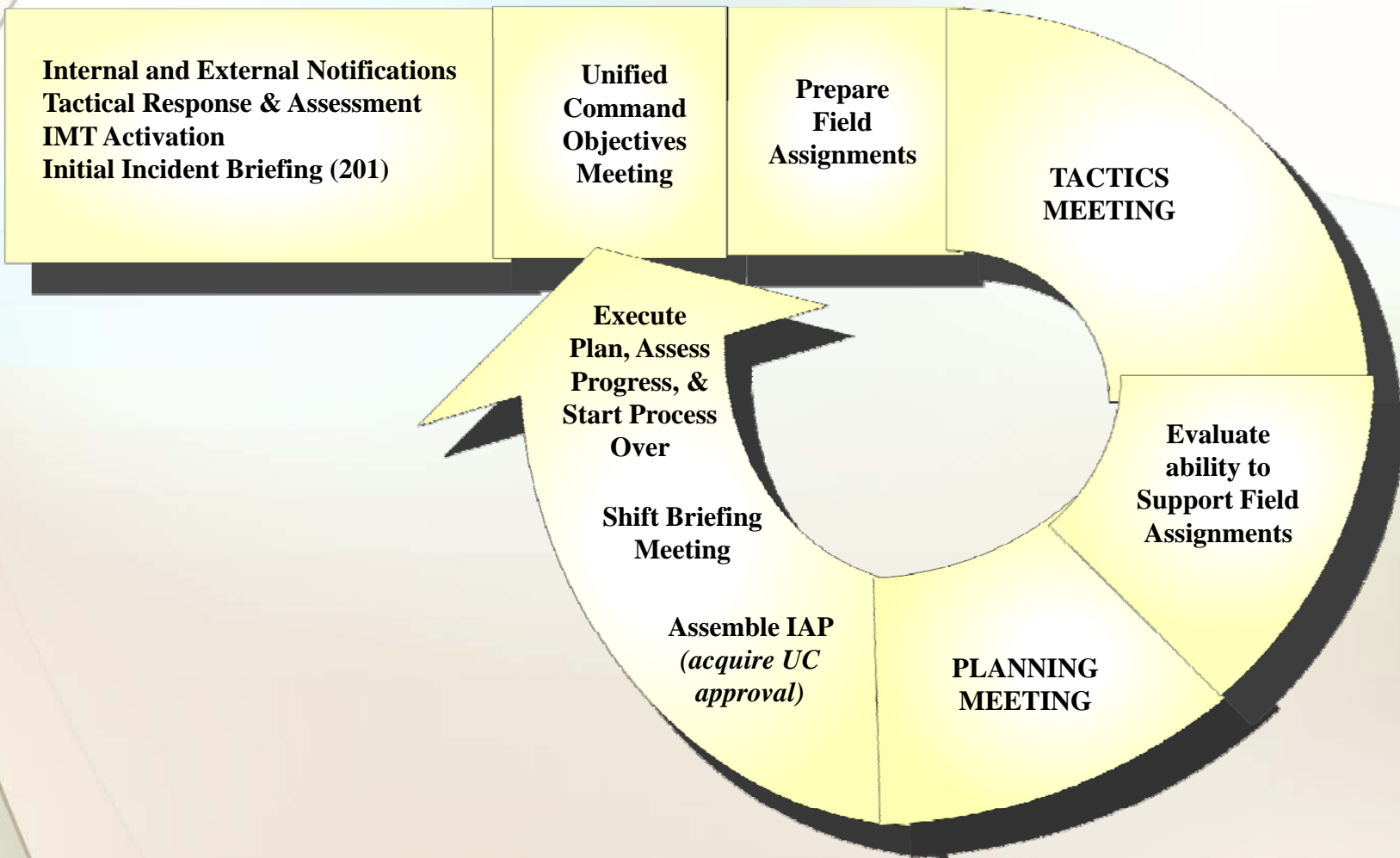
* = other potential options



PLANNING CYCLE

- Initial Incident Briefing
- Unified Command Objective Meeting
- Assessment Meetings
- Tactics Meeting
- Planning Meeting
- Shift Change Briefing

Planning Cycle



Unified Command Meeting

- The SOSOC, the FOSOC, and the Incident Commander discuss and concur on the spill response efforts and relevant issues prior to joint incident action planning.
- Results of the UC meeting will guide the Operation and Planning Sections' efforts prior to their next meetings.

Tactics Meeting

- The meeting may be initiated with a summary of the status of on-going current field and IMT response operations.
- This meeting creates the blueprint for tactical resource deployment during the next operational period.

Planning Meeting

A status report of the current field and IMT response operations are usually provided at the beginning of the planning meeting.

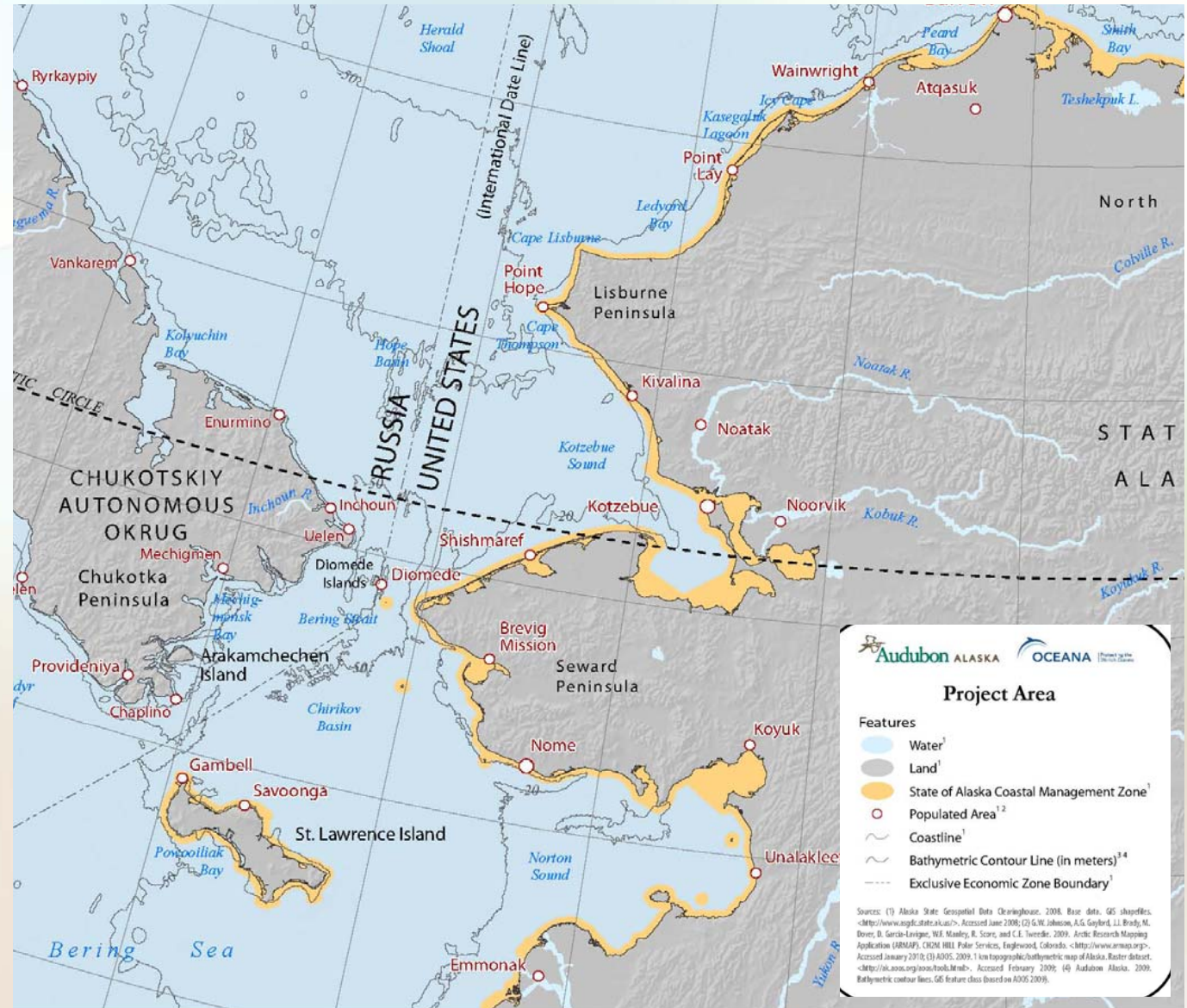
The planning meeting further defines and fine tunes incident objectives, strategies, tactics, and additional resource needs for the next operational period.

