

# **National Strategy for the Arctic Region**

## **Implementation Report**

**January 2015**

## EXECUTIVE SUMMARY

The Arctic is a key region of the United States with critical influence on the global environment and economy. The Arctic is a peaceful and stable region in the world, and the United States will continue to work with the international community to understand the region, and its impacts on the globe, through coordinated scientific research and traditional knowledge. The importance of the region, coupled with a coordinated approach, provides unique and fresh opportunities for unprecedented regional cooperation and expansion of international governance.

The *National Strategy for the Arctic Region (Strategy)* laid out the United States' priorities for the region; its *Implementation Plan* then provided clear guidance and responsibilities to achieve milestones associated with the *Strategy*. This report describes implementation progress along the three lines of effort described in the *Strategy*:

- I. Advance United States Security Interests
- II. Pursue Responsible Arctic Region Stewardship
- III. Strengthen International Cooperation

The Federal Government, in coordination with the State of Alaska and Alaska Natives, accomplished the following key objectives:

- **The President released the *Executive Order on Enhancing Coordination of National Effort in the Arctic*.** This document provides a clear process to coordinate guidance, harmony of effort, and consistent application of Arctic policies across Federal agencies and offices. It also provides an avenue to strengthen partnerships with State, local, and tribal governments; academic and research institutions; and the private and nonprofit sectors.
- **The Department of State appointed Admiral Robert Papp as the U.S. Special Representative for the Arctic Region.** The appointment, which establishes a senior-level representative for the State Department to support Federal efforts to increase engagement with international partners on Arctic Council activities.

While the United States has made significant progress over the past year, more work remains. Some initiatives are ahead of schedule; others continue to be addressed. This report discusses the broad range of activities underway by the Federal Government, in coordination with the State of Alaska, Alaska Natives, and international, regional, and local stakeholders. The full *Implementation Plan* for the *Strategy* can be found online at [www.whitehouse.gov/sites/default/files/docs/implementation\\_plan\\_for\\_the\\_national\\_strategy\\_for\\_the\\_arctic\\_region\\_-\\_fi...pdf](http://www.whitehouse.gov/sites/default/files/docs/implementation_plan_for_the_national_strategy_for_the_arctic_region_-_fi...pdf)

## **Line of Effort I. Advance United States Security Interests**

Protecting the American people, our sovereign territory and rights, and the natural resources and other interests of the United States, remains the highest priority of the Federal Government. The first line of effort focuses on activities intended to support these priorities: preparing for increased activity in the maritime domain; sustaining and supporting evolving aviation requirements; developing communication infrastructure; enhancing domain awareness; sustaining federal capability to conduct maritime operations in ice-impacted waters; promoting freedom of navigation and overflight and other use of the sea in accordance with international law; and developing renewable and non-renewable energy resources. The following sections describe Federal efforts to promote safety, security, and stability in the region.

### **Prepare for Increased Activity in the Maritime Domain**

**An interagency group funded a report sponsored by the Committee on the Marine Transportation System to analyze maritime traffic in the Arctic and develop a 10-year Arctic vessel activity projection.**

The purpose of the analysis was to obtain the best available information regarding the number and location of vessels under certain scenarios in the U.S. Arctic to support future Arctic infrastructure considerations. The authors of the report reviewed the literature, examined existing vessel track information, and developed predictions of future Arctic maritime activity based on a regression analysis influenced by economic growth factors and other variables.

The vessel activity projection report was the product of extensive review involving more than 10 departments and agencies, and public comment from stakeholders, including the State of Alaska, the Marine Exchange of Alaska, the World Ocean Council, the University of Alaska at Fairbanks, the Pew Charitable Trusts, and the City of Nome. Though the scope precluded policy or budget recommendations, the interagency report gave agency leaders views into future Arctic maritime activities and concerns.

