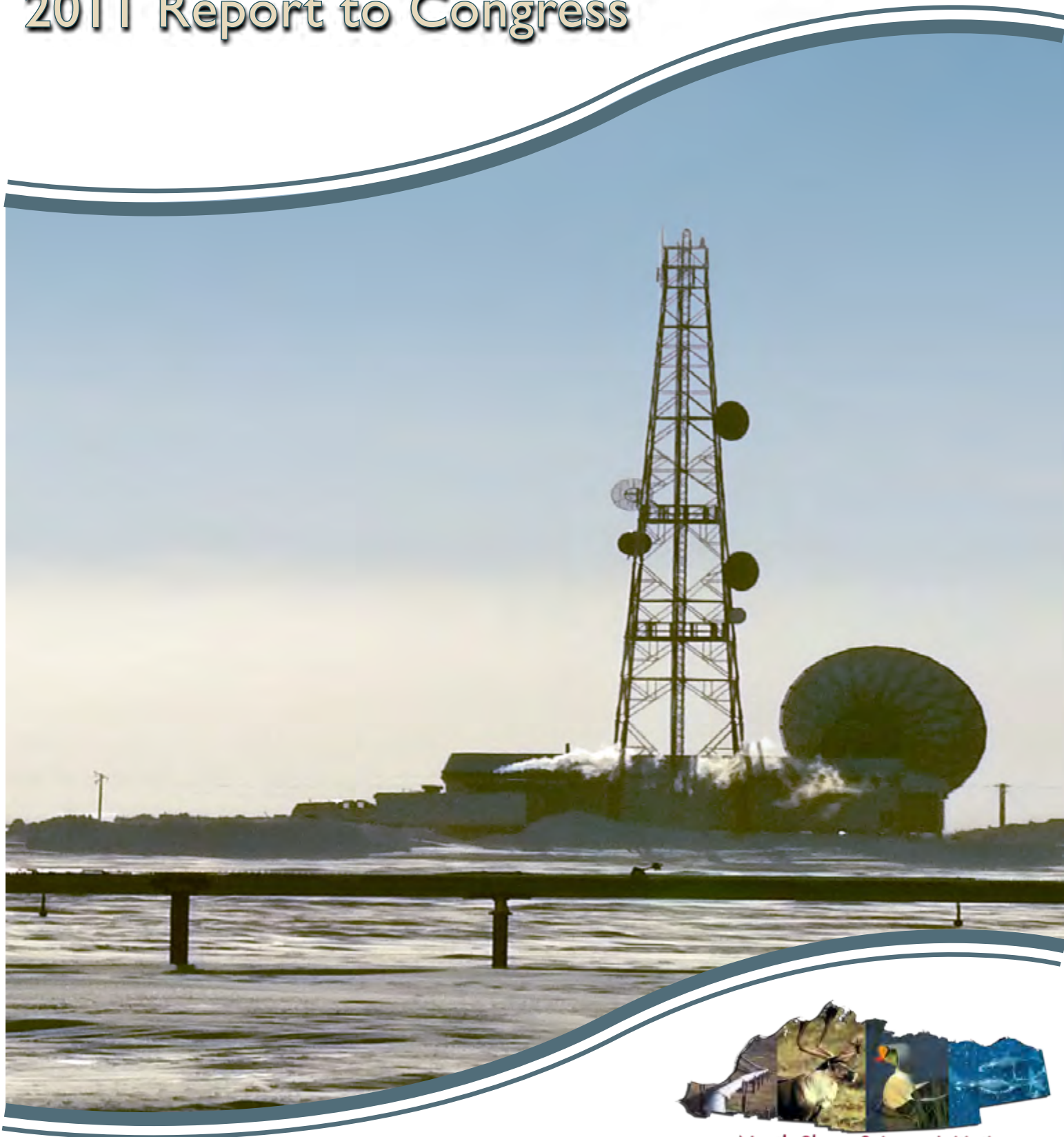


North Slope Science Initiative

2011 Report to Congress



North Slope Science Initiative
ALASKA

<http://www.northslope.org>



Scope, Mission and Vision

The North Slope Science Initiative (NSSI) was developed by local, state and federal governments with trust responsibilities for land and ocean management, to facilitate and improve collection and dissemination of ecosystem information pertaining to Alaska's North Slope region, including coastal and offshore regions. The **mission** of the NSSI is to improve scientific and regulatory understanding of terrestrial, aquatic and marine ecosystems for consideration in the context of resource development activities and climate change. The **vision** of the NSSI is to identify those data and information needs management agencies and governments will need in the future to develop management scenarios using the best information and mitigation to conserve the environments of the North Slope. The NSSI adopts a strategic framework to provide resource managers with the data and analyses they need to help evaluate multiple simultaneous goals and objectives related to each agency's mission on the North Slope. The NSSI uses and complements the information produced under other North Slope science programs, both internal and external. The NSSI also facilitates information sharing among agencies, non-governmental organizations, industry, academia, international programs and members of the public to increase communication and reduce redundancy among science programs.

2005 Legal Mandate

Under the provisions of PL 109-58, the annual report is due to the Secretary of the Interior each fiscal year. This, the fourth such Report to Congress, describes the background, scope, mission, and vision of the NSSI; outlines NSSI objectives; presents the administrative structure and accomplishments; and outlines future directions based on identified issues on the North Slope and in the adjacent marine environment.

Credits

John F. Payne, Ph.D., Executive Director, NSSI, and the collective NSSI Oversight Group are the principal authors of this report, with input and review from the NSSI Senior Staff Committee.

North Slope Science Initiative

2011 Report to Congress

Executive Summary

The North Slope of Alaska is America's Arctic. Encompassing 231,000 km² (89,000 mi²), it is a vast area believed to have some of the largest oil, gas, and coal potential remaining in the United States. The North Slope and adjoining seas are also home to a diverse array of fish, wildlife, and plant resources that support a vibrant subsistence culture. In sustaining these resources and planning for safe energy exploration and development, managers also face the challenge of a rapidly changing climate. While the unparalleled challenges and opportunities of a changing arctic climate are recognized, there is a growing need in the public and private sectors for information and more effective ways to support climate-related and development decisions. In fact, the changes now being experienced are of such magnitude that there is federal, state, and local consensus that enhanced, coordinated, and sustained observation, research, and monitoring are vital. In response, federal, state, and local governments collectively formed the NSSI, which is formally authorized under the Energy Policy Act of 2005 (Section 348). The NSSI, with its broad legislative mandate, is integrated across federal, state, and local governments with both partnered research and service. The NSSI membership believes it can increase collaboration and coordination among its membership and with industry, academia, non-governmental organizations, the public, and the Circumpolar Arctic community that will lead to better informed management decisions in the future. This fourth Report to Congress outlines again the formation and organization of the NSSI and highlights its 2011 and cumulative accomplishments.

In 2011, with the full engagement of its member agencies, the NSSI and its Science Technical Advisory Panel made significant progress in several areas:

- ◆ Assigned a co-lead with the Kingdom of Denmark for the terrestrial circumpolar biodiversity monitoring program;
- ◆ Hosted a series of place-based workshops to bring resource and regulatory managers, scientists, and local residents together building lasting relationships, and sharing knowledge across disciplines, decision makers, and local residents;
- ◆ Prioritized resource data needs into a collective publication with recommendations for managers on addressing issues;
- ◆ Continued to develop issue papers to identify resources and information needs for addressing data gaps that resource managers may need to make informed decisions;
- ◆ Continued outreach, collaborating closely with other initiatives including the Department of the Interior's Arctic Landscape Conservation Cooperative and Alaska Climate Science Center, National Oceanic and Atmospheric Administration Climate Service, and non-governmental initiatives such as Alaska Oceans Observing Systems, North Pacific Research Board, Arctic Council working groups, and others within the greater pan-Arctic community;

Executive Summary (Continued)

- ◆ Continued to enhance coordination and collaboration with academic institutions, National Science Foundation, U.S. Arctic Research Commission, non-governmental organizations, industry, Interagency Arctic Research Policy Committee, and the greater pan-Arctic community to share information, address management issues, and collaborate on common issues.
- ◆ Partnered with the U.S. Geological Survey, State of Alaska, and others to establish updated and higher resolution digital information layers for evaluating and planning future activities;
- ◆ Continued to refine a data management and information sharing system for North Slope science that provides linkages to other systems and circumpolar Arctic information;
- ◆ Developed a more consistent and accurate vegetation baseline for the entire North Slope. This cost-share project was between the NSSI, U.S. Fish and Wildlife Service, the Alaska Natural Heritage Program, Natural Resources Conservation Service, Spatial Solutions, Inc., national LandFire program, and Ducks Unlimited, Inc.;
- ◆ Continued to expand a project tracking database of ongoing North Slope projects; and,
- ◆ Enhanced the public NSSI website by adding a helicopter tracking system for member agencies to coordinate helicopter usage and for local residents to find out who is operating helicopters on the North Slope.

Adequate funding is essential for the NSSI to continue its success coordinating research and monitoring activities that support shared local, state and federal management needs in America's Arctic. Funds support core data and information sharing tools. This includes implementation of priority needs among emerging concerns such as permafrost, hydrology, erosion, fire regime, social and economic challenges, increasing marine activities, and an array of species of shared interest. Each of these broad category of information raises important management questions and challenges that require both short- and long-term budget planning. Consistent base funding would support a stable staff, including the position of Executive Director and three staff positions. Since its inception, the NSSI has continued to evolve its organizational effectiveness, interagency interaction and coordination on federal, state and local levels. This growth in cooperation is increasingly reflected as the benefits of the initiative. In the near future, the NSSI will focus on identifying future development scenarios on Alaska's North Slope, including on-and off-shore. Its focus will also identify information needs for management decision making relative to the development scenarios; coordinate long-term monitoring relative to development scenarios, information needs and emerging issues; improve coordination and communication among managers, residents and scientists; and develop an NSSI marketing plan for multiple audiences.

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Legislative Purpose and Objectives of the North Slope Science Initiative

The NSSI was formally authorized in Section 348, Energy Policy Act of 2005 (Public Law 109-58). The legislative purpose and objectives are stated below:

§(a)(2) The **purpose** of the Initiative shall be to implement efforts to coordinate collection of scientific data that will provide a better understanding of the terrestrial, aquatic, and marine ecosystems of the North Slope of Alaska.

§(b) **Objectives:** To ensure that the Initiative is conducted through a comprehensive science strategy and implementation plan, the Initiative shall, at a minimum—

1. identify and prioritize information needs for inventory, monitoring, and research activities to address the individual and cumulative effects of past, ongoing, and anticipated development activities and environmental change on the North Slope;
2. develop an understanding of information needs for regulatory and land management agencies, local governments, and the public;
3. focus on prioritization of pressing natural resource management and ecosystem information needs, coordination, and cooperation among agencies and organizations;
4. coordinate ongoing and future inventory, monitoring, and research activities to minimize duplication of effort, share financial resources and expertise, and assure the collection of quality information;
5. identify priority needs not addressed by agency science programs in effect on the date of enactment of this Act and develop a funding strategy to meet those needs;
6. provide a consistent approach to high caliber science, including inventory, monitoring, and research;
7. maintain and improve public and agency access to—
 - a. accumulated and ongoing research; and
 - b. contemporary and traditional local knowledge; and
8. ensure through appropriate peer review that the science conducted by participating agencies and organizations is of the highest technical quality.

Note: Objectives will be referenced hereafter by (Obj. #).

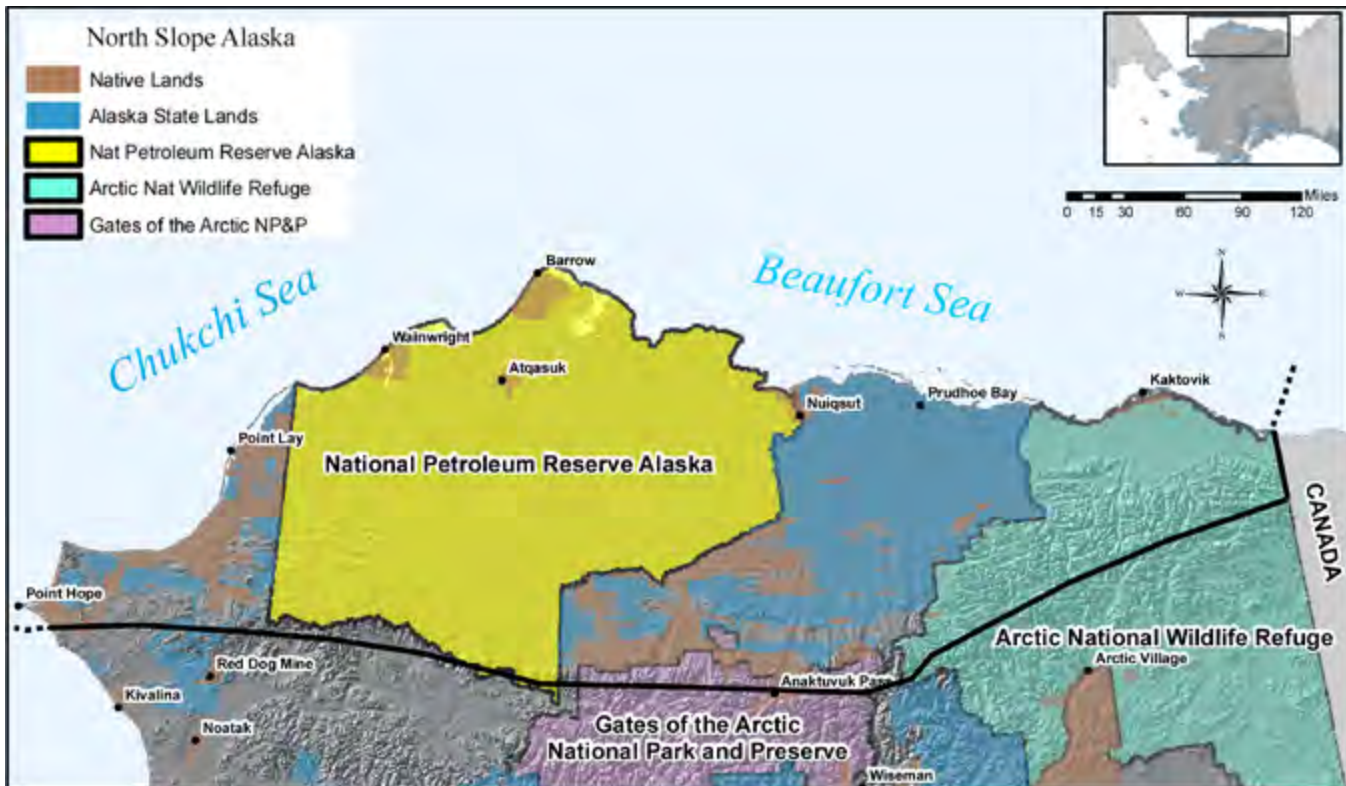
Background and Need for the North Slope Science Initiative