Planning Meeting

A primary goal during the planning meeting is to assess the ability of the Logistics Section provide the necessary resources for the response effort, including any additional personnel or equipment, as well as communications, transportation, and medical needs, etc.

Nearshore Response Planning

- Protect State Waters and Resources from Impacts of Oil Spills
- State Waters extend out to 3 miles from the shoreline



Nearshore Response Plan Specifics

- **Identify Manageable Response Zones for the subarea**
- **Pre Identify Nearshore Response Tactics (both for open water and broken ice conditions)**
- **Pre-Identify Resources and Logistical Support, Command and Control Arrangements**
- **Implement in Conjunction with GRS**



Local Response

- **All responses are local**
- **Local knowledge**
- **Local responders**
- **Local resources**
- **Local On-Scene Coordinator**
- **Regional Stakeholder Committee**
- **Drills, training and exercises**




North Slope Borough Village Response Team – GC-2 Spill (March 2006)



Local-Hire Worker – Selendang Ayu Spill (April 2005)

Local Response Agreements


- **Formal Agreement between DEC and Local Community**
- **Activated by DEC's State On-Scene Coordinator for spills in local area**
- **Local Community Reimbursed by DEC for expenses incurred**



Alaska Department
of Environmental Conservation

Community Spill Response

Developing partnerships with local communities to expand Alaska's oil and hazardous substance spill response capabilities and readiness



Prevention and Emergency Response Program

Desired Information from Local Communities

- *Community Capabilities*
 - *Staging Areas*
 - *Communications*
 - *Logistical Support*
 - *Spill Response Capabilities*
- *Specific Areas of Local Concern
(Sensitive Area Protection)*

Federal/State Reporting Requirements



**National
Response
Center**

1-800-424-8802



Report Spills to the NRC at:

1 800 424-8802

The National Response Center is the SOLE national point of contact for reporting Oil, Chemical, Radiological and Biological discharges.

***EPA and USCG Emergency
Telephone Number***

REPORT ALL

**OIL AND HAZARDOUS
SUBSTANCE SPILLS**

ALASKA LAW REQUIRES REPORTING OF ALL SPILLS

During normal business hours

contact the nearest DEC Area Response Team office:

Central Area Response Team:	Anchorage	269-3063 fax: 269-7648
Northern Area Response Team:	Fairbanks	451-2121 fax: 451-2362
Southeast Area Response Team:	Juneau	465-5340 fax: 465-2237

Outside normal business hours, call: 1-800-478-9300



Alaska Department of Environmental Conservation
Division of Spill Prevention and Response

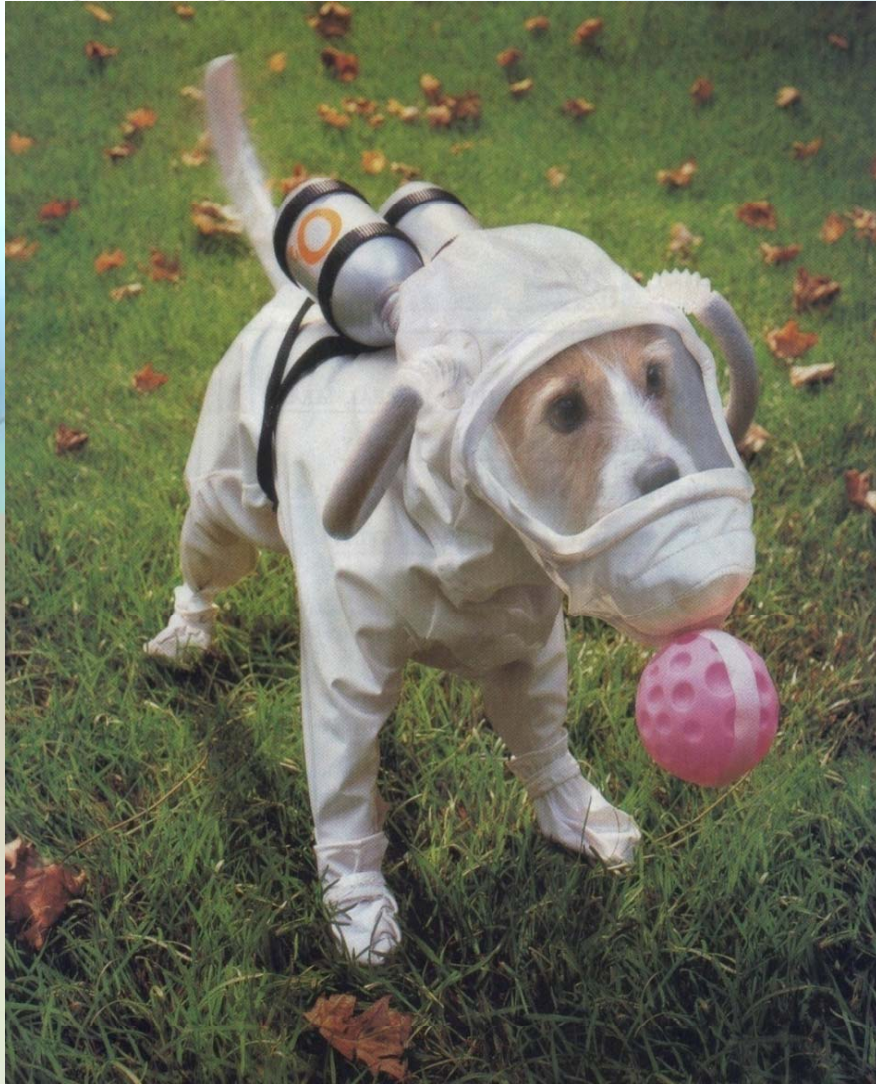
rev. 8/99

***ADEC Emergency Telephone
Numbers***

Internet References

- ***Sensitive area maps:***
 - <http://www.asgdc.state.ak.us/maps/cplans/subareas.html>
- ***Environmental Sensitivity Index maps:***
 - <http://response.restoration.noaa.gov/esi/esiintro.html>
- ***Contingency plans and guidelines:***
 - <http://dec.alaska.gov/spar/perp/plan.htm>
- ***Geographic Response Strategies:***
 - <http://www.dec.state.ak.us/spar/perp/grs/home.htm>

Questions / Discussion




*Dale Gardner,
Alaska Dept of Env. Conservation
dale.gardner@alaska.gov
(907) 269-7682*

NOAA National Ocean Service Office of Response and Restoration

ERMA®

Environmental Response Management Application

Amy Merten, Ph.D., Michele Jacobi
NOAA's Office of Response and Restoration
Allison Bailey (Sound GIS)
Zach Winters-Staszak (Genwest Systems)

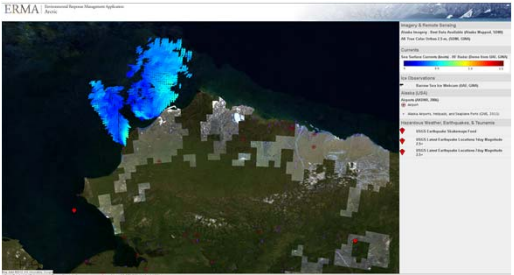


Barrow, AK
Nov 8-9, 2012

NOAA National Ocean Service Office of Response and Restoration

What is ERMA?

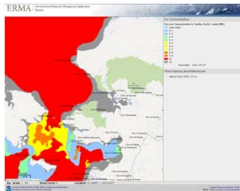
ERMA is an online mapping tool for visualizing environmental information relevant to oil spills and natural disasters.



NOAA National Ocean Service Office of Response and Restoration

What is ERMA?

- Provides centralized access to information
- Increases communication, coordination, and efficiency
- Prepare for, respond to, assess impacts from hazardous incidents or conditions
- Analyze and visualize environmental information relevant to all hazards



NOAA National Ocean Service Office of Response and Restoration

Arctic ERMA Project

- Funded by NOAA, OSRI and BSEE
- Integrated with the Arctic Council EPPR Working Group
- Key Workshop (Anchorage, AK – Apr 5/6, 2011):
 - Diverse participation
 - Identify and prioritize data for inclusion
 - Arctic Communities Work Shops emerged
- Alaska Ocean Observing System (AOOS) – Data services/method development
- UAF/GINA (Geographic Information Network of Alaska) – Data services/method development
- NWAB – GIS Subsistence Mapping Project

NOAA National Ocean Service Office of Response and Restoration

Use ERMA to...