The report developed estimates of vessel traffic (numbers of vessels and transits) based on modeling of current baseline traffic data and growth potential as influenced by three scenarios: business-as-usual growth; diversion from other maritime routes; and oil and gas exploration. Findings indicate that, while the total number of vessels in the U.S. Arctic over the next 10 years likely will be relatively small compared with other shipping lanes (240 vessels transited the Bering Strait, 16,596 vessels transited the Suez Canal, and 13,482 vessels transited the Panama Canal in 2013), the relative growth for ships operating in the Bering Strait is great—as is the potential environmental impact.

Vessel projections accounted for growth in maritime traffic as influenced by multiple factors, including climate and infrastructure; community and environment; geo-political variables; and a range of drivers for increases or decreases in traffic such as infrastructure development, icebreaker support, U.S. Coast Guard and search-and-rescue assets, increasing natural resource extraction, insurance costs, and environmental risks. Projections indicate a range of growth

patterns dependent on these factors: low growth estimates indicate a 75% increase (420 vessels per year) while high growth could result in up to a 420% increase (1260 vessels per year).

### **Sustain and Support Evolving Aviation Requirements**

**The Federal Aviation Administration improved air safety in Alaska by deploying 33 Automatic Dependent Surveillance-Broadcast (ADS-B) ground stations to provide pilot advisory services (traffic and weather information to the cockpit) and Air Traffic Control (ATC) separation services, including surveillance, weather, and communications improvements.** Previous radar coverage was limited, so these additional ground stations, and four additional stations installed along the Alaska Peninsula and at Lake Clark-Bristol, enhanced safety, increased efficiency, and provided additional benefits to air carriers and military traffic, including extended surveillance in the North Pacific transition area for commercial airliners flying into Alaska airspace from the Lower 48.

Additionally, four ground stations installed on Alaska's North Slope will provide ATC surveillance for high-altitude aircraft flying westbound out of the Anchorage Flight Information Region. Three of the four radio stations in the North Slope region also provide pilot advisory services; the last planned radio station, Point Thompson, is scheduled for installation in 2015 due to ongoing negotiations and alternate site analysis.

**The FAA began upgrading the Wide Area Augmentation System (WAAS) by transitioning from a military frequency to a civil frequency.** The existing hardware is failing and delivering a degraded signal; therefore, upgraded hardware is an aviation safety requirement. The enhanced signal from the new frequency and hardware will ensure signal stability and reliability which translates directly to aviation safety in Alaska's remote regions. Through continuing coordination and analysis, FAA is working with the State of Alaska to assess existing infrastructure, maintenance requirements, navigational systems, and compliance with Airport Improvement Program grant assurances to maximize the utility and availability of existing aviation assets in the Arctic.

### **Develop Communication Infrastructure in the Arctic**

**The National Telecommunications and Information Administration (NTIA) submitted a Notice of Inquiry in the Federal Register regarding the availability of telecommunications services in the Arctic.** The NTIA interviewed Alaska State, academic, and industry telecommunications experts, residents in remote Arctic Alaska areas, and key terrestrial and satellite telecommunications carriers in the region. The NTIA is drafting an assessment of telecommunications services in Alaska above the Arctic Circle and is expected to complete its report by April 2015.

Through the Arctic Council, the State Department proposed that an Expert Council within the Sustainable Development Working Group be created that consists of telecommunications industry experts, government experts and other interested parties **to comprehensively review access to telecommunications across the entire Arctic and identify opportunities for Arctic nations to build a robust telecommunication infrastructure** to support the ever-increasing human activity in the Arctic.

### Enhance Arctic Domain Awareness

**During maritime readiness exercises (i.e., “Operation Arctic Shield”), the Coast Guard, in coordination with NOAA and industry representatives, tested both small Group 1 unmanned aerial systems (UAS) and aerostat platforms for simulated oil spill tracking and monitoring capability.** The event yielded mixed results for the viability of both platforms, and participants expect to complete formal analysis and an after-action report in 2015. Operation Arctic Shield 2014 also offered an opportunity to develop recovery procedures for the UAS by using a net to capture the vehicle onboard CGC HEALY, a significant safety improvement over water recoveries in the Arctic environment.