The North Slope of Alaska is a vast area of the polar arctic encompassing 231,000 km² (89,000 mi²) – roughly the combined size of America’s eastern seaboard states from Maine to Maryland. The offshore areas of the Chukchi and Beaufort Seas have an additional 295,000 km² (114,000 mi²). The natural resources of the North Slope are considerable. The area is believed to have some of the largest oil, gas, and coal potential remaining in the United States. The North Slope is also home to an abundant and diverse array of native fish, wildlife, and plant resources that supports the vibrant subsistence culture of the Inupiat people who reside in the area. Balanced and scientifically informed management of fish, wildlife, subsistence, and energy resources continues to be the goal of agencies, Alaska residents, and industry.

The wetland, coastal, and off-shore habitats of the North Slope also support a wide variety of important fish and wildlife populations. Over 200 species of birds migrate to the North Slope each summer to nest and raise their young, including hundreds of thousands of waterfowl (including the threatened spectacled and Steller’s eiders), shorebirds and many others. These summer visitors migrate to the North Slope from nearly every U.S.



Male spectacled eider. (USFWS)



North Slope Land Status (information on this map should be used for graphic display only). (BLM)

state and as far away as South America, Africa, Asia, and Antarctica. Four caribou herds numbering about 400,000 animals, currently more than half of Alaska's caribou, make their home on the North Slope and provide a significant portion of the wild native foods harvested by North Slope residents. Offshore areas provide habitat for a variety of marine mammals, including the polar bear, four species of ice seals, walrus, and several species of whale. Marine mammals comprise over 60 percent of the annual subsistence harvest. Freshwater fishes, particularly several whitefish species (e.g., Aanaakliq, Pikuktuuq, and Qaaktaq) and dolly varden (Iqalukpik), are also an important food source. The North Slope is the largest contiguous region of wetlands within the Arctic (CAVM Team 2003), in large part due to the continuous presence of permafrost beneath the surface.

The North Slope, all of which is above the Arctic Circle, is a place where global forces have long been converging. In years past, it was a pathway for the spread of the Inuit culture eastward across arctic North America. In modern times, whalers followed the bowhead whales into the pack ice; military contractors constructed the network of Distant Early Warning radar stations bringing the first large scale-development to the region; and oil companies developed a large industrial complex. Today the North Slope is a pan-arctic focal point of growing global awareness and is used for observation and assessment of the near- and long-term term impacts of climate change.

All of these resources and their patterns of development are of vital importance, both nationally and internationally and to the residents of the North Slope who depend on them for subsistence and economic well-being. The resources are managed by federal, state, and local agencies to maintain healthy fish and wildlife populations and their habitats in a productive environment. The laws and



Rolligons, all-terrain vehicles that move on large, low-pressure adjustable tires, are typical of the vehicles used for transportation. (NETL)

which return these materials to the formation underground. Ice roads have replaced gravel roads for exploration activities. Alaska has an impressive record of incorporating new technologies for exploration and development activities to reduce environmental impacts.

Resource managers are seeking ways to adapt to a rapidly changing Arctic environment. Climate change impacts to the Arctic have both regional and global implications and will likely have increasing significant Arctic and worldwide environmental and societal consequences (IPCC 2007). These Arctic-wide changes are of such magnitude and rate that there is broad consensus that enhanced, coordinated, and sustained observation, research, and monitoring is vital. The Study of Arctic Environmental Change (SEARCH), along with the International Study of Arctic Change (ISAC), both International Polar Year legacies, has identified three components toward adapting to change: observing change, understanding change, and responding to change. The collective NSSI represents one of the organizational entities within the larger Arctic science and resource management community that serve to address areas within each of these components. As such, the NSSI works within the greater community to move forward with well-planned and coordinated inventory, monitoring, and research strategy to:

- (1) document the magnitude, variation, and rate of changes that are currently occurring and place them in the context of past environmental change;
- (2) understand the regional and global causes and consequences of current changes;
- (3) predict the magnitude, variation, and rate and consequences of Arctic and global change;
- and (4) identify effective management practices appropriate to Arctic change.

regulations that govern oil and gas development and protect the environment are among the most stringent in the United States, and Alaska is proud of its track record. Through continued technological improvements, industry has succeeded in reducing the footprint of development while expanding into new areas with directional drilling, targeting oil reservoirs several miles from the main drill site. Reserve pits for holding drilling wastes have been replaced by grind and inject facilities



(NOAA)

The NSSI and New National Initiatives:

In 2009 and 2010, the Departments of Interior (DOI) and Commerce announced new, separate national initiatives. These initiatives have regional nodes that will bring significant new capacities to address the science needs throughout Alaska and the Arctic. On September 14, 2009, the Secretary of the Interior signed Secretarial Order Number 3289, “Addressing the Impacts of Climate Change on America’s Water, Land, and Other Natural and Cultural Resources.” This order established the Climate Change Response Council, chaired by the Secretary, to coordinate activities within and across the bureaus to develop and implement an integrated Departmental strategy for climate change response. Working at the landscape, regional, and national scales through the establishment of DOI Climate Science Centers (CSCs) and Landscape Conservation Cooperatives (LCCs), the Department is defining and implementing a vision that integrates DOI science and management expertise with that of NSSI’s partners, providing available information and best management practices to support strategic adaptation and mitigation efforts on U.S. and international public and private lands. This vision supports individual bureau missions while creating synergies with other DOI agencies and partners to implement integrated climate change science, adaptation, and mitigation strategies across broad landscapes. DOI bureaus will pool their resources to support and leverage the joint work of CSCs and LCCs. Project-level funding, the implementation and regulatory, management, or policy decisions will continue to be the responsibility of each bureau and partner.

In addition, the National Oceanic and Atmospheric Administration (NOAA) created a Regional Climate Service in Alaska and developed an Arctic vision and strategy. NOAA envisions an Arctic where conservation management is based on sound science that supports healthy, productive, and resilient communities and ecosystems. The agency seeks a future that better understands and predicts the global implications of changes in the Arctic.



NSSI Science Technical Advisory Panel members and representatives from the North Slope Borough and BP observe water quality testing using a robot. (NSSI)



Navy ICEX camp in the Beaufort Sea. (USCG)

Relationship of the National Security Presidential Directive (NSPD-66) and Homeland Security Presidential Directive (HSPD-25), to the North Slope Science Initiative

On January 9, 2009, the President issued two directives related to the U.S. Arctic. Although these directives are not specifically related to the administration and operation of the NSSI, they contain components which help set direction related to the NSSI. Section III (A)(2) states that the policy of the United States is to “Protect the Arctic environment and conserve its biological resources.” Section III (A)(3) states that the United States will “ensure that natural resource management and economic development in the region are environmentally sustainable.” Section III (A)(6) states that the United States will “enhance scientific monitoring and research into local, regional, and global environmental issues.”

These also direct that the United States will actively promote access to arctic research, establish effective arctic observing networks, work with the Interagency Arctic Research Policy Committee and U.S. Arctic Research Commission, and strengthen partnerships with academic and research institutions. The NSSI through its Science Technical Advisory Panel and the Oversight Group, with the assistance of its Senior Staff Committee, are addressing or coordinating many of these directives that are now the policy of the United States as a member of the pan-Arctic community.

NSSI, Arctic LCC, Alaska CSC and NOAA’s Arctic Vision: Putting the Power of Collaboration to Work

The DOI chose the Arctic as one of eight places nationwide to initiate a LCC, due not only to the rapid warming of the region but also to the solid foundation of federal and state land and resource management agencies in Alaska. These agencies are working together to develop an integrated scientific approach to address climate change and other stressors to Arctic resources. The NSSI developed a partnership structure for identifying science needs and sharing information in the Arctic. The NSSI Emerging Issues document, combined with the pilot WildREACH report, from the Arctic LCC, form an excellent foundational inventory of research and management issues facing the Arctic. This framework will help prioritize science needs for the North Slope and puts the power of collaboration to work. It allows the Arctic LCC to focus and develop consensus on a set of Arctic conservation goals. Alaska is fortunate to serve as the first place nationwide to host a DOI Climate Science Center. This center is working with the University of Alaska Fairbanks to meet climate science needs for conservation decisions in Alaska. The ability to meet these priorities and leveraging multi-agency and partner resources will determine the success of these initiatives. All of the combined and integrated resources of the NSSI, Arctic LCC, Alaska CSC, and NOAA’s Climate Service, represent a good beginning for understanding and confronting the complexity of Arctic issues.

National Research Council Reports and the NSSI

Much of the early roots of the NSSI was in the first National Research Council report. In 2003, the National Academies in response to a request from Congress, prepared the *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*. The purpose of the report was to review information on oil and gas activities and assess the known and possible cumulative impacts of those activities. The report considered impacts on the physical, biotic, human and marine environments from past and present development activities. Several findings and recommendations were developed, including:

- ◆ **Climate Change:** Additional research and modeling is required to understand its impacts on the Arctic and, more importantly, on the North Slope region.
- ◆ **Need for Comprehensive Planning:** Currently, multiple agencies make decisions on industrial activities on a case-by-case basis, without a comprehensive plan to guide the process. A comprehensive plan is needed to ensure that future decisions match the overall goals for the region, in all phases of development.
- ◆ **Ecosystem Research:** Currently, the North Slope lacks ecosystem-level research. There is a need to increase research activities and focus on ecological processes.
- ◆ **Offshore Oil Spills:** The potential for a large arctic offshore oil spill requires additional research to address the effects of such a spill, how marine life could be protected, and the effectiveness of various cleanup activities, especially in broken sea ice.

In 2009, the National Research Council released a second report: *Informing decisions in a changing climate: panel on strategies and methods for climate-related decision support*. This report reaffirmed the organizational structure and benefits of the NSSI by outlining a cooperative, stakeholder-based, deliberative approach that decision makers can use. The NSSI was originally established to follow the six principles of the report, long before the report was released. These guiding principles are:

- ◆ Begin with the users' needs.
- ◆ Give priority to products over process.
- ◆ Link to information producers and users.
- ◆ Build connections across disciplines and organizations.
- ◆ Seek institutional stability.
- ◆ Design processes for learning.

As the unparalleled challenges and opportunities of a changing climate, resource exploration, and development activities become more important to the nation, so does the need for information and more effective ways to support resource decisions. The NSSI, with its broad legislative mandate, is integrated across federal, state, and local governments with partnered research and service. The NSSI believes it can increase collaboration and coordination with industry, the public, academia, non-governmental organizations, and the greater pan-Arctic community to lead to better informed management decisions in the future.

Organizational Structure and Administration of the North Slope Science Initiative

Why is the North Slope Science Initiative Unique in its Organization?