Visualize the situation status during an oil spill drill



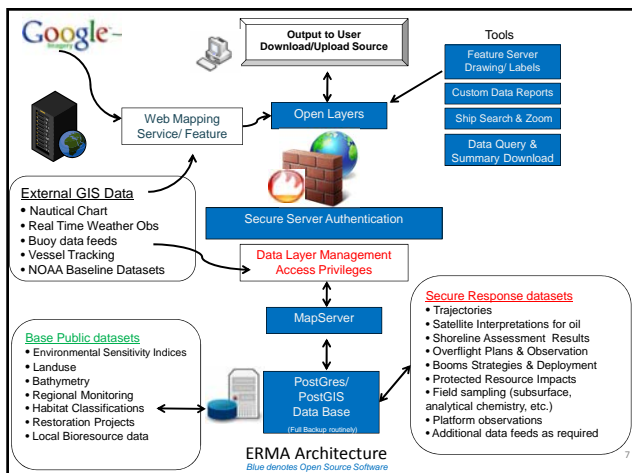

Analyze threats from climate change, drilling, and hurricanes

Assess damage and plan for restoration




Create a Common Operational Picture in a disaster response

Environmental Response Management Application (ERMA)

NOAA National Ocean Service Office of Response and Restoration

How ERMA Can Help?

- **Data Collection, Visualization, and Sharing**
 - Cross Jurisdictional boundaries (Multi Agency, Multi State, Multi Cultural)
- **Resource Information**
 - Subsistence, cultural
 - Sensitive habitats
 - Species distribution and life history
- **Critical Infrastructure**
 - Airport and landing areas
 - Water intake locations
 - Communication centers
- **Aid in the development of Response Plans**
 - Environmental Sensitivity Index (ESI) maps
 - Area Contingency Planning (ACP)
 - Geographic Response Plans (GRP)

NOAA National Ocean Service Office of Response and Restoration

Account Access

- **Public Side**
 - All publicly available data
- **Restricted Account Side**
 - Username/password required
 - Verified by NOAA
 - Various levels of access
 - Active incidents
 - Sensitive datasets
 - Natural Resource Damage Assessment (NRDA)
 - Drills

NOAA National Ocean Service Office of Response and Restoration

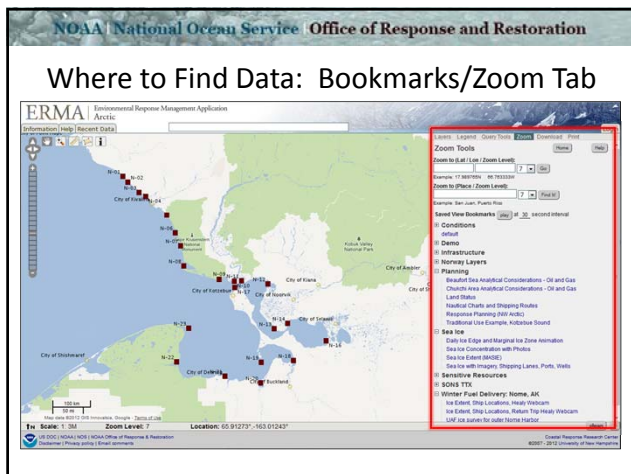
ERMA Layout

NOAA National Ocean Service Office of Response and Restoration

Where to Find Data: Layers Tab

NOAA National Ocean Service Office of Response and Restoration

Where to Find Data: Legend Tab



NOAA National Ocean Service Office of Response and Restoration

Types of Information in ERMA

- **Base Mapping**
 - Aerial imagery, terrain, roads
 - Nautical charts
- **Response Planning**
 - Equipment locations
 - Infrastructure
- **Incident Information**
 - Trajectories
 - Real time resource tracking
 - Shoreline oiling
 - Sampling data
- **Weather & Buoys**
 - Hurricane/Storms
 - Remote-sensing imagery
- **Resources at Risk**
 - NOAA ESI data layers
 - Shorezone
 - Local habitat and species
 - Seafood safety
- **Documents & Photo Links**
 - ESI and GRP .pdfs
 - Attached to layers
 - Field photos

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Goals of Arctic ERMA

- Represent area of significant activities (US-Canadian Beaufort and Chukchi Sea to south of the Bering Straits)
- Include international partners
- Leverage existing data/programs; not creating new data
- Common platform specifically focused on spill response
 - Demonstrated success during Deepwater Horizon → transferred platform to Arctic

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Arctic ERMA Timeline

- Oil in ice research (05 to present)
- Arctic Disasters Workshop (Mar 08)
- US Arctic Research Commission (09/10)
- US Arctic Council (AMSA and EPPR – 08-Present)
- Partial funding NOAA Coastal Zone Planning in FY 10
- **Arctic NRDA Workshop (Apr 10)**
- **Arctic ERMA Stakeholders Workshop (Apr 11)**
- **Kotzebue Workshop (May 12)**
- **Barrow Workshop (Nov 12)**

NOAA/BSEE Funding

- Enhance/finish Arctic ERMA before exploratory drilling commences
- Tasks:
 - Finished acquiring key data sets
Launched July 31, 2012
 - Develop “stand-alone” ERMA (currently)
 - Training/drills
 - Operations/Maintenance

Arctic Communities Workshops

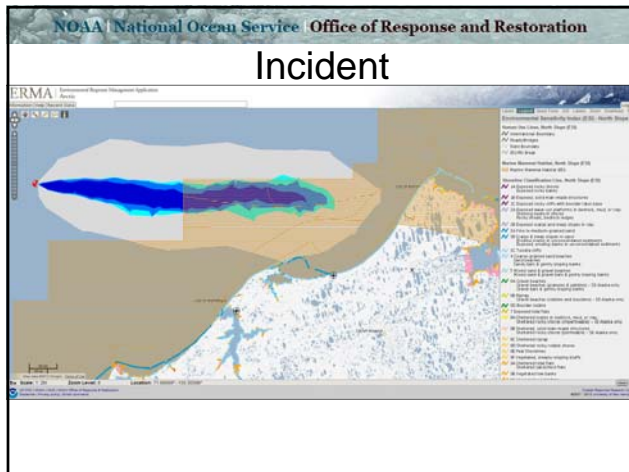
- NWAB/Kotzebue – May 21-22, 2012
- NSB/Barrow – Nov 8-9, 2012
- Establish understanding of oil spill response, NRDA and ERMA
- Identify local knowledge data and information
- Initiate agreements to protect local knowledge/information

AK and Arctic Partners

- Arctic Communities – Kotzebue and Barrow
 - This workshop, in particular!
- Alaska Ocean Observing System (AOOS)
- University of Alaska – Fairbanks
- Oil Spill Recovery Institute, Cordova, AK
- Arctic Council’s Emergency, Prevention, Preparedness and Response Working Group

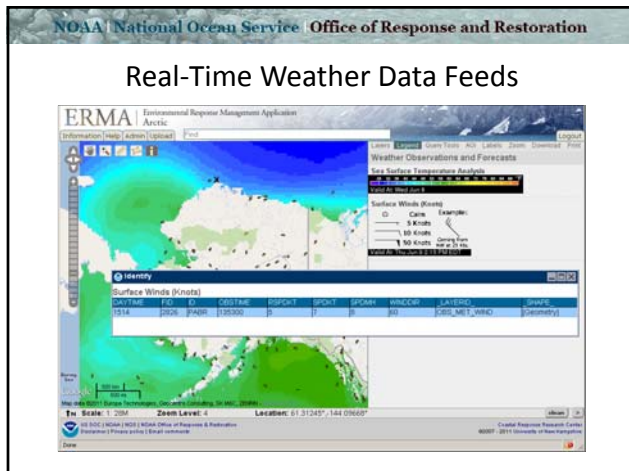
How will ERMA use your maps/data?