### Sustain Federal Capability to Conduct Maritime Operations in Ice-impacted Waters

**The Department of Homeland Security is leading an interagency effort to describe capabilities needed to operate in ice-impacted waters to support Federal activities in the Polar Regions and sovereign responsibilities<sup>1</sup> over the next 20 years.** Report writers continue to analyze and obtain information on vessel activity projections, research priorities, and ongoing capability assessments by other agencies. An interagency working group is evaluating the recently released report by the Committee on Marine Transportation Systems to assist in developing long-term plans to sustain Federal capability to physically access the Arctic with sufficient capacity to support U.S. interests.

### Promote International Law and Freedom of the Seas

**The United States continued to assert its freedom-of-navigation interests consistent with customary international law as reflected in the Law of the Sea Convention.** In accordance with international law, Federal agencies conducted military exercises and operations in the Arctic. The United States continued to ensure freedom of navigation interests were preserved as the International code for Ships Operating in Polar Waters – the Polar Code – was developed at the International Maritime Organization and in Arctic Council working groups and task forces affecting shipping.

### Pursue the Development of Renewable Energy Resources

**To support the President’s energy strategy and align with climate change initiatives and the charge to provide clean, renewable energy resources in the Arctic, the Department of Energy (DOE) embarked on multiple efforts.** The DOE conducted extensive outreach with regional and local stakeholders through its Energy Ambassador program, a technical assistance and capacity building program to support regional non-profit and inter-tribal organizations with renewable energy development efforts in Alaska’s Native villages. In addition, the Office of Indian Energy called for applications to Alaska Strategic Technical Assistance Response Team (START) Round III, an in-depth technical assistance program to support community-based energy planning, clean energy and energy efficiency project support, and community education.

To review and provide input on the 10-year strategic plan to promote renewable energy resource development in the Arctic region, DOE hosted a kick-off meeting in September 2014 at the Alaska Rural Energy Conference, which convened Federal, State, tribal, and utility stakeholders.

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<sup>1</sup> Sovereign responsibilities include national defense, enforcement of laws, protection of resources, and other obligations of nation-states to maintain peace and security, including requirements under international laws, rules and norms.

In addition, DOE held seven consultation and outreach sessions for Alaska Native tribes, corporations, state, and local government stakeholders in Anchorage, Fairbanks, and five hub communities.

Through the National Science Foundation and other science organizations, DOE engaged the science and research community to identify funding partnerships for renewable energy technology development.

DOE arranged to conduct a series of public-private investment forums in 2015 to identify, develop, and implement models to leverage private investment with public funds (Federal and State) to deploy clean energy projects. Identifying partnerships is a critical component of developing sustainable funding for renewable energy deployment.

Through financial assistance programs, DOE advanced renewable energy and energy efficiency projects in Alaska, including the “Solarize Alaska” initiative. DOE will deploy at least five megawatts of solar power in the Arctic region by the end of 2016 through “Solarize Alaska.”

DOE established a study of existing wind-diesel power systems, which will be completed in 2015. DOE personnel also developed standardized models for design and operation of micro-grid systems. The work included identifying a rural utility business model, with incentive and operations best-practices for integrating renewable energy.

### **Ensure the Safe and Responsible Development of Non-Renewable Energy Resources**

**The National Oceanic and Atmospheric Administration (NOAA) conducted deep-water baseline sea floor assessments.** These yielded extensive oceanographic information to support the *Strategy*'s objective to ensure safe and responsible exploration and development of Arctic non-renewable energy resources in an environmentally sound manner.