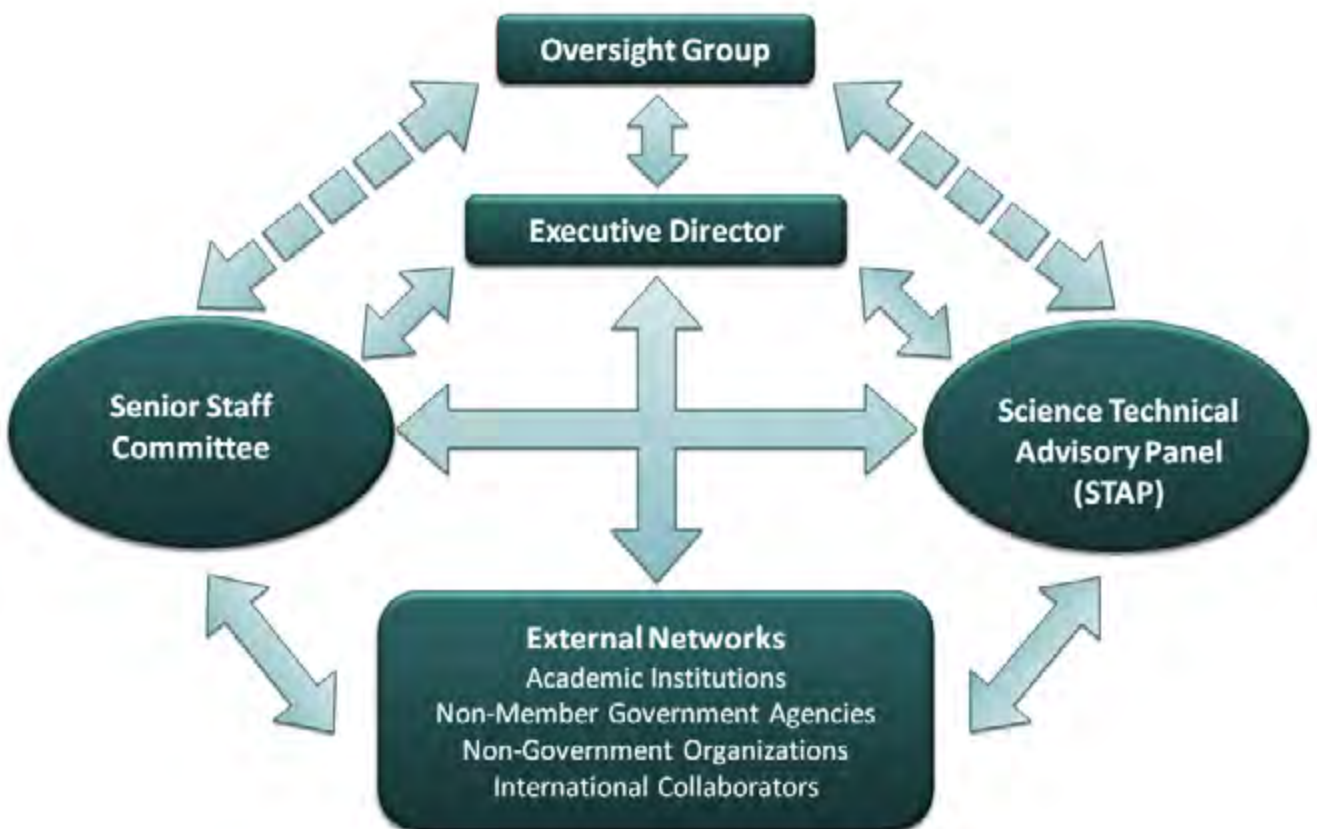
The NSSI's uniqueness begins with its senior leadership on the Oversight Group (See charter, Appendix 1). The group's membership comes from lead agency, government, and organization managers with responsibilities for resources on the North Slope and its off-shore environments. The NSSI also has a unique Science Technical Advisory Panel, operated under the Federal Advisory Committee Act, whose 15 members represent more than 300 collective years of expertise in the Arctic. NSSI's members include:

U.S. Department of the Interior	
Bureau of Land Management (designated administrative agency)	State Director
Bureau of Ocean Energy Management ¹	Regional Director
National Park Service	Regional Director
U.S. Fish and Wildlife Service	Regional Director
U.S. Department of Commerce	
National Marine Fisheries Service	Regional Administrator
State of Alaska	
Department of Fish and Game	Commissioner
Department of Natural Resources	Commissioner
Local Government / Resource Manager	
Arctic Slope Regional Corporation	President
North Slope Borough	Mayor
Advisory to the NSSI	
NOAA Climate Service	Regional Director
National Weather Service	Regional Director
U.S. Arctic Research Commission	Chair
U.S. Department of Energy	Director, NETL
U.S. Geological Survey	Regional Executive

¹ On October 1, 2011, the Bureau of Ocean Energy Management, Regulation, and Enforcement was divided into two organizations: Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety Environmental Enforcement (BSEE).

Consistent with its mission and vision, the NSSI is a highly interactive organization. It draws advice from a variety of disciplines, expertise, and knowledge. This functional structure is designed to assist federal, state, and local governments; academia; industry; and the public in making strategic, informed decisions based on short- and long-term ecosystem management needs. This structure, as sited by a small core of NSSI staff and a science advisory panel, provides independent expert review and advice; facilitates energetic liaison among member programs and their resources; provides effective coordination and communication; and develops a common infrastructure for data management, proposals, publications, and information processing.

North Slope Science Initiative Implementing Legislation



The NSSI is an organization that provides for highly effective interaction between government leadership, the senior staff specialists of member entities, its multidisciplinary Science Technical Advisory Panel, and outside networks to identify management needs and provide recommendations to address those needs to leadership. The NSSI organization is not intended to supplant individual agency science or management programs, but to validate many of the science directions already being addressed by some individual NSSI member agencies and help in the sharing of human and monetary capital to address needs beyond an individual agency capability. The entire organization is bounded by the collective needs of its membership while still providing individual agency science programs the opportunity to share in addressing those collective needs, or by offering an expanded network of expertise. (NSSI)

Functionally, the NSSI organizational structure includes: Oversight Group, Executive Director and staff, Science Technical Advisory Panel, and Senior Staff Committee. These four components are highly interactive and bring a variety of expertise and knowledge to the organization.

Oversight Group

The Oversight Group (OG) is the senior-level management from the NSSI member and advisory agencies. The OG:

- ◆ Sets direction for the NSSI and cascades that direction through member agencies;
- ◆ Lays out a clear vision and sets goals and expectations;
- ◆ Serves as the decision maker for NSSI priorities and activities;
- ◆ Provides executive level leadership;
- ◆ Provides a forum for looking forward; and,
- ◆ Approves NSSI's annual Report to Congress

Executive Director

The Executive Director's office provides the managerial guidance and executive oversight on day-to-day activities of the NSSI; advice and consultation to governmental agencies, scientific and academic institutions, and other interested parties to further the Congressional objectives of the NSSI; and, coordinates and develops integration of science-based activities for the North Slope. In addition, the Executive Director:

- ◆ Identifies decision points for the Oversight Group;
- ◆ Implements the Oversight Group's decisions;
- ◆ Carries out direction from the Oversight Group through coordination with the Senior Staff Committee, Science Technical Advisory Panel, and others;
- ◆ Is the Designated Federal Officer for the Science Technical Advisory Panel;
- ◆ Manages the NSSI budget;
- ◆ Promotes the NSSI;
- ◆ Consults with the Oversight Group Chair when a subject matter may be outside the normal operations of the initiative. For example, a request to the NSSI for a response to a task may conflict with a member agency(ies) policy or operations. The Executive Director and Chair may consult with other members as necessary to draft the appropriate response;
- ◆ Speaks on behalf of the NSSI, but not on behalf of member agencies; and,
- ◆ Develops the annual Report to Congress.

Senior Staff Committee

The Senior Staff Committee (SSC) members are representatives from member agencies with experience in North Slope management and science. The SSC Chair also serves as the NSSI Deputy Director. The respective OG member clearly communicates their role within the NSSI to their SSC member and their immediate supervisor. These roles may include:

- ◆ Identifying environmental issues or needs as assigned by their respective OG member;
- ◆ Advise their respective OG member on assignments and direction of the NSSI;
- ◆ Compile input and information from across their respective agencies;
- ◆ Serve as the liaison between their respective OG member and their agency; and,
- ◆ Reviews Science Technical Advisory Panel work and provides feedback to the OG.

Science Technical Advisory Panel

The Science Technical Advisory Panel (STAP) is a legislatively mandated Federal Advisory Committee Act (FACA) group consisting of not more than 15 scientists and technical experts from diverse professions and interests (See charter, Appendix 2). This may include the oil and gas industry, subsistence users, Alaska Native entities, conservation organizations, wildlife management organizations, academia, and other areas determined by the Secretary of the Interior. The panel's duties are listed in the STAP Charter (Appendix 3, or <http://www.northslope.org>). Panel members may come from disciplines such as:

- | | | |
|---|-------------------------|----------------|
| ◆ North Slope traditional and local knowledge | ◆ Hydrology | ◆ Economics |
| ◆ Landscape ecology | ◆ Limnology | ◆ Ornithology |
| ◆ Petroleum engineering | ◆ Ecology | ◆ Oceanography |
| ◆ Civil engineering | ◆ Wildlife biology | ◆ Fisheries |
| ◆ Geology | ◆ Biometrics | ◆ Biology |
| ◆ Botany | ◆ Sociology | ◆ Climatology |
| | ◆ Cultural anthropology | |



Science Technical Advisory Panel members at Pump Station I. (NSSI)

2011 Progress and Accomplishments

The NSSI has identified several accomplishments using the feedback from workshops and information from its Senior Staff Committee, Science Technical Advisory Panel and Oversight Group, which increase the value of the organization. These accomplishments include (more information on each is available on the NSSI website <http://www.northslope.org>):

- ✓ **The terrestrial circumpolar biodiversity monitoring program**, the NSSI is co-lead with the Kingdom of Denmark.
- ✓ **Place-based workshops** brought together managers, scientists and local residents. These workshops built lasting relationships and shared knowledge across disciplines, between decision makers, and with local residents.
- ✓ **Recommendations on resource data needs published** for resource managers.
- ✓ **Emerging Issue papers** work continued, identifying issues, data gaps, and information needs and making recommendations on how to fill those gaps for managers to make informed decisions.
- ✓ **Outreach, coordination, information sharing, and collaboration efforts** continued with other initiatives. This includes the Department of the Interior's Arctic Landscape Conservation Cooperative and Alaska Climate Science Center, the National Oceanic and Atmospheric Administration Alaska Climate Service, and non-governmental initiatives such as the Alaska Oceans Observation System, North Pacific Research Board, National Science Foundation, U.S. Arctic Research Commission, Interagency Arctic Research Policy Committee, non-government organizations, industry, and the greater pan-Arctic community.
- ✓ **Higher-resolution digital information layers** updated through a partnership with USGS, The State of Alaska, and others, for evaluation purposes and planning for future activities.
- ✓ **Data management and information sharing system refinement** continued that provides links to other systems and circumpolar Arctic information.
- ✓ **North Slope Vegetation baseline** work continued. The baseline is to meet the need for a consistent and accurate baseline and was accomplished through a cost-sharing project between the NSSI, U.S. Fish and Wildlife Service, Alaska Natural Heritage Program, Natural Resources Conservation Service, Spatial Solutions, Inc., National LandFire Program, and Ducks Unlimited, Inc.
- ✓ **Helicopter tracking system enhances the NSSI website.** The added feature is for member agencies to coordinate helicopter usage and for local residents to find out who is operating helicopters on the North Slope. (<http://www.northslope.org>)

Workshops

Workshops provide opportunities to identify common issues or concerns, share current knowledge and provide a forum for increasing communication and understanding. In 2011, the NSSI sponsored and co-sponsored two major workshops: the second “Canada/United States Oil and Gas Research Forum” in Calgary, Alberta, Canada; and “Science, Natural Resources and Subsistence in Alaska’s Arctic Lands and Waters” in Barrow, Alaska. The next generation of workshops will focus on current events such as terrestrial biodiversity monitoring in the Arctic. In October 2011, the NSSI became a co-sponsor with the Arctic Council for, “Conservation of Arctic Flora and Fauna,” a circumpolar biodiversity monitoring workshop in Copenhagen, Denmark, with a follow-up workshop in Alaska in late spring 2012.

Canada and United States, Northern Oil and Gas Research Forum



Canada/U.S. Oil and Gas Research Forum. (NSSI)

The second United States and Canada North Oil and Gas Research Forum, *Current Status and Future Directions for the Chukchi Sea, Beaufort Sea, North Slope and Mackenzie Delta*, was held November 30 through December 2, 2010, in Calgary, Alberta, Canada. The U.S. and Canada share a history of oil and gas exploration and development in the Beaufort Sea and adjoining coastal areas. Currently, both countries are considering proposals for the transmission of natural gas resources to southern markets, and for ongoing exploration and development of oil and gas resources. Both countries have undertaken significant research in support of

the environmental assessment and regulatory processes associated with oil and gas development. This research is important as it enables governments and industry to fulfill their responsibilities to the public by ensuring that oil and gas development is carried out in a way that minimizes environmental and social impacts and supports economic development. This joint forum brought United States and Canadian scientists, industry, and regulators together to share information about research programs and to discuss future directions for northern oil and gas exploration and development. The forum provided an important communication tool for regulators, industry, and communities to become better informed about existing research and how information is used in decision-making, and to discuss future opportunities for international collaboration (visit

<http://www.northslope.org> for the full workshop report).



North Slope exploration well. (NSSI)

Science, Natural Resources, and Subsistence in Alaska's Arctic Lands and Waters: A Continuing Dialogue on Working Together to Understand our Changing Arctic

The workshop brought more than 130 North Slope community members, scientists, regulators, and resource managers in a way that facilitated the understanding of environmental and development changes currently being experienced on the North Slope and in the off shore environments. Almost an equal number of local residents, scientists, and resource managers or regulators participated. Over 50 science posters were available for review by all participants. The posters shared information on specific research projects or initiatives and covered a wide breadth of science activities on the North Slope. At the end of the workshop, the majority of the posters were provided to the Barrow Area Science Consortium for local school students, scientists, and others who may not have attended the workshop.