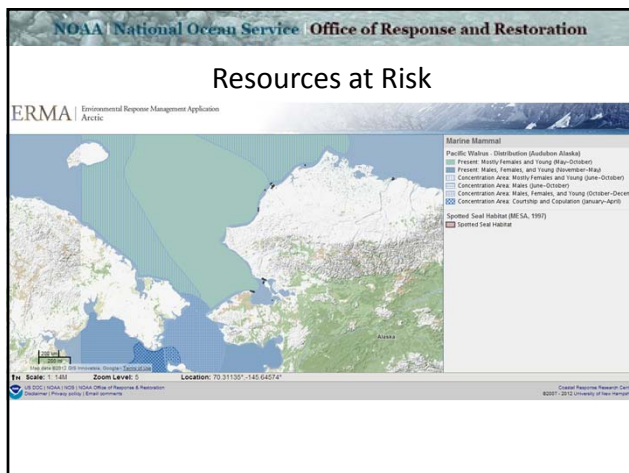
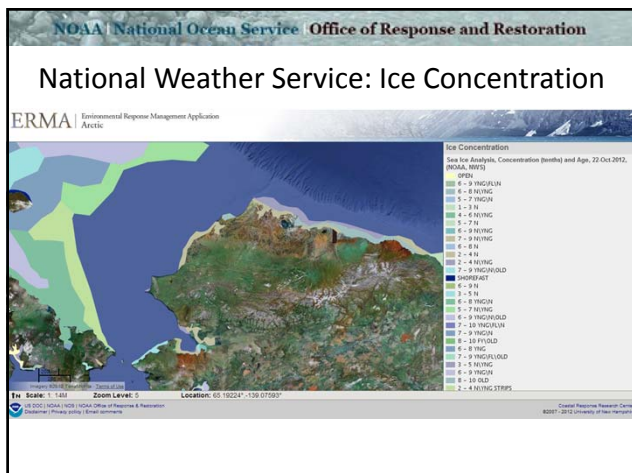
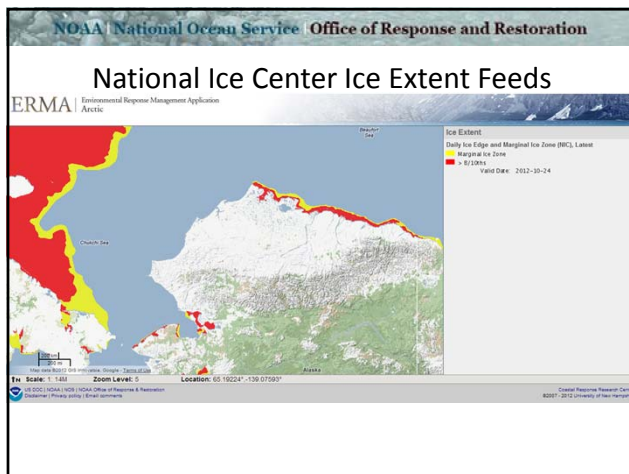
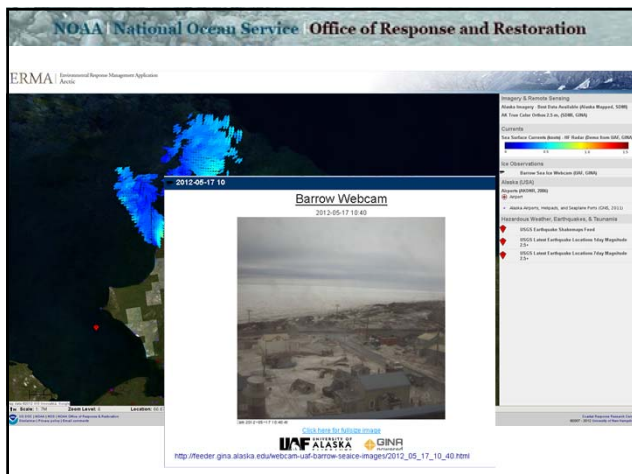
- Preparedness:
 - What if the unthinkable happens here? What are the spill risks?
 - What are the local response priorities? Do they align with the Geographic Response Plans?
 - Can we make general predictions of areas of concern based on habitat/species relationships for different seasons....
 - Prioritize data sets that you want to be public
 - For example, Iñupiaq place names?
 - Are there others?

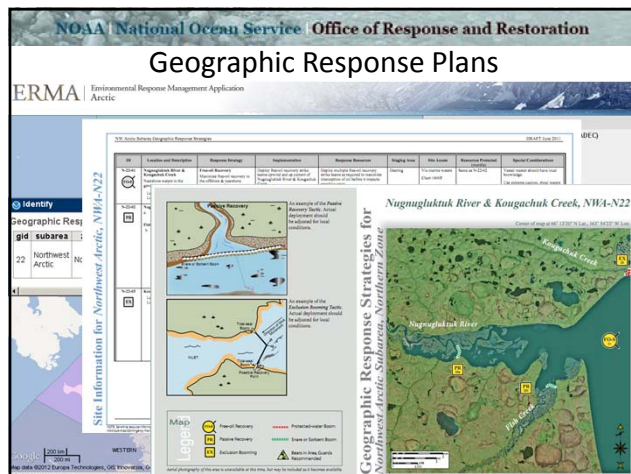
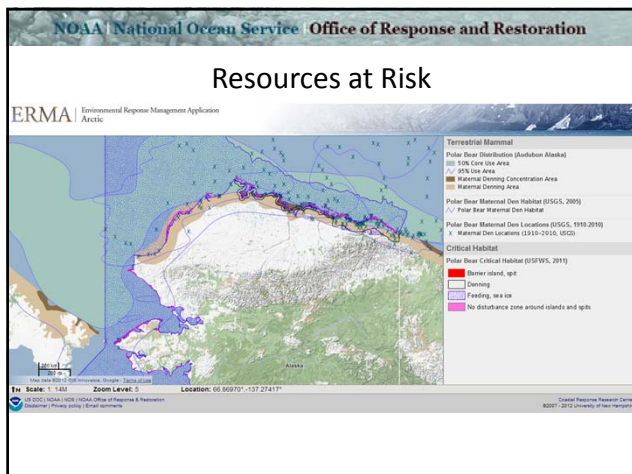


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Demo







- Data & Mapping Technology Best Practices**
- Documented Data Development
 - Must have metadata!
 - Data Accessibility
 - Make data available so others can use it
 - Planning and Preparedness
 - Not just in crisis mode
 - Data Sharing Agreements
 - Focus on what you know, share with others for what you don't, avoid duplication

- What if a spill happens near this region?**
- Critical to have local people in the response infrastructure
 - “Real-time” traditional, local knowledge
 - Need your experts to work with our experts to make maps that affect protection and cleanup
 - Use subsistence mapping effort here to guide the response effort
 - Borough and Villages approve data access!!!
 - Pull in your community data providers

Thoughts on Integrating

More “hands on”

- Detailed training for Subsistence Mapping Team?
- New ERMA code with more sophisticated privilege settings – protect data until needed
- Identify data management people should a spill occur? The Borough uploads subsistence data?
- Use ERMA as scenario development/thought tool in schools?

Thoughts on Integrating, cont'd

- Build in a way to report traditional observations
 - Hajo Eiken’s (UAF) work with subsistence hunters reporting ice conditions
 - Expand LEO – Local Environmental Observer network for a spill or other event?
- Village Peer Reviewers
- Finish Stand-Alone ERMA

For More Information

<https://www.erma.unh.edu/arctic>

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 - Ben Shorr
 - Kari Sheets
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 - JB Huyett
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 - Hayley Pickus
- I.M. Systems Group
 - Matt Dorsey
 - Laura Johnson
 - Jay Coady
- Development Team:
 - University of New Hampshire:
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 - Chander Ganesan, OTG

Funding Sources: Coastal Response Research Center, US EPA Region II, U.S. Coast Guard, NOAA's Office of Response and Restoration and Coastal Storms Program, Oil Spill Recovery Institute, Bureau of Safety and Environmental Enforcement

**Oil and Gas in the Arctic:
Can Scientific Research Help Improve Decisions
and Reduce Risk?**

Barrow, Alaska
November 8, 2012

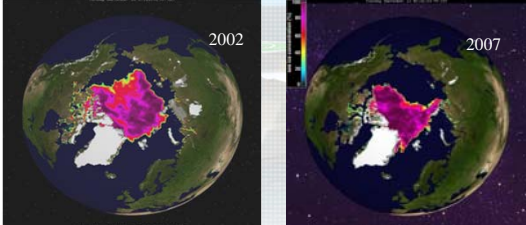
Fran Ulmer
Member, National Commission of the BP DWH Oil Spill Commission
Chair, US Arctic Research Commission

 National Commission on the
BP DEEPWATER HORIZON OIL SPILL
AND OFFSHORE DRILLING

UNITED STATES ARCTIC
RESEARCH COMMISSION 



Arctic Focus

- Many Arctic related issues in the news
- Climate change is major policy driver
- Concern about ecosystems, communities




VERY Rapid Change

- Warmer temperatures
- Less sea ice
- Thawing permafrost
- Vulnerable species

Human Activity Increasing

- Increased shipping activity
- Oil and gas development
- Tourism/fishing
- Infrastructure planning
- Research investment



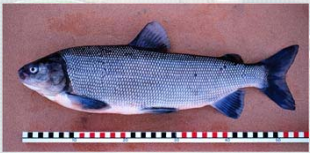
Shipping and Navigation

- Infrastructure essential
- Training
- Mapping and charting
- Navigation aids
- Communication
- IMO Polar Code




Fisheries

- Complex international regulations
- Science-based management regimes
- Lack of sufficient observation and understanding of Arctic Ocean ecosystems
- Cooperative international research essential
- Moratorium?
- Special areas?