The workshop format was built around the following two key questions relevant to all participants and to the goals of the workshop: (1) How can scientists contribute to detecting and documenting environmental changes that are relevant to local people, regulators, and land managers, and (2) How can the science community more effectively involve local people, regulators, and land managers in scientific research? The primary goal of the workshop was to help scientists, resource managers, regulators, and local residents contribute to better detection, documentation, and understanding of the environmental changes occurring across the North Slope and in the off shore environments. The secondary goal was



Round table discussion on setting important directions for the future.
(NSSI)



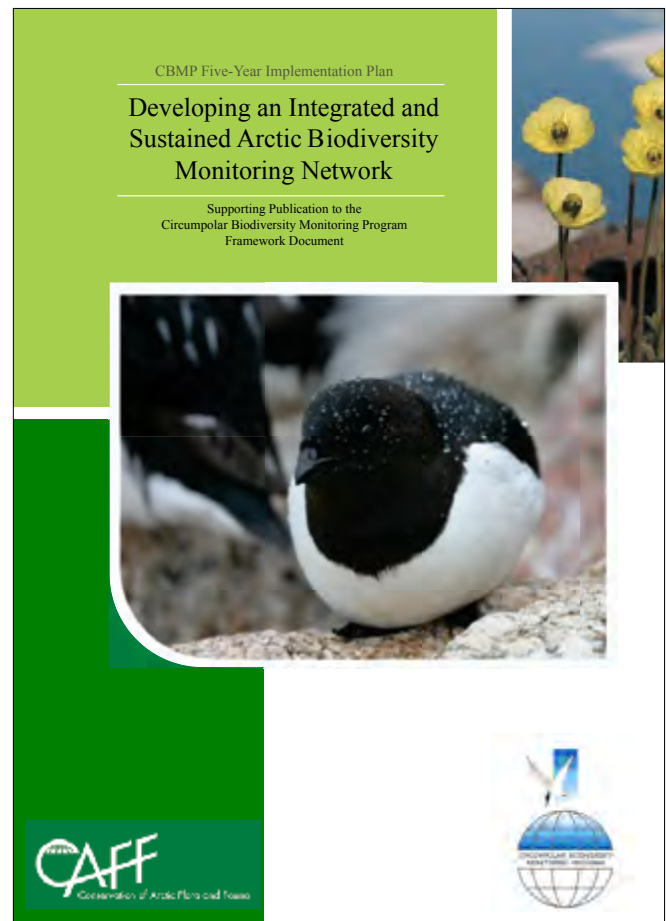
Workshop Day Two: Marine Subsistence Panel with Robert Suydam-Fenton, Rexford, and Henry Huntington. (NSSI)

to identify ways the science community can more effectively involve local resident's, resource managers, and regulators in developing hypotheses for future scientific research, participating in field studies and understanding results. Each of the central focus areas were introduced by speakers having considerable expertise of the topic, followed by panel discussions with representatives from the local community, resource managers, and scientists (for the full workshop report visit the website at: <http://www.northslope.org>)

Terrestrial Circumpolar Biodiversity Monitoring Workshop

The NSSI is co-leading with the Kingdom of Denmark (Denmark, Greenland and Faroe Islands) the terrestrial circumpolar biodiversity monitoring program. This is an effort through the Arctic Council's Conservation of Arctic Flora and Fauna working group. The first workshop of the working group, was October 11-14, 2011, in Sonnerupgård, Denmark, near Copenhagen, that brought together about 50 of the world's Arctic experts to develop the first draft of a circumpolar monitoring plan. The workshop coincided with similar workshops (International Arctic Science Committee [IASC] and the International Network for Terrestrial Research and Monitoring in the Arctic [INTERACT]). These workshops also helped develop synergies in Arctic terrestrial research and monitoring. A complete description of the Circumpolar Biodiversity Monitoring Program is available at: <http://cbmp.arcticportal.org/>

The need to measure change in Arctic biodiversity is increasing, given the emerging evidence that Arctic ecosystems are already responding, in some cases quite dramatically, to climatic changes (Hinzman et al. 2005; Post et al. 2009). Substantial shifts in the arctic environment are predicted for the near future through encroachment of more southerly species and ecosystems (IPCC 2007; ACIA 2005), and recent changes in physical elements such as sea ice have outpaced predicted changes (Stroeve et al. 2007). Limited functional redundancy in Arctic ecosystems poses a particular risk as the loss of a single species could have dramatic and cascading effects on an ecosystem's state and function (Post et al. 2009). A common single-species approach to monitoring, especially with a bias toward charismatic (versus functional) species, limits the ability to detect and understand potentially critical changes in the arctic ecosystems. A broader and more integrated approach that includes more functional species and ecosystem aspects is needed to develop a better understanding of how the Arctic's living resources are responding to change and how these changes compare with global biodiversity trends. The use of a broader and more integrated approach to biodiversity monitoring is essential in order to develop effective conservation and adaptation strategies.



Circumpolar Biodiversity Monitoring Program five-year implementation plan. (CAFF)

Emerging Issues and Highlights

The STAP continues its ground-breaking work developing issue papers with background information on the resources of the North Slope and its off-shore environments. Each summary includes the status of relevant science and information needs; preliminary findings on management concerns; and a shortlist of STAP recommendations to initiate and address the science of these critical and shared needs. Other forums like the Alaska Climate Change Executive Roundtable, Alaska Governor's Subcabinet on Climate Change, the Department of the Interior's Arctic Landscape Conservation Cooperative and Climate Center, and Interagency Arctic Research Policy Committee are interested in these NSSI products as they build their science programs. The STAP released the first thirteen of these issue papers in late 2009, with three additional released in 2011. Several of these papers address the off shore environments and are complementary to the recently released USGS Circular 1370, *An evaluation of the science needs to inform decisions on Outer Continental Shelf energy development in the Chukchi and Beaufort Seas, Alaska* (Holland-Bartels, Leslie, and Pierce, Brenda, eds., 2011). For more detail on each of the summaries, please visit the website where each of the papers, or can be viewed or downloaded from the NSSI website: (<http://www.northslope.org>).

A logical follow on to the issue papers is the development of the "connectivity" paper entitled *Environmental Change and Potential Impacts: Applied Research Priorities for Alaska's North Slope* (Streever, et al 2011), which broadly defines applicable overarching priorities, based on the issue papers. These overarching priorities are:

- ◆ Systematic assessment of the range of potential development scenarios for 20 years into the future in a manner that will contribute to refinement of specific research priorities;
- ◆ Enhanced and well-organized collection of climate and weather data across the North Slope in a manner that will facilitate improved regional climate modeling, verification of climate models, and application of data in research projects;
- ◆ Regional coordination of existing long-term monitoring projects; and,
- ◆ Renewed and systematic efforts to improve communication among managers, residents, and scientists through initiation of frequent "place-based" workshops.

Issue 1: Weather and Climate

Status: Weather and data collection are ad hoc at best. This is troubling and in need of immediate rectification.

Recommendation: Systematic approach to collect, store, manage, disseminate, and maintain weather data and equipment. Conduct inventories of existing weather stations, a gap analysis, and invest in a better, well-coordinated or centrally managed system.



Ivishak River, Arctic National Wildlife Refuge at sunset. (USFWS)



Canadian Coast Guard helicopter approaching U.S. Coast Guard icebreaker Healy. (Dr. Pablo Clemente-Colon, NSIDC)

model using the Arctic Council's "Arctic Marine Shipping Assessment 2009 Report" with its cumulative oil and gas development effects, and various National Environmental Policy Act (NEPA) documents that will be relevant for decision makers and make the information accessible to the public (e.g., through GINA).

Issue 2: Increasing Marine Activity

Status: There is no arctic-specific baseline information on current conditions and risk assessment related to increased marine activity.

Recommendation: Develop a plan and standards for the next two decades for the coastal and offshore waters of the North Slope. Identify the range of human activities (e.g., oil and gas development, fishing, and tourism) and physical and biological environments. Establish a baseline of current conditions, such as community composition, noise levels, water quality, or invasive species. Create a risk assessment for oil spills, shipping accidents, bird strikes, and similar. Create a

model using the Arctic Council's "Arctic Marine Shipping Assessment 2009 Report" with its cumulative oil and gas development effects, and various National Environmental Policy Act (NEPA) documents that will be relevant for decision makers and make the information accessible to the public (e.g., through GINA).

Issue 3: Changing Sea Ice Conditions

Status: Daily satellite data is available for the North Slope's adjacent ocean areas on sea ice conditions. The National Ice Center provides daily data on sea ice extent, type, and concentration, and the National Oceanic and Atmospheric Administration buoy network collects daily wind, wave, and ice observations for the open seas. Historical and remote sensing sea ice data are available from the National Snow and Ice Data Center, National Oceanographic Data Center, and Canadian Ice Service. Satellite data depends on cloud cover and varies from



Researching Changing Sea Ice Conditions. (Hajo Eicken, UAF)

200 m to 25 km in spatial resolution, and there is an immediate need for better resolution. Collectively, this information, along with local traditional ecological knowledge, is useful in assessing ice conditions.

Recommendation: NSSI recommends a series of actions, beginning with a synthesis workshop. It is critical to get high-quality, user-friendly access to data and model projects for sea ice and ocean changes that are specific to local conditions. More research is needed to understand the fate and effects of oil spills in sea ice during freeze-up and spring melts.



A block of permafrost on a beach shows the signs of coastal erosion at a quick pace. (Ken Dunton, University of Texas)

Issue 4: Permafrost

Status: Permafrost measurement techniques and existing data are not yet sufficient to address most management concerns. Active layer depth, subsidence thermokarst, and their relation to threshold conditions in the active layer of the permafrost system may be of more immediate importance to land managers, than conditions such as melting.

Recommendation: NSSI recommends centralizing all permafrost data in an accessible location. Combining ground observations with remote sensing techniques, such as Synthetic Aperture Radar (SAR) combined with active layer monitoring results, may hold some promise for a better understanding of permafrost.

Issue 5: Coastal and Riverine Erosion

Status: North Slope coastal erosion rates, to the extent currently measurable, are among the highest in the world and increasing. There is no accurate map of coastal and river corridors showing existing resources at risk, nor a robust erosion model. As sea levels rise, shorefast ice and near-shore pack ice decrease, active layer depth increases, and there are more intense storms.

Recommendation: Develop an accurate coastline and river corridor map, along with a program to remap selected, targeted regions of the coastline every three-to-five years. Accurate risk assessment for loss of cultural sites, contaminant release, infrastructure damage, and similar risks, depends on the development of a robust erosion model.

Issue 6: Hydrology and Lake Drying

Status: North Slope hydrological processes, status, and trends are poorly understood. Climate changes are difficult to predict or document, as ongoing industrial development and the environment continue to change rapidly.

Recommendation: Short- and long-term hydrological and meteorological information for all waters and wetlands is critical for the Arctic. Remote sensing technologies useful for understanding and monitoring hydrology have yet to mature, but warrant further research and development.



Arctic Coastal Plain. (USGS)

Issue 7: Coastal Salinization

Status: Little is known about North Slope coastal salinization, as current data are inadequate to fully assess trends. Coastal salinization will change the composition of plant and animal species and may reduce the availability of water to construct ice roads. Although coastal salinization has not yet impacted large areas, it has occurred in areas where native communities, the oil industry, and subsistence fishing and hunting activities are concentrated.

Recommendation: Model future coastal salinization and research local plant species salinity tolerances, site-specific conditions for trapping water and salt from melting ice, and the use of snow trapping to mitigate salt content of meltwater.

Issue 8: Contaminants

Status: Some research has identified biological responses to contaminants in the Arctic, but significant dose-response data for arctic wildlife are too limited to draw clear conclusions.

Recommendation: Develop effective contaminant management strategies, including developing accurate data on release and distribution of contaminants into the arctic environment. Most significant is the atmospheric transport of contaminants, although oceans, rivers, sea ice, and migratory fauna are additional transporters. Continue to monitor contaminant levels to understand the extent of exposure for people and the environment. Co-management councils have opportunities to monitor contaminants in the tissues of fish, seabirds, and marine mammals.

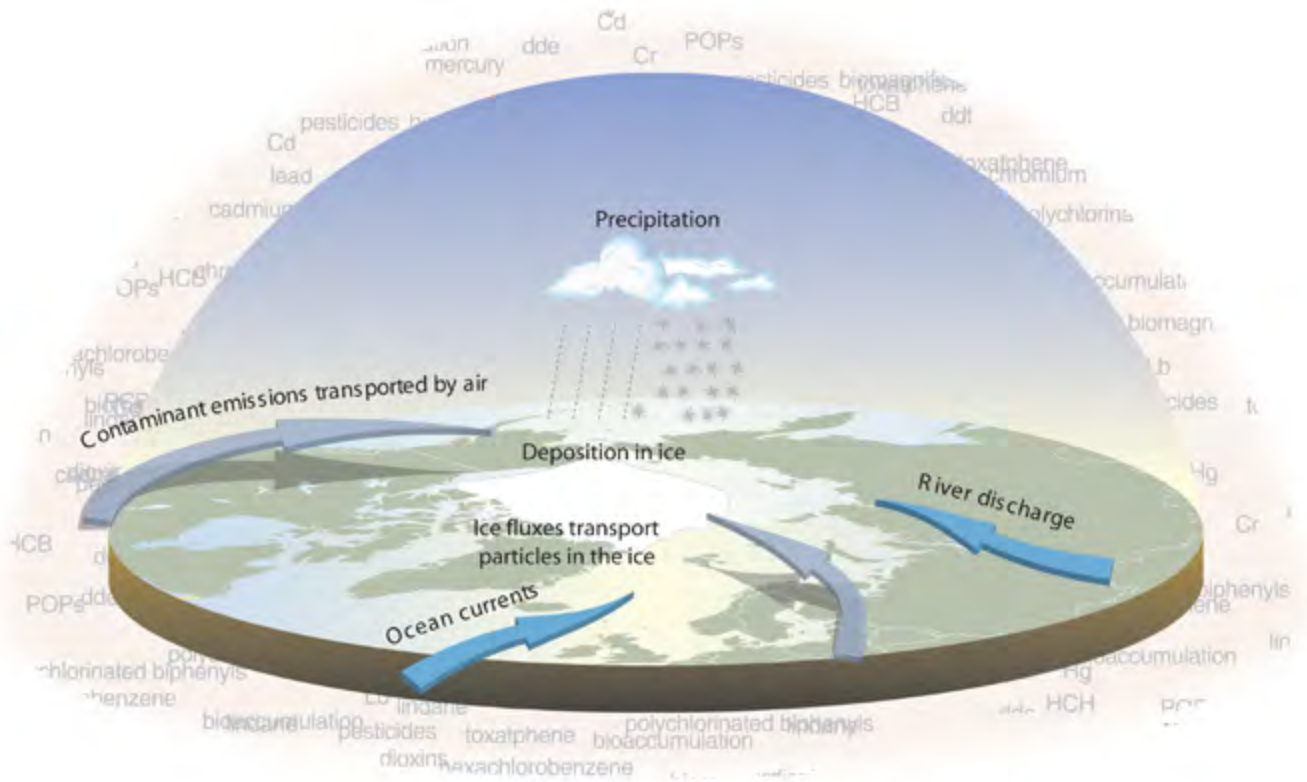


Illustration of the many contaminant pathways into Arctic environments. (AMAP 202.ACIA.2040)



Cottongrass growth increase inside of the fire perimeter due to fertilization of burned organics and warmer soil. (BLM)

Issue 9: Fire Regime

Status: The 2007 large and highly-publicized Anaktuvuk River tundra fire prompted the question, “Is the fire regime changing on the North Slope; and if so, how?” We cannot answer that question. Effects such a change has on human safety, village protection planning, fire season communications, coal deposit protection, energy development infrastructure protection, changes in fire management plans, and funding for fire suppression can be addressed annually or in-season by the Alaska Wildland Fire Coordinating Group and its member agencies.