U.S. ARCTIC RESEARCH COMMISSION

Arctic Boundary as defined by the Arctic Research and Policy Act (ARPA)



Fran Ulmer, Chair
U.S. Arctic Research Commission

Duties of the Commission

- National Arctic research policy
- Facilitate Arctic research cooperation
- Review federal Arctic research programs
- Recommend improved methods for data sharing
- Cooperate with the State of Alaska
- International scientific cooperation

2012 Research Goals

- Environmental Change
- Arctic Human Health
- Civil Infrastructure
- Natural Resource Assessment and Earth Science
- Indigenous Languages, Identities, and Cultures



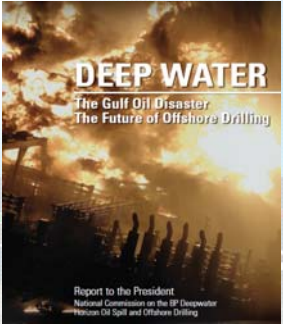
REPORT ON THE **Goals and Objectives for Arctic Research 2011-2012**
FOR THE U.S. ARCTIC RESEARCH PROGRAM PLAN

9

National Commission on the BP Deepwater Horizon Oil Spill


Recommendations to federal agencies, industry and Congress

www.oilspillcommission.gov



DEEP WATER
The Gulf Oil Disaster
The Future of Offshore Drilling

Report to the President
National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling



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Recommendations for the Arctic

- Drilling must be done with the utmost care because of the sensitive Arctic environment
- An immediate, comprehensive research program to provide a foundation of scientific information is needed
- Industry and the Coast Guard should address needs with respect to:
 - Oil-spill response
 - Containment
 - Search and rescue
- The U.S. should promote the development of international drilling standards for the Arctic

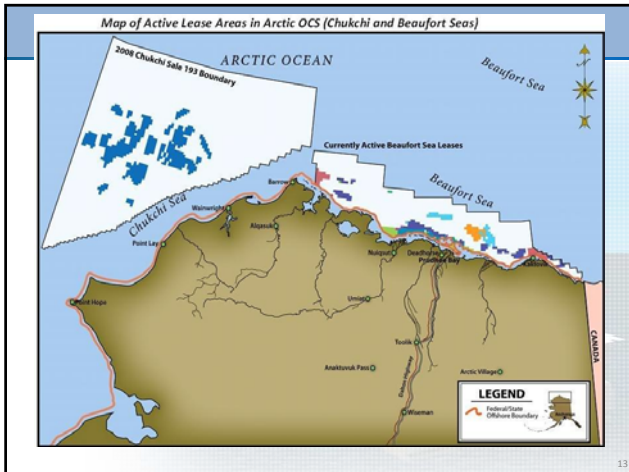


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Response and Containment Recommendations

- Improve oil spill response capabilities
 - Better planning: broader reviews, incorporate “worst-case” scenarios
 - Establish special processes for spills of national significance
 - Strengthen state and local involvement
 - Increased research and development
 - Improved regulations governing dispersants
- Improve well containment capabilities
 - Government should acquire technical expertise
 - Industry should have adequate well containment capability readily available
 - Improve ability to estimate well flow rates accurately
 - Safer well design
 - Better and more sensors

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Challenges Specific to Arctic Resource Development

Remote, cold, dark, expensive and unique

- Threats to subsistence culture
- Limited infrastructure
- Cumulative impacts
- International players
- Response in icy conditions
 - Human health & safety concerns
 - Appropriate technology/tools

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Response in Icy Conditions

Human health and safety concerns

- An effective response requires environmental and oil spill conditions safe enough for people to operate response tools.
- Questions remain about the fates and impacts of dispersant and herders for those who depend upon marine animals for subsistence.
- Research is needed on the impacts of *in situ* burning, especially in the near-shore environment

Appropriate technology/tools

- R&D priorities for prevention, oil spill detection/monitoring and response. Must be functional in cold, icy conditions.

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Research Needs


- Improved tools are needed to **measure and map** oil spill thickness to identify areas of pooled oil that may be thick enough to collect or burn.
- Mechanical response tools are needed that are effective in spring **broken ice** and fall freeze-up conditions.
- Improved tools are needed to **detect** and map oil among drifting broken ice and encapsulated in and under ice.
- Methods and tools are needed to **recover** oil trapped under ice and to respond to subsea spills.

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USARC's Oil Spill White Paper

2010 USARC Recommendations:

- Expanded endowment funding for research
- Increased funding for NOAA and NSF ecological baseline research programs in the arctic
- Oil spill trajectory research
- Research into fate, metabolism and effects of spilled oil in the environment
- Improved stakeholder consultation in planning research and development objectives
- A reinvigoration of ICCOPR



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Agreements and Strategies to Improve Research and Response


- Increase emergency response assets, equipment, supplies, training
- Expand communications capabilities
- Improve logistical support for responders
- Implement Arctic Council Search and Rescue Agreement
- Develop and adopt Arctic Council Task Force on Oil Spill Preparedness and Response



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Baseline data to properly design mitigation strategies and assess environmental impacts

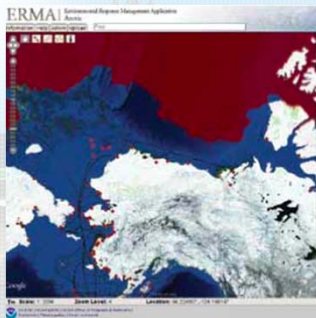
- Upcoming Arctic research synthesis (North Pacific Research Board, National Science Foundation, several federal agencies, industry)
- USGS Gap Analysis
- BOEM Environmental Studies Program
- Shell/CP/Statoil/NOAA sharing data
- Other initiatives (non profit organizations, academia, local governments, industry)



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Environmental Response Management Application

ERMA® is a web-based Geographic Information System (GIS) tool designed to assist both emergency responders and environmental resource managers. ERMA integrates and synthesizes various types of information, provides a common operational picture to those involved in an incident, and improves communication and coordination between responders and stakeholders.



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Oil Spills in Arctic Ice Covered Waters...

Summary of Current Federal Research Activities:

- BOEM (Environmental Studies Program)
- BSEE (Ohmsett facility)
- NOAA (OR&R Arctic ERMA)
- DOD (CRREL in NH)
- USCG (ICCOPR)




Heders in Broken Ice



Interagency Coordinating Committee on Oil Pollution Research (ICCOPR)
Advancing Spill Prevention and Response Capabilities

Search ICCOPR 

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Other non-US-Federal Research Activities

SINTEF Arctic Open
OSU-AR-070-02-14-0450-2
REPORT

Oil in Ice - JIP

Report no.: 32

Joint industry program on oil spill contingency for Arctic and ice-covered waters

SUMMARY REPORT

Zoran Erik Sarstrom, Per Johan Brandvik, Jan Bost, Per Odling, David Siddons, Liv-Gunn Hareide, Sverre Petter, Jarne Frod Rasmussen and Arne Singstad

SINTEF Materials and Chemistry
Marine Environmental Technology

Date: 10.04.2010



- API/JIP
- SINTEF/JIP
- AK Oil Spill Recovery Inst.
- Alaska Clean Seas
- Nat' l Academy Study
- Environment Canada
- Fermo Statement

Spill Response in the Arctic Offshore

Prepared for the American Petroleum Institute and the Joint Industry Programme on Oil Spill Recovery in Ice

February 2, 2012
FINAL

US ARC Summary of available research 2010 & 2012

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ARCTIC UPDATE

THE US ARCTIC RESEARCH COMMISSION DAILY EMAIL NEWSLETTER



Arctic Daily Update

www.arctic.gov





Reports and Website



Report to the President
National Commission on the Oil Spill and Offshore Drilling

Implementing the Recommendations of the National Oil Spill Commission:

Oil Spill Commission Action
www.oscaction.org

www.oilspillcommission.gov

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WELCOME

North Slope Borough:
Oil Spill Workshop

Day 2



Coastal Response Research Center

1

THANK YOU Participants!