Recommendation: Basic data requirements to support modeling on fire regime changes for the North Slope are contained in the issue summaries for “Vegetation Change” and “Weather and Climate.”

Issue 10: Vegetation Change

Status: Much of North Slope vegetation is mapped, but there are technical issues related to scale, accuracy, density of field, and continuity of coverage that limit their application. No formal change-detection plan appears to be in place. The implications and ramifications of changes to North Slope vegetation are widespread, complex, and interwoven with other management concerns, such as migratory birds, fire regime, and caribou. The NSSI has a North Slope-wide plan for vegetation change detection and monitoring.



Sampling vegetation on the North Slope. (ADNR)

Recommendation: Complete a single, North Slope-wide land cover map, such as NSSI's current effort, to help address many issues and as a basis for starting a Slope-wide change-detection program. We recommend moving immediately beyond the inventory stage and begin formal programs to delineate change. Long-term (multi-decadal) monitoring sites may provide the highest level of detail for detecting vegetation change. We recommend a site inventory to determine the number or types of long-term sites present on the North Slope. This inventory should include standard site sizes, methodologies, and recommendations for establishing additional sites. It would be helpful to have a more focused and reduced list of pressing management questions that the STAP could use to convene experts in producing a "vegetation-change ramification" model.



Arctic Tern soaring in the blue skies of summer. (NSSI)

Issue 11: Species of Interest—Migratory Birds

Status: North Slope migratory bird data is currently incomplete for rare species (existing species in low numbers), habitat use (including offshore, migratory corridors, and wintering areas), and selection. There is a need to develop appropriate mitigation measures in areas of oil and gas development to accurately predict the potential impacts of climate change and land management decisions.

Recommendations: We need inter-annual and seasonal North Slope migratory bird data to describe the natural range and variations in population parameters, status, and trends. Understanding impacts within migratory corridors and areas farther south will

contribute to management decisions. An oil spill into Arctic waters and the Outer Continental Shelf, especially during a period of broken ice, could be devastating to migratory birds. This is especially true as oil could be concentrated at the water surface in open leads, directly impacting resting birds. As these leads close or shift, oil could be forced down into the water column and impacting prey or successful foraging. An onshore spill into a water body could also greatly affect birds.

Issue 12: Species of Interest— Caribou

Status: Current management concerns about caribou deal with the perceived differences in the management of the four herds that calve on the North Slope. The earlier work of the National Petroleum Reserve-Alaska (NPR-A) Research and Monitoring Team (e.g., monitoring strategy, caribou model, and subsistence access model) may serve as a useful starting point for identifying some of the core data needs and planning work.

Recommendation: Start a data-sharing network.

Identify and prioritize caribou data needs for the North Slope through a meeting or mini-conference. Develop a plan and parameters for cooperative annual data collection and a structure for the data-sharing network. Following the meeting, directed research projects supported individually or collaboratively by NSSI members or its affiliates, will address some management concerns.



Bull Caribou. (NSSI)



Bowhead whale under ice. (NOAA)

Issue 13: Species of Interest— Marine Mammals and Their Prey

Status: Marine mammals data on species abundance, seasonal distribution, movements, and human-animal interactions in the Arctic is often unavailable or out-of-date (>8 yrs. old). The data are often not at the spatial scales, nor in the areas where managers need to make decisions. There is some harvest monitoring of bowhead and beluga whales, polar bears, ice seals, walrus, and fish. The U.S. Fish and Wildlife Service systematically monitors polar bear and walrus harvest.

Recommendation: If necessary, focus data collection on species listed as endangered or threatened under the Endangered Species Act, depleted under the Marine Mammals Protection Act, or harvested for subsistence. Traditional Ecological Knowledge about these species should be a priority to include when

assessing historical information on marine mammals, their prey, and fish distribution. This data will be critical to understanding changes in subsistence harvests. Modeling is needed to focus and integrate studies, developed by hypotheses, and to predict likely future states.

Issue 14: Species of Interest– Fisheries

Status: There is a great need for better data on arctic fisheries abundance and seasonal distribution, observed changes over time, and fish subsistence practices (e.g., net type, mesh sizes used, net length, soak time, distances traveled to fish) for the North Slope. There have been very few Traditional Ecological Knowledge studies directed at Arctic fisheries. Information on Chukchi Sea drainages, marine fisheries, and winter distribution of freshwater and anadromous fish are especially lacking.



Arctic Cisco. (USGS)

Recommendation: Priority data collection should include those fish species important to subsistence harvest, that are prey for marine mammals or migratory birds listed as endangered or threatened under the Endangered Species Act or depleted under the Marine Mammals Protection Act. Conduct Traditional Ecological Knowledge studies for arctic fisheries. A key management goal for subsistence use is to maintain populations of existing subsistence target species at levels that will ensure sustainable subsistence harvests. Both scientific and Traditional Ecological Knowledge studies will be important in improving our understanding of arctic fish species.

Issue 15: Social and Economic Dimensions of North Slope Communities

Status: People living on the North Slope are facing social and economic changes as oil and gas activities increase and they confront the realities of climate change. A greater number of entities are involved in social and economic studies on the North Slope, yet the coordination of these studies, their reviews, approvals, and involvement of local residents is limited. There is a growing need to integrate social and economic systems knowledge with environmental knowledge when making decisions about land use, natural resources, and industrial development.



Native Dancer. (NSSI)

Recommendation: Reorient the evaluation of land-use, resource, and development decisions to include more integrated approaches focused on systems-based concepts such as ecosystem services, food security, and sustainable livelihoods. Local/traditional knowledge has value, yet we need to establish better methods such as community-based monitoring to incorporate local and traditional knowledge with scientific research for assessing change. Undertake efforts to understand change by linking the community level to regional, state, national, and international scale processes.

Connectivity and Prioritizing Research Recommendations

NESSI's STAP developed "Environmental Change and Potential Impacts: Applied Research Priorities for Alaska's North Slope." This 'connectivity' paper discusses how the emerging issue summaries relate to overall management priorities for the North Slope and is an initial step toward prioritizing applied research. Each issue, except "weather and climate" (addressed separately), was applied to one of three following "state of knowledge" categories:

1. Issues are reasonably well-understood; research is sufficient to satisfy most current management questions.
2. Issues are less well understood; more research and monitoring is required to address management questions; and,
3. Issues are poorly understood; needs substantial additional research

Most emerging issues are interdependent. For example, changes in active layer thickness above permafrost will likely result in changes to hydrology, which impact vegetation, which impact caribou and some migratory bird populations.

Estimates for Research Results: The amount of time to generate meaningful research results is estimated. Important baseline information needs for many issues are required in the short-term. Realistically, meaningful results may require at least a decade for restoration experiments, permafrost studies, vegetation change assessments, and more because of the slow growth of plants and slow response of permafrost. This is why the STAP estimated the probable number of years in five-year increments, to a maximum of 20 years. These increments are the time needed to move an issue from "state of knowledge" category #3 to #2 (above), or from category #2 to #1. Even reasonably well-understood issues (category #1) require an ongoing investment in monitoring.

Research Priorities. The STAP considered the relationships, state of knowledge, and time required for meaningful results for each issue and prioritized the three most pressing applied research topics for each. Throughout development of the issue papers and prioritization of applied research topics, five broadly applicable overarching priorities emerged (full report available at <http://www.northslope.org>). These are:

- ◆ Systematic assessment of potential development and climate scenarios over the next twenty years in a way that contributes to the refinement of specific research priorities;
- ◆ Enhanced and well-organized climate and weather data collection across the North Slope in a way that facilitates improved regional climate modeling, verification of climate models, and application of data in research projects;

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Environmental Change and Potential Impacts: Applied Research Priorities for Alaska's North Slope

by B. Streever, R. Suydam, J.F. Payne, F. Shuchman, R.P. Angilas, G. Balogh, J. Brown, J. Grunblatt, S. Guyer, D.L. Kane, J.J. Kolby, G. Kolman, D.R. Lonsay, W. Loya, P. Martin, S.E. Moore, W.G. Pageau, C. Risa, D.J. Reed, T. Stormo, M. Sturm, J.J. Taylor, T. Vliet, D. Williams and D. Yoolet

INTRODUCTION

THE NORTH SLOPE OF ALASKA is the vast area north of the crest of the Brooks Range (Fig. 1). Its land base encompasses 231 000 km² (89 000 mi²), an area roughly the size of Minnesota, most of which is wetland habitat underlain by permafrost and part of which contains the largest operating oil fields in the United States. The nearshore and offshore waters of the Chukchi and Beaufort seas add another 295 000 km² (114 000 mi²) and hold what may be the largest undeveloped oil reserves remaining in the United States. The region is home to an abundant and diverse array of fish, wildlife, and plants, resources that support the vibrant subsistence culture of about 6000 Iñupiat Eskimos. The caribou herds that summer on the North Slope are an important food resource for Iñupiat communities, as are some native plants, bowhead whales, beluga whales, four species of ice seals, and walrus living in the Beaufort and Chukchi seas. Further, Alaska's North Slope is at the forefront of global climate change, with an increase in mean annual temperature of 2.5° in Barrow, Alaska (ACRC, 2008). Federal, state, and local agencies manage the biotic and abiotic resources of the North Slope to maintain fish and wildlife populations and their habitats while also allowing energy development. The laws and regulations applied by government agencies managing the North Slope are rigorous, complex, and often controversial.

Appropriate management requires information that can be gained only through applied research. We provide a brief history of applied research on the North Slope, introduce the North Slope Science Initiative (NSSI) as an organization tasked with improving the coordination of science across the region, and posit applied science priorities that are essential for successful and informed management.

HISTORY OF NORTH SLOPE APPLIED SCIENCE

The earliest attempts to understand the North Slope region undoubtedly occurred when Iñupiat people and their predecessors shared information immediately relevant to their survival (Chance, 1990). Much later, a tradition of science grew from work initially undertaken during mapping expeditions, such as that of Rochford Maguire and Dr. John Simpson during their sojourn near Barrow from 1852 to 1854 (Maguire, 1988). This tradition grew during the First International Polar Year in 1882–83 and through Diamond Jenness's anthropological studies during the 1913 Karluk expedition (Jenness, 1957). The presence of oil seeps led to establishment of the Naval Petroleum Reserve Number 4 in 1923. Exploratory drilling for oil and gas in the Alaskan Arctic started during World War II, and the Office of Naval Research established the Naval Arctic Research Laboratory (NARL) in Barrow in 1947 (Reed, 1958; Norton, 2001a). By 1948, a Scientific Advisory Board had been established for NARL, and nine research projects were underway, including work sponsored by multiple government agencies (Schindler, 2001). Over the decades, Barrow became a center for research activity, including ice island research, field studies across the North Slope, and the establishment in 1970 of the International Biological Programme's Tundra Biome project funded by the National Science Foundation (NSF). Following transfer of NARL to the Upeyayvik Iñupiat Corporation, the Barrow Environmental Observatory (BEO) was established and subsequently zoned as a scientific research district. The Barrow Arctic Science Consortium was established in 1995 to promote science in the region, integrate scientists with the local community, and assist with management of the BEO.

To the southeast, adjacent to the Trans-Alaska Pipeline, in 1975 the National Science Foundation and the University of Alaska established the Toolik Field Station, which has hosted an Arctic Tundra Long-Term Ecological Research Program for freshwater and terrestrial field studies since the late 1980s. To the west of the pipeline lies the Arctic National Wildlife Refuge, where wildlife and wilderness studies began in the 1950s and continue into the present.

The discovery of economically recoverable oil in 1968 about 240 km (150 mi) east of Barrow and the subsequent development of oilfields spawned efforts to collect baseline data and to assess environmental impacts. Research was supported by various government agencies, private

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InfoNorth (Arctic) Publication. (NSSI)

- ◆ Regional coordination of existing long-term monitoring projects; and,
- ◆ Renewed and systematic efforts to improve communication among North Slope land managers, residents, and scientists through the initiation of frequent “place-based” workshops.

Direction and Focus for the Near Term

The Oversight Group acknowledges the excellent work of the Executive Director, Senior Staff Committee and the Science Technical Advisory Panel in developing the emerging issues and connectivity paper described above. The overarching priorities from the connectivity paper guided the NSSI Oversight Group in reaching decision regarding future directions for the NSSI. The NSSI’s focus for the next three years will be to: Identify future development scenarios on Alaska’s North Slope, prioritize and communicate about the collection of scientific information and contemporary and traditional knowledge needed for sound and timely decision making.

Those future goals include:

- ◆ Identify future development scenarios on Alaska’s North Slope (including on-and off-shore) with the following sideboards:
 - Timeline of 20 years into the future;
 - Oil, gas, minerals, and associated infrastructure with consideration for tourism, shipping, defense, ports, fishing and other development projects; and,
 - Define data limitations with regard to intended use, scale, and uncertainties.
- ◆ Identify information needs to make management decisions relative to the development scenarios with the following sideboards:
 - Characterize the environmental baseline, post-project, cumulative effects and trends;
 - Identify information needs that cut across agencies and mandates; and,
 - Provide recommendations on which emerging issues to address as priorities.
- ◆ Coordinate long-term monitoring relative to development scenarios, information needs, and emerging issues with the following sideboards:
 - Identify inventory of existing monitoring efforts that are either 10-years or greater in duration, or are being planned for a minimum of 10-years;
 - Identify gaps in needed monitoring; and,
 - Identify which variables should be monitored over a given period of time.
- ◆ Improve coordination and communication among managers, residents, and scientists with the following sideboards:
 - Build upon the lessons learned and recommendations from the Barrow Workshop;
 - Identify workshops and dialogues needed to help improve communications and understanding;

- Help interpret science in a relevant way for local people and decision makers; and,
- Identify best ways to reach the intended audiences.
- ◆ Develop a NSSI marketing plan for multiple audiences with the following sideboards:
 - Develop hard copy (handouts, factsheets, fliers) and soft copy (radio, web and video);
 - Engage marketing, public relations and publication specialists from both within and outside agencies; and,
 - Develop a report or other product that is uniquely identified with the NSSI.

Coordination and Cooperation

One of the primary goals of local, state, and federal partners when forming the North Slope Science Initiative was to improve upon their awareness and collective understanding of each others' missions, management concerns, and science needs. This purpose was solidified under the enabling legislation that emphasized coordination of ongoing and future inventory; monitoring and research activities; and cooperation among NSSI parties and the broader scientific community. The structure and organization of the NSSI was designed to enable, and NSSI leadership has promoted, the communications needed to accomplish this purpose.



Conservation of Arctic Flora and Fauna Bi-Annual Meeting, Iceland 2011. (NSSI)

External Communication

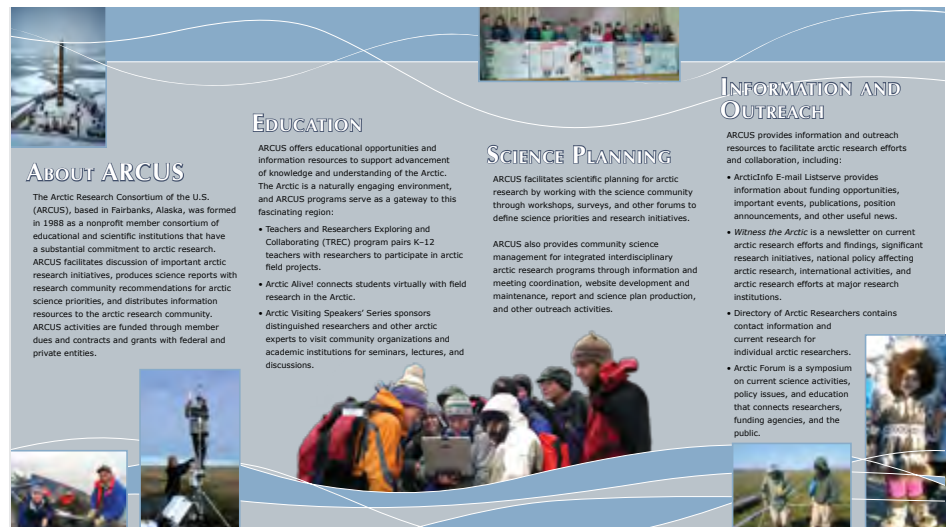
The mission and administrative structure of NSSI requires a viable network of external contacts with academia, non-governmental entities, industry, and other science organizations. These contacts bring together potential partners, add a broader knowledge of North Slope endeavors, and assure scientific excellence in NSSI products. Networking for NSSI is accomplished in three major categories through: 1) internal communications with member agencies to gain knowledge into projects or programs occurring or planned for the North Slope; 2) Science Technical Advisory Panel expertise; and 3) academia, workshops, seminars, and interaction with the National Science Foundation Office of Polar Programs, and other external networks having knowledge of Arctic and pan-Arctic environments (see Appendix 4).

Collaboration with Arctic Research and Policy

The Arctic Research and Policy Act of 1984, Public Law 98-373, July 31, 1984; amended as Public Law 101-609, November 16, 1990 (ARPA), provides for a comprehensive national policy dealing with national research needs and objectives in the Arctic. The Act was followed on January 9, 2009, by two Presidential Directives (NSPD-66 and HSPD-25) that brought dated U.S. Arctic policy to the forefront

of security and climate change. The ARPA established the Arctic Research Commission (ARC) and an Interagency Arctic Research Policy Committee (IARPC) to help implement the Act. The NSSI is a formal member of the IARPC as an independent organization. NSSI membership and participation in IARPC programs is important and mutually beneficial to both entities because of their difference in reach, but similarity in mission. The mission of IARPC:

- ◆ Helps set priorities for future Arctic research;
- ◆ Works with the Arctic Research Commission to develop and establish an integrated national Arctic research policy to guide federal agencies in developing and implementing their research programs in the Arctic;
- ◆ Consults with the Arctic Research Commission on matters related to Arctic research policy, programs and funding support;
- ◆ Develops a five-year plan to implement the national policy, and updates the plan biennially;
- ◆ Coordinates preparation of multi-agency budget documents for arctic research;
- ◆ Facilitates cooperation between the federal, State, and local governments in scientific arctic research;
- ◆ Coordinates and promotes cooperative scientific arctic research programs with other nations;
- ◆ Promotes federal interagency coordination of Arctic research activities, including logistical planning and data sharing; and,
- ◆ Submits a biennial report to Congress through the President, containing a statement of the activities and accomplishments of the IARPC since its last report.



ARCUS brochure. (ARCUS)

Having principle investigator status in the development of the Arctic Observing Network and the larger Sustained Arctic Observing Network furthers the goals of the NSSI and expands networking capabilities and future partnership opportunities for Arctic activities outside the NSSI organization. There is strategic value to the NSSI in developing information sharing tools for the long-term sustainability of arctic data. To this end, the NSSI has positioned itself as key player and contributor for the design and development of both the U.S. and the international observing systems.

NSSI Internal Communication

Even before the formation of the NSSI, the various member organizations each supported a range of inventory, monitoring, and research activities. That level of ongoing activity continues, but the substantial benefit of the organizational structure of the NSSI is that the Oversight Group and their senior staff regularly communicate and coordinate new and ongoing projects and their implications to management decisions. The Oversight Group meets at least four times a year. The Senior Staff Committee meets a minimum six times/year. These groups discuss each agency's specific North Slope issues and use of science for better decision making. In addition, the Senior Staff Committee meet annually to introduce new agency initiatives and report on the progress of ongoing projects. These meetings allow each organization to better understand what others are planning. They can share, collaborate, and coordinate both knowledge and resources (monetary and human capital). Each of the 2010 accomplishments in this section benefited from NSSI-assisted coordination. Such interface also helps determined future information needs by providing these forums for emerging management questions (see "Future Directions" section, page 16).



Representatives from U.S., Denmark, Greenland, Sweden, and the Faroe Islands discuss terrestrial biodiversity monitoring. (NSSI)

NSSI Member Agency Cooperative Science on the North Slope

The NSSI has also provided a forum for its members to build on their own agency's study or research programs. Each year, senior staff from the member agencies gather to present their individual agency projects planned for the upcoming fiscal year. This forum provides a basis for additional cooperation and collaboration that is focused on the work each agency is planning within their mandates. Descriptions of some of the coordinated science efforts of each NSSI agency that has an operational component on the North Slope can be viewed either on the NSSI website through its Project Tracking/Data portal or on each of the member agency websites.

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For additional information on the North Slope of Alaska, or the membership organizations of the North Slope Science Initiative, please visit these websites:

Federal:

Bureau of Land Management, Alaska	http://www.blm.gov/ak
Bureau of Ocean Energy Management, Alaska OCS Region	http://www.boem.gov
National Park Service, Alaska Region	http://www.nps.gov/alaska
National Marine Fisheries Service, Alaska Region	http://fakr.noaa.gov
National Weather Service, Alaska Region	http://www.arh.noaa.gov
U.S. Arctic Research Commission	http://www.arctic.gov
U.S. Department of Energy	http://www.energy.gov/alaska.htm
U.S. Fish and Wildlife Service, Region 7	http://alaska.fws.gov
U.S. Geological Survey, Alaska Science Center	http://alaska.usgs.gov

North Slope:

North Slope Borough	http://www.north-slope.org
Arctic Slope Regional Corporation	http://www.asrc.com

State of Alaska:

Alaska Department of Commerce, Community & Economic Development	http://www.commerce.state.ak.us
Alaska Department of Environmental Conservation	http://dec.state.gov
Alaska Department of Fish and Game	http://www.adfg.state.ak.us
Alaska Department of Natural Resources	http://dnr.state.gov
Alaska Department of Transportation & Public Facilities	http://www.dot.state.ak.us/
University of Alaska Fairbanks-Arctic Research	http://www.uaf.edu/uaf/research

Appendix I: Oversight Group Charter

North Slope Science Initiative

Department of the Interior (Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Geological Survey, Minerals Management Service, and National Park Service), Department of Commerce (NOAA National Marine Fisheries Service and National Weather Service), Department of Energy (National Energy and Technology Laboratory), State of Alaska (Department of Fish and Game and Department of Natural Resources), Arctic Slope Regional Corporation, North Slope Borough and U.S. Arctic Research Commission

Charter

North Slope Science Oversight Group

1. **Official Designation:** North Slope Science Initiative, North Slope Science Oversight Group (hereafter the Oversight Group).
2. **Background and Need:** Alaska's North Slope provides important terrestrial, marine and estuarine habitat for thousands of migratory birds, caribou and other terrestrial mammals, marine mammals, and fish, and is culturally important to many Alaskan Natives and their communities. Its petroleum resources are vital to the Nation and it currently provides about 11% of annual domestic oil production. When production of the large reserves of natural gas and coal in the region becomes economically feasible, the strategic and economic importance of the North Slope's hydrocarbon energy resources will be even greater. Past oil and gas activities have impacted habitats but those impacts have been difficult to measure. It is essential that state, federal and North Slope Borough and Arctic Slope Regional Corporation natural resource agencies collectively develop and implement cooperative North Slope-wide inventory, monitoring and research programs to provide the scientific information necessary to address development impacts, and to differentiate these impacts from those caused by natural processes.
3. **Mission and Vision:** The North Slope Science Initiative is the effort of federal, state and local governments having responsibilities for land and ocean management, to facilitate and improve collection and dissemination of ecosystem information pertaining to the Alaskan North Slope region, including coastal and offshore regions. The *mission* of the NSSI is to improve scientific and regulatory understanding of terrestrial, aquatic and marine ecosystems for consideration in the context of resource development activities and climate change. The *vision* of the NSSI is to identify those data and information needs that management agencies will need in the future to develop management scenarios using the best information and mitigation to preserve the environments of the North Slope. The NSSI adopts a strategic framework to provide resource managers with the data and analyses they need to help evaluate multiple simultaneous goals and objectives related to each agency's mission on the North Slope. The NSSI utilizes and complements the information produced under other North Slope science programs, both internal and external. The NSSI also facilitates information sharing among agencies, non-governmental organizations, industry, academia and members of the public to increase communication and reduce redundancy among science programs.

- 4. Legislative Purpose and Objectives:** The NSSI was formally authorized in Section 348, Energy Policy Act of 2005 (Public Law 109-58). The legislative **purpose** and **objectives** are stated below:

§(a)(2) The **purpose** of the Initiative shall be to implement efforts to coordinate collection of scientific data that will provide a better understanding of the terrestrial, aquatic, and marine ecosystems of the North Slope of Alaska.