Coastal Response Research Center

2

Workshop Aspirations

- We will speak honestly
- We will listen to and hear one another
- We will respect each other's views
- We will have an open and fair forum
- We will have faith that we can find common ground
- All views will be documented and reflected in workshop report
- Workshop will provide benefit to all



Coastal Response Research Center

3

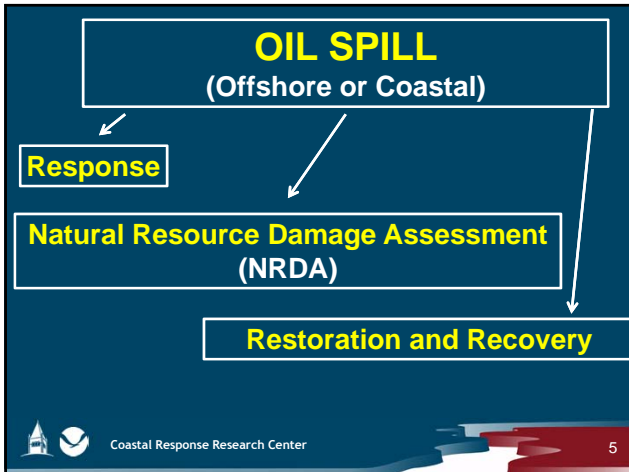
Facilitation Pledge

- I will recognize and encourage everyone to speak
- I will discourage side conversations
- I commit to:
 - Being engaged in meeting
 - Keeping us on task and time
 - Being neutral, fair, kind, and faithful to the process
- **Stop me if I am not doing this!**



Coastal Response Research Center

4



Oil Spill Response

- **Natural weathering processes** = evaporation, natural dispersion, dissolution, biodegradation, settling, photolysis
- **Response methods** =
 - Oil removal processes (booms/skimbers, sorbents, chemical herders, burning, shoreline collection) **Usually $\leq 20\%$ of oil spilled**
 - Chemical dispersants

Coastal Response Research Center 6

Where Does the Rest of the Oil Go?

- Typically $\leq 20\%$ is removed by engineered processes
- Remaining oil goes through weathering processes

Coastal Response Research Center 7

Natural Weathering Processes

- **Function of Environmental Conditions**
 - Temperature
 - (H_2O , Air)
 - Wind
 - Oil Type
 - Currents, Tides
 - Ice

Coastal Response Research Center 8

Fate of Weathered Oil

- Complex
- We are recording your questions and concerns
- March 2013 four week lecture series
 - Collaboration with Tuzzy Library and Iisagvik College



Friday Morning

AGENDA - DAY 2

8:30 AM	Opening Prayer and Announcements Nancy Kinner
8:45 AM	Introduction to Natural Resource Damage Assessment (NRDA), Restoration/Recovery Mary Baker, NOAA, Assessment & Restoration Division Arctic ERMA® in NRDA and Restoration/Recovery Amy Merten, Mary Baker
10:15 AM	Small Group Breakout Session II: Discussion of NRDA, Restoration/Recovery <i>Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help</i> Breakout Group Questions: <ul style="list-style-type: none">• What effects of oil spills most concern you (for example, health and use of natural resources)?<ul style="list-style-type: none">◦ Marine mammals◦ Birds◦ Fish◦ Crab or other shellfish◦ Land mammals• Other cultural concerns (for example, education, language, arts)• Are there special habitats or specific areas that you are most concerned about? (for example, sensitive areas, historical sites, camp areas)• Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?• How could the ERMA tool be useful for evaluating effects of spills?• What information would you like to see included in the tool to support evaluation of effects?• What are best practices for community involvement in evaluating effects?
11:45 AM	Lunch (provided)

Breakout Group Questions

Session II: Discussion of NRDA, Restoration, and Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help

- What effects of oil spills most concern you (for example, health and use of natural resources)?
- Are there special habitats or specific areas that you are most concerned about? (sensitive areas, historical sites, camp areas)
- Given the changing Arctic environment, what background/baseline information do you think we need to consider about the health of the environment before a spill occurs?
- How could the ERMA tool be useful for evaluating effects of spills?
- What information would you like to see included in the tool to support evaluation of effects?
- What are best practices for community involvement in evaluating effects?



Session III: Discussion of NRDA, Restoration, and Recovery

Theme: Logistics of NRDA, concerns, how local communities can most effectively participate, and how ERMA can help

- What specific concerns do you have relative to restoration and recovery?
- Are there examples of habitat areas that could be improved?
- Are there other sources of contamination that could be controlled?
- What traditional methods of restoration and recovery are practiced?
- What could be done to sustain cultural and subsistence practices that might be affected by oil?
- What are best practices for community involvement in restoration and recovery?
- How could the ERMA tool be useful for planning restoration?
- What information would you like to see included in the tool to support restoration planning?



Friday Afternoon

12:45 PM	<p>Small Group Breakout Session III: Discussion of NRDA, Restoration & Recovery <i>Theme: Exploring restoration options and how ERMA® can help</i></p> <p>Breakout Group Questions:</p> <ul style="list-style-type: none"> • What specific concerns do you have relative to restoration and recovery? • Are there examples of habitat areas that could be improved? • Are there other sources of contamination that could be controlled? • What traditional methods of restoration and recovery are practiced? • What could be done to sustain cultural and subsistence practices that might be affected by oil? • What are best practices for community involvement in restoration and recovery? • How could the ERMA tool be useful for planning restoration? • What information would you like to see included in the tool to support restoration planning?
2:45 PM	Group Reports to Plenary Session
3:15 PM	Wrap Up
4:00 PM	Adjourn



Breakout Group Assignments

Group A Heritage Center	Group B Heritage Center	Group C Library - Classroom
Group Lead: Tom DeRuyter (or Mary Baker or Dan Gardner)	Group Lead: Robert Taylor	Group Lead: Cheryl Rose
Recorder: Jessica McGuire	Recorder: Rachel Aronson	Recorder: Allison Baily
Ray Allen Mary Baker Liamon Berlowe Rusty Brown Eliot Burke Doreen Lempke Robert Miller George Olesman David Panagiotou Fran Ulmer	Nancy Brown, Jr Phil Brown Sarah Coburn Jennifer Dunbar Thomas Ivers Amy Martin Billy Bear Parkalak Emma Pelton Ian Sage Nescha Stalbacke	Edie Anaman Richard Campbell Dix Edie Dale Gardner Lee Kaylock Clark Lewis Joseph Locksley Tom Okonak Thomas Olesman Todd Skorno
Group D Library - Director's Office	Group E Library - Video Conference Room	
Group Lead: Gary Shigenaka	Group Lead: Sarah Allen	
Recorder: Zach Winters Staszak	Recorder: Joe Justice	
Thoda Akhavanak Lily Anagnostou Johnny Adams Charles Brewer Lorenza Baticchio Lorenz Nagasaki, Jr Joseph Panagiotou Lorenzo Ruffolo Chris Smith Veronica Vanda	Martha Avallin Sander Brewer Craig Gerlach Martha Gubrowski George Hooningspoek Cassidy Parkalak Siri Rowles Robert Szymanski Vera Williams	



Workshop Outcomes

- Report on workshop to be widely circulated
 - Federal and state agencies
 - Report from NWAB available today
- Improved Arctic ERMA®
- Enhanced relationships between communities & government agencies



- www.crrc.unh.edu/workshops



NOAA National Ocean Service Office of Response and Restoration

Use ERMA to...