§(b) **Objectives-** To ensure that the Initiative is conducted through a comprehensive science strategy and implementation plan, the Initiative shall, at a minimum—

- (1) identify and prioritize information needs for inventory, monitoring, and research activities to address the individual and cumulative effects of past, ongoing, and anticipated development activities and environmental change on the North Slope;
 - (2) develop an understanding of information needs for regulatory and land management agencies, local governments, and the public;
 - (3) focus on prioritization of pressing natural resource management and ecosystem information needs, coordination, and cooperation among agencies and organizations;
 - (4) coordinate ongoing and future inventory, monitoring, and research activities to minimize duplication of effort, share financial resources and expertise, and assure the collection of quality information;
 - (5) identify priority needs not addressed by agency science programs in effect on the date of enactment of this Act and develop a funding strategy to meet those needs;
 - (6) provide a consistent approach to high caliber science, including inventory, monitoring, and research;
 - (7) maintain and improve public and agency access to—
 - (A) accumulated and ongoing research; and
 - (B) contemporary and traditional local knowledge; and
 - (8) ensure through appropriate peer review that the science conducted by participating agencies and organizations is of the highest technical quality.
- 5. Membership:** The Oversight Group consists of the following member agencies with voting privileges: the State Director of the Bureau of Land Management; the Regional Directors of the U.S. Fish and Wildlife Service, National Park Service, National Marine Fisheries Service, and the Minerals Management Service; the Commissioners of the Alaska Department of Natural Resources and the Alaska Department of Fish and Game; the Arctic Slope Regional Corporation President; and the Mayor of the North Slope Borough. These agencies represent the principal government agencies at the regional, state, and federal level with management responsibilities for public lands, fish, and wildlife on the North Slope. In addition, the U.S. Geological Survey, U.S. Arctic Research Commission, National Weather Service and the U.S. Department of Energy will participate on the Oversight Group as the primary advisory agencies on science issues related to the North Slope, but will not have voting privileges.

6. Summary of Agency Missions and Roles:

A. Federal

1. Bureau of Land Management: collaboratively manages its Alaska lands and its uses on the North Slope to promote healthy and productive ecosystems for present and future generations, in accordance with the Federal Land Policy Management Act (FLPMA) and the Naval Petroleum Reserves Production Act of 1976 (NPRPA). The NPRPA encourages oil and gas leasing in the National Petroleum Reserve Alaska (NPR-A) while requiring protection of important surface resources and uses, including any activities related to the protection of environmental, fish and wildlife, and historical or scenic values.
2. Fish and Wildlife Service: is one of the primary natural resource management agencies on the North Slope. The mission of the Fish and Wildlife Service is to work with others to conserve, protect and enhance the fish, wildlife and plants and their habitats for the continuing benefit of the American people. The Fish and Wildlife Service manages the 19 million acre Arctic National Wildlife Refuge in northeast Alaska, and has primary management authority for migratory birds, certain threatened and endangered species, polar bear, and Pacific walrus. The Service also cooperates with other federal and state agencies and various industries to minimize the effects of development on fish and wildlife resources. To accomplish this mission, the Service is involved in a variety of research, monitoring and management projects of the North Slope and in adjacent coastal waters of the Beaufort Sea.
3. Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement (the former Minerals Management Service): manages the energy and mineral resources located on the Nation's Outer Continental Shelf, collects revenue from the federal OCS and onshore Federal and Indian lands, and distributes those revenues. The MMS Offshore Minerals Management Program administers the OCS competitive leasing program and oversees exploration and production of our Nation's offshore natural gas, oil, other mineral resources and alternative energy for safety and environmental soundness. MMS is also responsible for oil spill response reviews for all platforms off the Nation's coasts. MMS funds environmental and technology studies for ocean energy and minerals. The prime laws for the MMS Offshore Program are the Outer Continental Shelf Lands Act and the Oil Pollution Act.
4. National Park Service: preserves the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.
5. Geological Survey: serves the Nation as the Department of Interior's lead science agency by providing scientific expertise responsive to important natural resources issues and natural hazards assessments. The mission of the USGS Alaska Science Center (ASC) is to provide scientific leadership and accurate, objective, and timely data, information, and research findings about the earth and its flora and fauna to Federal and State resource managers and policy makers, local government, and the public to support sound decision-making regarding natural resources, natural hazards, and ecosystems in Alaska and circumpolar regions. To meet the specific information needs of resource management agencies for the marine and terrestrial ecosystems of the North Slope of Alaska, the ASC will combine and enhance the Center's diverse science programs, capabilities, and talents with capabilities of USGS from across the nation to strengthen its scientific capacity and contribution to the resolution of the complex natural resource issues associated with change within the North Slope region.
6. NOAA/ National Marine Fisheries Service: provides stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems. NOAA's activities

on Alaska's North Slope include consultation and coordination regarding federal water development projects under the Fish and Wildlife Coordination Act and other laws, consultation regarding federal actions under the Endangered Species Act, and regulation of small take authorizations under the Marine Mammal Protection Act. Under this program, NOAA issues regulations or Incidental Harassment Authorizations for the unintentional take of small numbers of marine mammals. The authorizations often require monitoring and research to quantify the extent of take and to reduce harmful effects to marine mammals. NOAA also performs research concerning marine mammals under NOAA jurisdiction, including whales and seals. NOAA is especially involved with bowhead whales and whaling, including research, funding/grant work for the Alaska Eskimo Whaling Commission, and staffing for the U.S. delegation to the International Whaling Commission.

7. United States Department of Energy: seeks to protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy. To tackle our immediate need for oil and gas, the DOE continues to develop and promote technologies that can lower the costs of oil and natural gas exploration and development, maximize the efficiency and stability of America's oil and gas production and supply, and protect the environment. The Department's research activities are closely coordinated with, and synergistic to, the activities of other federal agencies including Environmental Protection Agency, and various branches of the Department of the Interior. DOE recently established the Arctic Energy Office in Fairbanks and is sponsoring numerous research efforts regarding the Alaska North Slope through that office and other DOE programs.

8. National Weather Service: The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) Alaska Region provides weather, hydrologic, climate forecasts and volcanic ash and tsunami warnings for the state of Alaska and its surrounding waters. The Region has an outstanding team of employees in three Weather Forecast Offices (WFO), 12 Weather Service Offices, the Alaska-Pacific River Forecast Center, the Alaska Aviation Weather Unit, the Anchorage Center Weather Service Unit, the West Coast and Alaska Tsunami Warning Center, the Anchorage Electronics Unit, and the Alaska Region Headquarters.

Staff members are dedicated to delivering climate, weather, and water warnings and forecasts in support of our mission to protect lives and property and enhance the economic interests of our Nation. This team of dedicated professionals, in collaboration with our critical partners such as NSSI, supports the NWS strategic plan theme of "Working Together to Save Lives."

The office with responsibility for the North Slope is WFO Fairbanks. Collocated with the International Arctic Research Center at the University of Alaska Fairbanks campus, this WFO provides all the weather and flood warnings, daily forecasts, and meteorologic and hydrologic data for the northern two-thirds of the state. The terrestrial area of responsibility of this office is the largest assigned to any National Weather Service Weather Forecast Office, encompassing some 340,000 square miles. Its area extends southward to the crest of the Alaska Range, eastward to the Alaska-Canada border, westward to the Bering Strait and northward to the Arctic Ocean including Barrow.

9. U.S. Arctic Research Commission: The United States Arctic Research Commission was established by the Arctic Research and Policy Act of 1984 (as amended, Public Law 101-609). The Commission's principal duties are (1) to establish the national policy, priorities, and goals necessary to construct a federal program plan for basic and applied scientific research with respect to the Arctic, including natural resources and materials, physical, biological and health sciences, and social and behavioral sciences; (2) to promote Arctic research, to recommend Arctic research policy, and to communicate our research and policy recommendations to the President and the Congress; (3) to work with the National Science Foundation as the lead agency

responsible for implementing the Arctic research policy and to support cooperation and collaboration throughout the Federal Government; (4) to give guidance to the Interagency Arctic Research Policy Committee (IARPC) to develop national Arctic research projects and a five-year plan to implement those projects; and (5) to interact with Arctic residents, international Arctic research programs and organizations and local institutions including regional governments in order to obtain the broadest possible view of Arctic research needs.

The Arctic Research and Policy Act was amended in 1990 to increase the number of Commissioners appointed by the President of the United States from five to seven voting members. Four members are from academic or research institutions; two members from private industry undertaking commercial activities in the Arctic; and one member from among the indigenous residents of the US Arctic. The Director of the National Science Foundation serves as an *ex officio* member.

B. State of Alaska:

1. Department of Fish and Game: protects, maintains and improves the fish and game resources of the state, and manages their use and development for the maximum benefit of the people of the state, consistent with the sustained yield principle. The Alaska Department of Fish and Game has a responsibility to collect biological information necessary to evaluate land development activities, to present this information to decision makers so they can make informed decisions and to provide options for development activities that will minimize or mitigate negative impacts of development. The department also fulfills specific statutory responsibilities for protecting freshwater anadromous fish habitat under the Anadromous Fish Act and providing free passage of anadromous and resident fish in fresh waterbodies.

2. Department of Natural Resources: is the lead resource development agency for the State of Alaska. Its mission is to develop, conserve and enhance natural resources for present and future Alaskans. Several Divisions in DNR have major responsibilities regarding North Slope developments.

(a) The Division of Oil and Gas develops and manages the state's oil and gas leasing programs. The division staff identifies prospective lease areas; performs geologic, economic, environmental and social analyses, develops a five-year leasing schedule, and conducts public review of proposed sales. The division conducts competitive oil and gas lease sales and monitors collection of all funds resulting from its programs.

(b) The Division of Geological and Geophysical Surveys (DGGS) generates, analyzes and interprets data on geologic resources and natural conditions; maps and inventories mineral and energy resources on state land for use by government, private industry, scientists, educators and the public.

(c) The Division of Mining, Land & Water is the primary manager of Alaska's land holdings. Responsibilities include ensuring the state's title; preparing land-use plans and easement atlases; classifying land; leasing and permitting state land for commercial and industrial uses, and coordinating needed authorizations for major developments on the North Slope. The division allocates and manages the state's water resources on all lands in Alaska, adjudicates water rights, provides technical hydrologic support, and assures dam safety.

(d) The Division of Coastal and Oceans Management administers the Alaska Coastal Management Program which provides stewardship for Alaska's rich and diverse coastal resources to ensure a healthy and vibrant Alaskan coast that efficiently sustains long-term economic and environmental productivity. It also administers the State of Alaska's Large Project teams responsible for coordinating state agency

participation on major resource development projects throughout Alaska.

(e) The Office of Project Management and Permitting administers the State of Alaska's Large Project teams responsible for coordinating state agency participation on major resource development projects throughout Alaska.

C. Arctic Slope Regional Corporation (ASRC): is the Alaska Native-owned regional corporation representing more than nine thousand Iñupiat Eskimos of Alaska's North Slope. The shareholders of ASRC own surface and subsurface title to more than four million acres of North Slope lands. By virtue of this title, the ASRC represents the largest private landowner on the North Slope. The ASRC ownership stems from an earlier claim of aboriginal title - covering the entire Alaskan North Slope - that was eventually settled in part by the Alaska Native Claims Settlement Act of 1971 ("ANCSA"). The mission of ASRC includes actively managing its lands and resources in order to enhance Iñupiat cultural and economic freedoms. ASRC is involved with a number of North Slope resource development activities, and has a variety of subsidiary companies that are active in North Slope resource development and other sectors.

D. North Slope Borough: Responsibilities include planning, zoning and permitting; coastal management; wildlife research with a focus on subsistence; and support for the traditional culture of the North Slope. The Borough's planning and zoning authority through its Home Rule Charter mandates active land use management across federal, state, Native and municipal lands. The Borough has a coastal management plan and participates in ACMP consistency reviews, stressing the health, safety and cultural welfare of NSB residents and compliance with environmental policies of local concern. The Borough monitors and conducts scientific research on marine and wildlife resources to ensure healthy population levels and to sustain a continued subsistence harvest for its residents. All of the Borough's planning and research activities are conducted in part to guarantee strong local input into subsistence resource management, with special emphasis on the blending of contemporary and traditional local knowledge as a mechanism to sustain the resources and the local indigenous culture.

7. **Officers and Organization:**

- A. Chair and Vice Chair:** The Oversight Group shall designate a chair and vice chair. The chair shall alternate annually between federal and non-federal voting members and serve from June 1 through May 31 of each year. The chair may participate in discussion and debate at the meetings and may vote on all questions before the Oversight Group. The vice chair shall assume the responsibilities of the chair in the event of the chair's absence. The vice chair shall be the chair elect for the annual rotation.
- B. Designees:** Oversight Group members may appoint designees to act on their behalf in their absence.
- C. Advisory Groups:** The Oversight Group may recommend to the Secretary of the Interior the establishment of formal advisory groups, such as the North Slope Science Technical Advisory Panel, as appropriate. Charters for any advisory group must be reviewed and approved by the Oversight Group and forwarded to the Secretary of the Interior following the guidance provided by the Federal Advisory Committee Act.
- D. Staffing and Budget:** Staffing and budget will be provided through the Bureau of Land Management as the designated administrative agency. Budgets will be prepared by the Executive Director and support staff and be reviewed and approved annually by the Oversight Group. An Executive Director will report programmatically to the Chair and Vice Chair of the Oversight Group. Support staff will report to the Executive Director.

E. Committees: The Oversight Group may establish other ad hoc and standing committees as deemed necessary, and will specify the purpose and duration of each committee. Any ad hoc committees established would automatically expire upon completion of their committee assignment. The Oversight Group will establish a standing staff level committee composed of one member from each representative Oversight Group member agency or organization. Staff committee members will advise their respective Oversight Group members on issues prior to each Oversight Group meeting, and will provide assistance to the Executive Director of NSSI as appropriate.

8. Oversight Group Meetings & Procedures:

A. Notice of Meetings: Reserved

B. Conduct of Meetings: Oversight Group meetings will be open to the public and will be generally conducted according to *Roberts Rules of Order*. The Oversight Group shall provide a reasonable opportunity for public comment.

C. Voting Procedures: A quorum of Oversight Group members, or their designees, shall be convened prior to any voting (a quorum shall consist of at least three federal members and two non-federal members). All decisions shall be made by the voting members by consensus. Oversight Group members may participate by telephone or teleconference. The U.S. Geological Survey and Department of Energy will not have voting privileges. The use of a proxy by voting members is not permitted.

D. Recusal: Oversight Group members may recuse themselves from voting, if necessary to avoid a conflict of interest.

E. Records: Minutes of each Oversight Group meeting will be posted on the NSSI website (<http://www.northslope.org>). Hard copies will be available upon request.

F. Closed Meetings (Executive Sessions): The Oversight Group may close meetings on matters pertaining to confidential personnel issues, litigation, confidential information such as archaeological information, and other matters included under applicable State and Federal laws and Borough ordinances.

G. Frequency and Location of Meetings: The Oversight Group will meet a minimum of two times per year—once in Anchorage and once in Barrow.

H. Expenses for Oversight Group: Expenses related to travel, lodging and per diem for Oversight Group meetings shall be borne by the representatives' respective member agencies.

9. Availability of Funds:

This agreement shall not be construed as a commitment by any federal agency signatory to expend funds in excess of available appropriations.

Appendix 2: Science Technical Advisory Panel Appointees

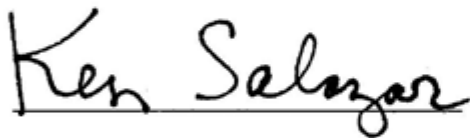
2011 Appointees and Representative Scientific Expertise	
Sue Moore, Ph.D.	Marine Ecology
Robert Suydam, Ph.D.	Marine Biology
Alvin Ott, Ph.D.	Habitat Biology
Gary Kofinas, Ph.D.	Social Science
W. Scott Pegau, Ph.D.	Oceanography
Wendy Loya, Ph.D.	Ecology/Biogeochemistry
Dan Reed, M.S.	Biometrics
Bill Streever, Ph.D.	Wildlife Biology/Restoration Ecology
John Kelley, Ph.D.	Oceanography/Environmental Monitoring
Caryn Rea, M.S.	Wildlife Biology
Robert Shuchman, Ph.D.	Remote Sensing
Matthew Sturm, Ph.D.	Geophysicist/Hydrology
Douglas Kane, Ph.D.	Civil Engineering
Jerry Brown, Ph.D.	Permafrost
Vacant	Traditional Ecological Knowledge

Appendix 3: Science Technical Advisory Panel Charter

1. **Committee's Official Designation:** North Slope Science Initiative Science Technical Advisory Panel (Panel).
2. **Authority:** The Panel is a statutory advisory committee established under Section 348(d), Energy Policy Act of 2005 (PL 109-58); Section 309 of the Federal Land Policy and Management Act (FLPMA), as amended (43 U.S.C. 1739); the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1600); Section 14 of the National Forest Management Act of 1976 (16 U.S.C. 472a); and the Wilderness Act (16 U.S.C. 1131). The Panel is established in accordance with the provisions of the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. App. 2.
3. **Objectives and Scope of Activities:** The Panel will advise the North Slope Science Oversight Group through the Designated Federal Officer (DFO) on proposed inventory, monitoring, and research functions.
4. **Description of Duties:** Panel duties and responsibilities are generally as follows:
 - a. Provide advice to the Oversight Group on proposed inventory, monitoring and research functions;
 - b. Advise the Oversight Group on scientific information relevant to the Oversight Group's mission;
 - c. Review selected reports to advise the Oversight Group on their content and relevance;
 - d. Review ongoing scientific programs of North Slope Science Initiative (NSSI) member organizations on the North Slope at the request of the member organizations to promote compatibility in methodologies and compilation of data;
 - e. Advise the Oversight Group on how to ensure that scientific products generated through NSSI activities are of the highest technical quality;
 - f. Periodically review the North Slope Science Plan and provide recommendations for changes to the Oversight Group;
 - g. Provide recommendations for proposed NSSI funded inventory, monitoring and research activities to the Oversight Group;
 - h. Provide other scientific advice as requested by the Oversight Group; and
5. **Agency or Official to Whom the Panel Reports:** The Panel reports to the Secretary of the Interior through the DFO.

6. **Support:** Administrative support and funding for activities of the Panel will be provided by the Bureau of Land Management.
7. **Estimated Operating Costs and Staff Years:** The annual operating costs associated with supporting the Panel's activities are estimated to be \$45,000, including all direct and indirect expenses and .50 of Federal staff years.
8. **Designated Federal Officer:** The DFO is the Executive Director, North Slope Science Initiative who is a full-time employee appointed in accordance with Agency procedures. The DFO will approve or call all the Panel and subcommittee meetings, prepare and approve all meeting agendas, attend all Panel and subcommittee meetings, adjourn any meeting when the DFO determines adjournment to be in the public interest, and chair meetings when directed to do so by the official to whom the advisory Panel reports.
9. **Estimated Number And Frequency of Meetings:** The Panel will meet approximately two to four times annually, and at such other times as designated by the DFO.
10. **Duration:** Continuing.
11. **Termination:** The Panel's charter will expire 2 years from the date the charter is filed, unless, prior to that date, it is renewed in accordance with the provisions of Section 14(a)(2) of the FACA. The Panel will not meet or take any official action without a valid current charter.
12. **Membership and Designation:** The Panel shall consist of a representative group of not more than 15 scientists and technical experts from diverse professions and interests, including:
 - a. the oil and gas industry;
 - b. subsistence users;
 - c. Native Alaskan entities;
 - d. conservation organizations;
 - e. wildlife management organizations; and
 - f. academia
13. **Ethics Responsibilities of Members:** No Panel or subcommittee member shall participate in any specific party matter including a lease, license, permit, contract, claim, agreement, or related litigation with the Department in which the member has a direct financial interest. As provided in 43 CFR 1784.2-2, members of the Panel shall be required to disclose their direct or indirect interest in leases, licenses, permits, contracts, or claims that involve lands or resources administered by the BLM, or in any litigation related thereto.

14. **Subcommittees:** Subject to the DFO's approval, subcommittees may be formed for the purposes of compiling information or conducting research. However, such subcommittees must act only under the direction of the DFO and must report their recommendations to the Panel for consideration. Subcommittees must not provide advice or work products directly to the Agency. The Panel's Chair, with the approval of the DFO, will appoint subcommittee members. Subcommittees will meet as necessary to accomplish their assignments, subject to the approval of the DFO.
15. **Record keeping:** The Records of the Panel, formally and informally established subcommittees of the Panel, shall be handled in accordance with General Records Schedule 26, Item 2, or other approved Agency records disposition schedule. These records shall be available for public inspection and copying, subject to the Freedom of Information Act, 5 U.S.C. 552.



SECRETARY OF THE INTERIOR

JUN 28 2010

DATE

JUN 29 2010

DATE CHARTER
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Appendix 4: Organizations and Initiatives Related to the Arctic

Alaska Center for Climate and Policy (ACCAP) (<http://www.uaf.edu/accap>)

Alaska Center for Climate and Policy (ACCAP) (www.uaf.edu/accap)

Alaska Fisheries Science Center (NOAA, NMFS) (<http://www.afsc.noaa.gov/>)

Alaska Marine Ecosystem Forum (AMEF)
(www.fakr.noaa.gov/npfmc/current_issues/ecosystem/AMEF_MOU.pdf)

Alaska Oceans Observing System (AOOS) (www.aos.org)

Alaska Oil and Gas Association (AOGA) (www.aoga.org)

Alaska Sea Grant (<http://seagrants.uaf.edu>)

Alaska Center for Climate and Policy (ACCAP) (<http://www.uaf.edu/accap/>)

Arctic Council (www.arctic-council.org)

Arctic Contaminants Action Program (ACAP) (http://arctic-council.org/working_group/acap)

Arctic Domain Awareness (<http://www.nga.mil/portal/site/nga01/>)

Alaska Marine Ecosystem Forum (AMEF)
(http://www.fakr.noaa.gov/npfmc/current_issues/ecosystem/AMEF_MOU.pdf)

Arctic Monitoring and Assessment Programme (AMAP) (http://arctic-council.org/working_group/amap)

Arctic Observing Network (AON)
(<http://www.nsf.gov/pubs/2008/nsf0842/index.jsp><http://www.arcus.org/search/AON>)

Arctic Ocean Biodiversity (ArcOD) (www.arcodiv.org)

Arctic Policy Group (APG) (http://arctic-council.org/member_state/united_states_of_america)

Arctic Portal (www.igospartners.org/)

Arctic Research Consortium of the United States (ARCUS) (www.arcus.org)

Arctic Research Mapping Application (ARMAP) (www.armac.org)

Arctic Systems Science Program (ARCSS) (<http://www.arcus.org/arcss/>)

ArcticNet, Canadian Network of Excellence (www.arcticnet.ulaval.ca)

Appleton Charitable Foundation (<http://www.appletonfoundation.org/arctic%20initiatives.html>)

Barrow Arctic Science Consortium (BASC) (www.arcticsscience.org)

Barrow Area Information Database (BAID-IMS) (www.baidims.org)

Barrow Area Information Database Geospatial Data Sets (BAID) (http://nsidc.org/data/docs/arcss/arcss400/access400_summary.html)

Canadian Sea Ice Service (<http://www.ice.ec.gc.ca/app/WsvPageDsp.cfm?id=11872&Lang=eng>)

Circum-Polar Environmental Observatories Network (CEON) (www.ceon.utep.edu)

Circumpolar Active Layer Monitoring (CALM) (www.udel.edu/Geography/calm)

Climate Change Executive Roundtable (http://alaska.fws.gov/climate_change.htm)

Conservation of Arctic Flora and Fauna (CAFF) (http://arctic-council.org/working_group/caff)

Emergency Prevention, Preparedness and Response (EPPR) (http://arctic-council.org/working_group/eppr)

Extended Continental Shelf (ECS) Working Group (<http://dfa.gov.ph/>)

Forum of Arctic Research Operators (FARO) (www.faro-arctic.org/)

Gateway to the United Nations Work on Climate Change (www.un.org/climatechange/)

Group on Earth Observations (GEO) (<http://earthobservations.org/>)

Integrated Global Observing Strategy (IGOS) (www.igospartners.org/)

Interagency Arctic Research Policy Committee (IARPC) (<http://www.nsf.gov/od/opp/arctic/iarpc/start.jsp>)

Interagency Committee on Ocean Sciences and Resource Management Integration (ICOSRMI) (<http://ocean.ceq.gov/about/icosrmi.html>)

International Arctic Science Committee (IASC) (<http://www.arcticportal.org/iasc/>)

International Long-Term Ecological Research (ILTER) (<http://ilternet.edu>)

International Permafrost Association (IPA) (<http://ipa.arcticportal.org/>)

International Polar Year (IPY) (www.ipy.org)

Marine Biological Laboratory (MBL), Woods Hole (<http://ecosystems.mbl.edu/>)

Morse Arctic Coastal Initiative (<http://www.morsearctic.net/links.php>)

National Energy Technology Laboratory
(<http://www.netl.doe.gov/technologies/oil-gas/AEO/FossilEnergy/AlaskaNSEnv.html>)

National Science Foundation, Office of Polar Programs (OPP)
(<http://www.nsf.gov/dir/index.jsp?org=OPP>)

National Security Presidential Directive/NSPD-66 & Homeland Security Presidential Directive/HSPD-25
(www.fas.org/org/offdocs/nspd/nspd-66.htm)

National Snow and Ice Data Center (NSIDC) (www.nsidc.org)

Naval Research Laboratory Arctic Initiatives
(<http://www.star.nesdis.noaa.gov/star/documents/meetings/Ice2011/dayOne/Stewart.pdf>)

NOAA Arctic Science Laboratory (<http://asl.arctic.noaa.gov/>)

Nordic Council
(<http://www.norden.org/en/news-and-events/news/new-initiatives-could-improve-eu-arctic-relations>)

North Pacific Research Board (NPRB) (www.nprb.org)

North Pole Environmental Observatory (<http://psc.apl.washington.edu/northpole/>)

Office of Polar Programs (OPP) (www.nsf.gov/od/opp/about.jsp)

Office of Science and Technology Policy (OSTP) (www.ostp.gov)

Polar Research Board (PRB) (<http://dels.nas.edu/prb>)

Prince William Sound Oil Spill Recovery Institute (OSRI) (www.pws-osri.org)

Protection of the Arctic Marine Environment (PAME) (http://arctic-council.org/working_group/pame)

SCANNET, Circumpolar Arctic Network of Terrestrial Field Bases (www.scannet.nu)

State of Alaska, Governor's Sub-Cabinet on Climate Change (<http://climatechange.alaska.gov>)

Study of Environmental Arctic Change (SEARCH) (<http://www.arcus.org/search/index.php>)

Sustainable Development Working Group (SDWG) (http://arctic-council.org/working_group/sdwg)

Sustained Arctic Observing Network (SAON) (www.arcticobserving.org)

U.S. Arctic Research Commission (<http://www.arctic.gov>)

U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) (www.crrel.usace.army.mil)

United States Global Change Research Program (www.globalchange.gov)

Unmanned Aerial Systems (UAS) (<http://uas.noaa.gov/testbeds/arctic/>)

Vision for the Canadian Arctic Research Initiative
(<http://www.scienceadvice.ca/en/assessments/completed/canadian-arctic.aspx>)

Woods Hole Research Center (http://www.whrc.org/global/arctic_system/index.html)

World Wildlife Fund – Arctic Initiative
(http://wwf.ca/about_us/careers/?6920/Operations-Manager-Arctic-Initiative)

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