Visualize the situation status during an oil spill drill




Analyze threats from climate change, drilling, and hurricanes

Assess damage and plan for restoration

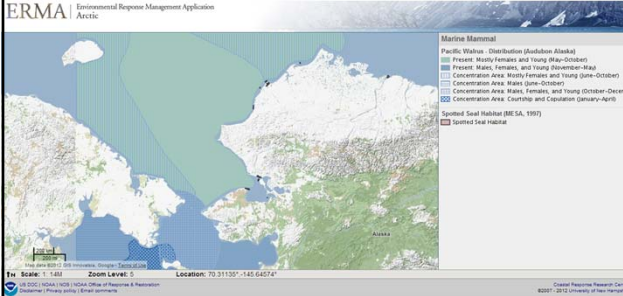



Create a Common Operational Picture in a disaster response

NOAA National Ocean Service Office of Response and Restoration

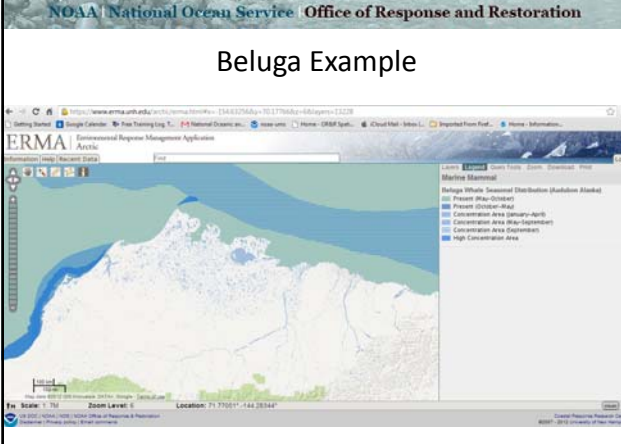
Resources at Risk

ERMA | Environmental Response Management Application
Arctic



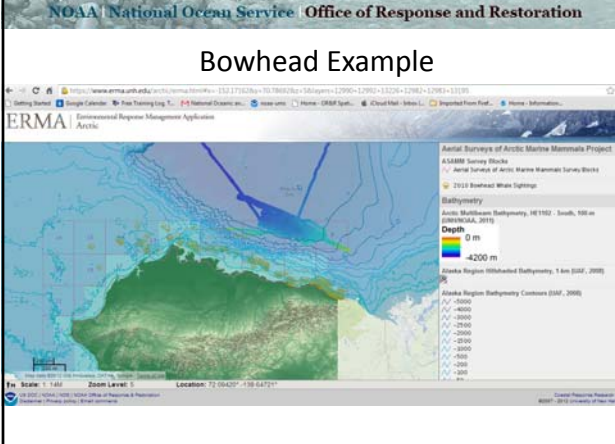
NOAA National Ocean Service Office of Response and Restoration

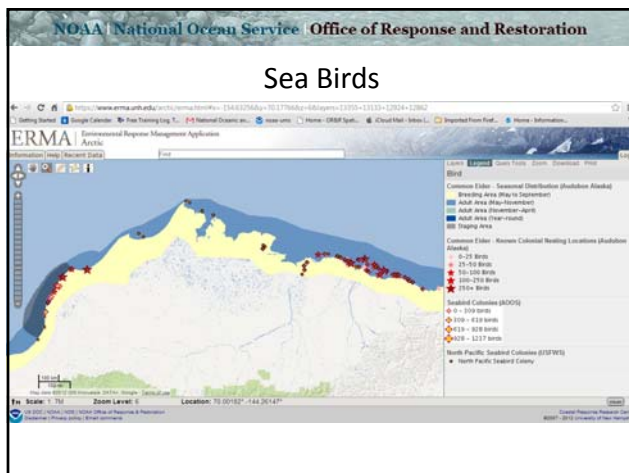
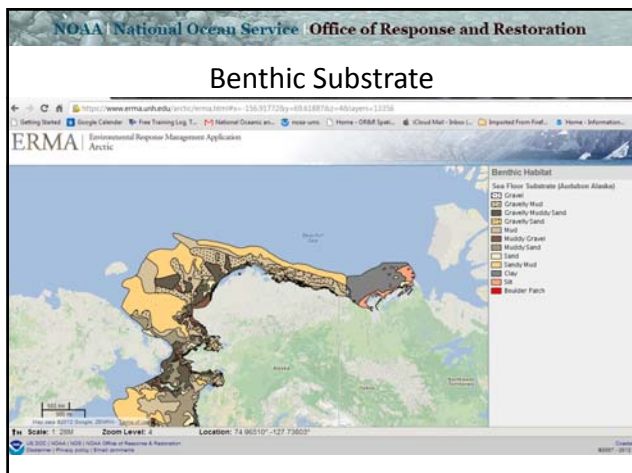
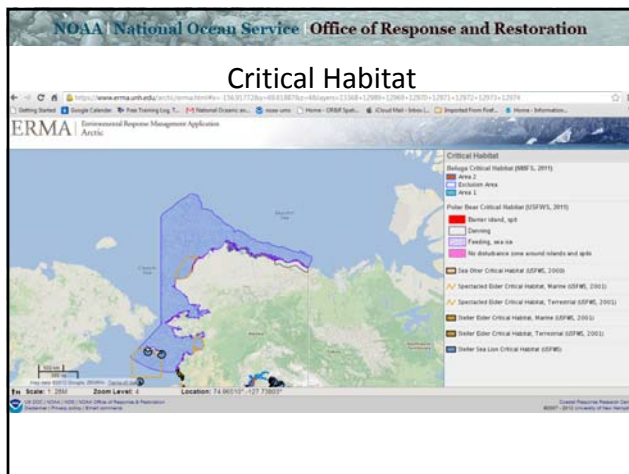
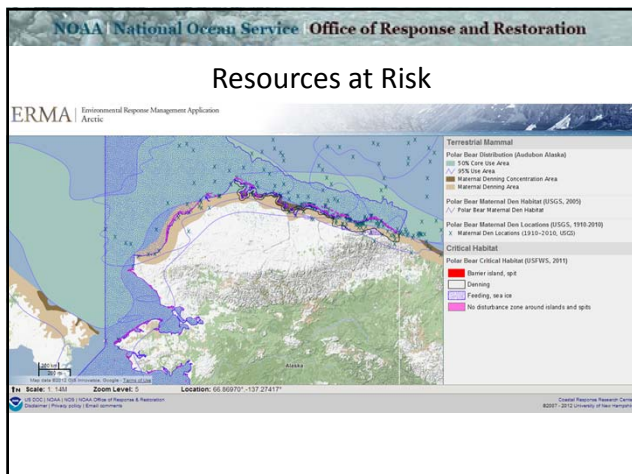
Beluga Example



NOAA National Ocean Service Office of Response and Restoration

Bowhead Example






DAMAGE ASSESSMENT, REMEDIATION, & RESTORATION PROGRAM

DARRP

Office of Response and Restoration • Office of Habitat Conservation • General Counsel for Natural Resources



Introduction to Natural Resource Damage Assessment NRDA

Topics

- Overview
- Legal: Laws and Regulations
- NRDA Process
- Restoration in the Arctic
- Summary



Top Three Things to Know

- Three liabilities from oil spills (public does not pay)
 - Injury to public natural resources
 - Response
 - 3rd party claims
- NRDA is restoration-focused
 - Restoration is considered early and throughout the process
 - Injuries (effects) are balanced against, and directly scaled to restoration
- NRDA is a Legal Process
 - Must demonstrate causality between release and injury using defensible science
 - Effects of oil must be on top of baseline condition

3

NRDA is based in the Oil Pollution Act (1990)

- Applies Public Trust Doctrine
- Polluter pays – compensatory not punitive
- Requires cooperation with polluter
- Requires public involvement
- Restoration must “restore, rehabilitate, replace, and acquire the equivalent” of injured natural resources and services

Cooperating with the PRP

- Required under NRDA rules
 - Trustees decide timing, duration, decision making process, level of participation, agreements, public involvement
- Funding and participation agreement
- Outcome = legal agreement (a consent decree)



An oil spill is like a house fire



Response is intended to stop further harm



Restoration rebuilds



Restoration compensates for "interim" loss



OPA 90 Definition of Injury

- ... an *observable or measurable adverse change in a natural resource or impairment of a natural resource service*. incorporates ... "destruction," "loss," and "loss of use"



Natural Resource Damage Assessment

- Amount of restoration implemented must EQUAL amount of injury (harm) that occurred

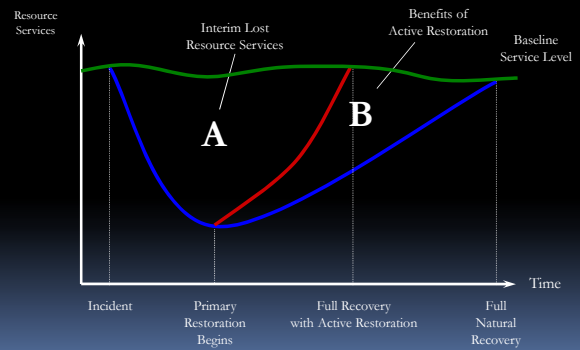


Goal of NRDA

To Balance Injury with Restoration



Restoration Benefits



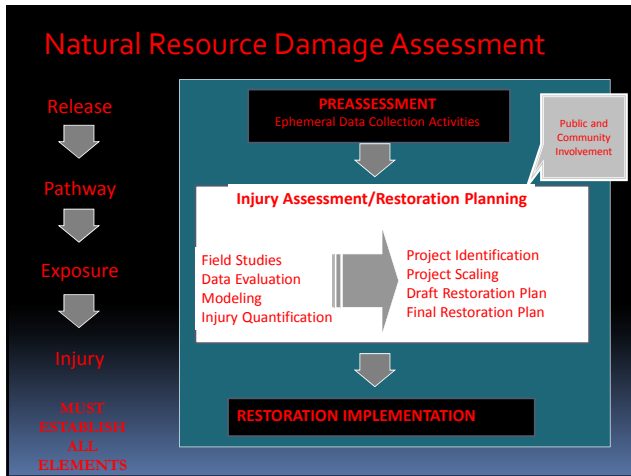
Damage Assessment Responsibilities

- Coordinate with response
 - Integrate concerns into cleanup
- Assess injuries: What was harmed?
- Evaluate Restoration: What can be done to
 - Return resources to baseline?
 - Compensate for loss?
- Oversee and/or implement restoration projects
- Recover assessment costs



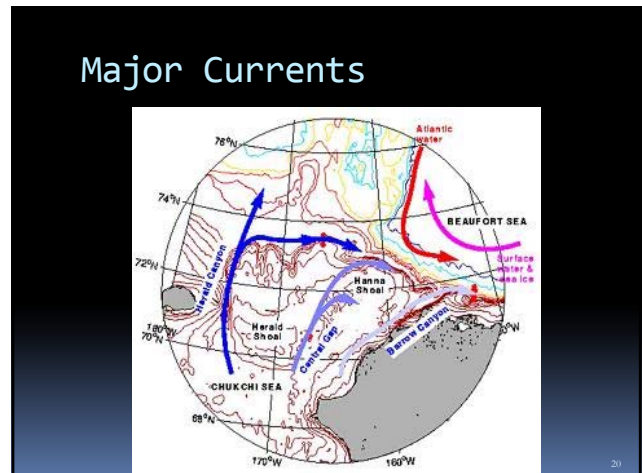
NRDA Does Not Address

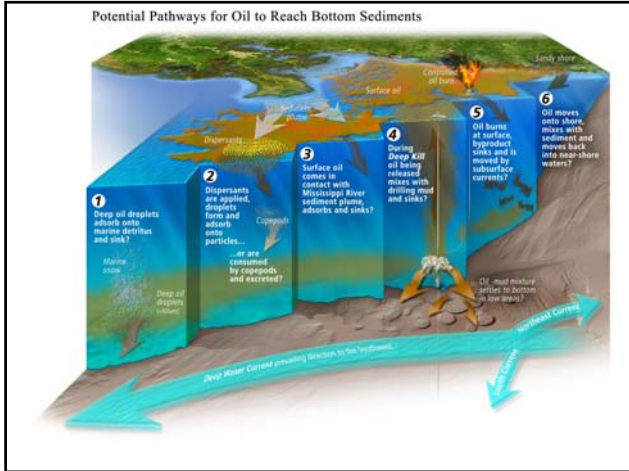
- Civil and criminal liability (CWA, OCSLA)
- Damages to real or personal property
 - Net loss of taxes, royalties, rents, fees, and other lost revenues by federal or state governments
 - Loss of profits or loss of earning capacity due to injury to natural resources
 - Net costs of public services



- ## 3 Steps of NRDA
- Preassessment
 - What happened?
 - Injury Assessment
 - What harm was done?
 - Restoration
 - What will be done to compensate for loss?

- ## Step 1: What Happened?
- Conceptual Modeling: How is oil reaching natural resources?
 - Physical transport pathways (floating on water, current driven transport, stranding on shorelines, sinking, evaporation)
 - Biological pathways (dermal contact, ingestion of water, prey consumption, inhalation)

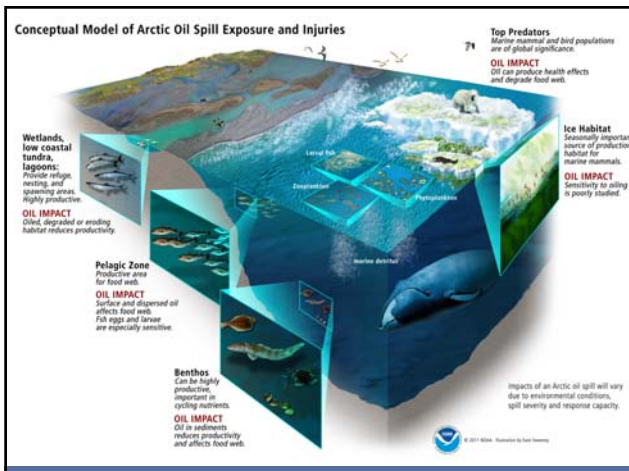




Step 1 continued...

- What animals and habitats could be exposed?
- What life stages are most sensitive to oil effects?
- How could they be affected (what injuries would you expect?)
- How are people using the resources?

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Step 2: Injury Assessment

- Verify pathways
- Identify resources at risk
- Evaluate exposure
- Measure injuries and compare with baseline
 - Habitat
 - Animals
 - Human Use



Defining Baseline

- Condition “but-for” the spill
 - Comparison to “pre-spill” conditions?
 - Comparison to appropriate reference sites?
 - Consider confounding factors and competing hypotheses
 - Physical degradation of habitat
 - Presence of other contaminants
 - Climate change

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Evaluating Exposure

- Water concentrations
- Sediment/soil concentrations
- Oil degradation rates
- Invertebrate tissue
- Fish bile
- Blood parameters
- Photographs
- Computer models



Evaluating Injury (1)

- Field measurements
- Lab studies
- Extrapolate from previous spills/literature
- Modeling
 - Biological population estimates
 - Life history tables
 - Toxicity values
 - Production foregone



Evaluating Injury (2)

- Human Use Injuries
 - Document geographic and temporal extent of lost use
 - Boat access, fishing, hunting areas



Making Legal Case

- Endpoints must be related to oil effects
- Endpoints should relate to restoration
- Drive sampling with hypotheses
- Use pre-approved protocols where possible
- Clear, accurate, and complete documentation is required
 - Quality documentation
 - Chain of Custody
 - Photos

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Natural Resource Services

- Fundamental to the determination of interim losses and for scaling restoration
- Have value because humans care about them
- Functions that one resource performs for another or for humans

Categories of Natural Resource Services

- Ecological
- Cultural/Historical
- Sustenance
- Commercial
- Recreational
- Passive/Existence



Step 3: Restoration Planning

- Compensate for what is injured
 - What is injured?
 - How badly is it injured
 - What could be replaced/restored/acquired?
 - How much is needed?



Scale to Compensate for the Injury Over Time

- Determine how severe injury is, how long it will last
- Determine benefits of restoration, how soon benefits will occur, how long they will last
- Determine how much restoration is needed to offset loss over time

Possible Arctic Restoration Options

- Marine mammals
- Birds
- Vegetation
- Fish passage
- Marine debris removal
- Cultural enhancement

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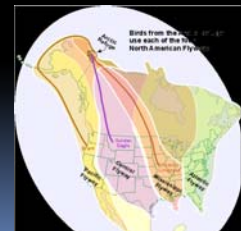
Restoring Marine Mammals

- As ice changes, polar bear and walrus spend more time on land
 - Reduce negative polar bear-human interactions
 - Minimize disturbance of walruses
 - Habitat Protection/Conservation Areas



Restoring Birds

- Limiting factors:
 - prey base, predation, habitat limited; other sources of mortality...
 - contamination, disturbance, hunting



Restoring Birds

- Large-scale invasive predator removal
- Bury powerlines that kill birds in fog
- Clean up existing contaminated sites along coast
- Habitat protection (acquisition, easements) wetlands mitigation banks



Restoring Vegetation

- Seed or transplant sod or wetland plants: Native grass cultivars or climax species (indigenous species)
- Fertilizer (generally phosphorus)
- Thermokarst (depressions from melting permafrost)
- No-action may be the most appropriate course



Restoring Coastal Habitat

- Fish passage/fish habitat
 - Placement of culverts to prevent thawing of the permafrost and subsequent settling of the culvert
 - Culverts placed at correct depths
 - Maintaining flow during late summer



Restoring Human Use

- Citizen Environmental Monitoring (Canada)
 - water temp, fish health, abundance data
 - based on western science and traditional knowledge
- Camp Sivunniigvik (Camp Sivu)
 - language preservation
- Camp Qunqaayu (Culture Camp)
 - Kuroshima Oil spill settlement
 - re-introduce cultural values and language
 - promote awareness of natural resources
 - passing on the knowledge of the elders



Summary

- Oil Pollution Act requires restoration of injured resources
- Injuries can be ecological or socioeconomic/cultural
- Understanding “baseline” is important
- Restoration of oiled Arctic natural resources will be challenging
- Village, local, and regional perspective is critical