**Partners in the Bureau of Ocean Energy Management (BOEM) and the National Oceanographic Partnership Program (NOPP) announced a contract award for a Marine Arctic Ecosystem Study (MARES). The study investigates the interrelationship among the physical, biological, chemical, and social science components of the Beaufort Sea ecosystem from Barrow, Alaska, to the Mackenzie River delta in Canadian waters.** BOEM coordinated and planned the integrated ecosystem research initiative with its Federal and private-sector partners: the Arctic Research Commission, the Coast Guard, U.S. Geological Survey, NOAA, Office of Naval Research, U.S. Integrated Ocean Observing System, Marine Mammal Commission, National Science Foundation and Shell Oil Company. An independent scientific review board of internationally recognized experts will help to steer and peer review the project, which is planned for at least five years (2014 to 2019). Additionally, a final report on study data from the multi-disciplinary investigation that examined the biological, chemical and physical properties of the Hanna Shoal Ecosystem is expected in 2016.

**BOEM initiated the concept of "Targeted Leasing" for all future Outer Continental Shelf (OCS) oil and gas lease sales in Alaska.** The effort begins with the Chukchi Sea OCS Oil and Gas Lease Sale presently proposed for 2016. Under targeted leasing, BOEM proactively determines which specific portions of the program area offer greater resource

potential, while minimizing possible conflicts with environmental and subsistence considerations.

**In conjunction with interagency partners, the Bureau of Land Management prepared a report assessing the capacity and integrity of the Trans-Alaska Pipeline System to facilitate the flow of additional onshore and offshore oil resources.** The detailed report, anticipated for release in early 2015, sets out specific actions necessary to accommodate increases in throughput.

**To improve and enhance performance and efficacy in Arctic conditions, the Bureau of Safety and Environmental Enforcement, in coordination with other agencies, continued to fund oil spill response research and response preparedness planning for all aspects of spill response.** This research can be found on the Internet ([www.bsee.gov/Research-and-Training/Oil-Spill-Response-Research/Categories/Arctic-Oil-Spill-Response-Research/](http://www.bsee.gov/Research-and-Training/Oil-Spill-Response-Research/Categories/Arctic-Oil-Spill-Response-Research/)) and includes:

- Oil spill detection and mapping under Arctic sea ice using autonomous vehicles
- Responding to oil spills in the Arctic environment
- Enhanced oil-spill detection sensors in low-light environments
- Technological assessments of Alaskan Arctic oil spill response temporary oil storage options
- Burning behavior of oil in ice channels
- The North Slope coastal imagery initiative
- Cold water dispersant effectiveness testing – (in progress)
- Oil spill response gap analysis for the U.S. Arctic Ocean – (in progress)
- Testing of skimmer hoses and hose couplings when subjected to an Arctic environment – consultant – (in progress)
- Research to support the prediction of effectiveness of dispersant use in the Beaufort and Chukchi seas – (in progress)

**The DOE continued its research program on methane hydrates.** Program officers funded a study, headed by the University of Texas-Austin, to advance the science and technology of resource characterization in the Gulf of Mexico. Working with Japan Oil, Gas and Metals National Corporation (JOGMEC) and the U.S. Geological Survey, program researchers analyzed geologic and geophysical data on Alaska's North Slope, lands that the Alaska Department of Natural Resources (DNR) temporarily withdrew from oil and gas leasing for hydrate resource evaluation. In October 2014, the DNR extended the "withheld" status of these lands for another 12 months.

DOE signed a Memorandum of Understanding (MOU) with JOGMEC detailing specific collaborations in Alaska initiated broadly by DOE's 2008 agreement with the Ministry of Economy, Trade and Industry. The MOU set out a path to jointly pursue research and development to demonstrate the resource potential of methane hydrate.

**The DOE continued to sponsor research on oil spill prevention. Information gained may help improve the safety and environmental sustainability of exploration and production in the offshore Arctic environment. Topics included:**

- Geophysical Data: Several projects are investigating how to improve the collection, modeling, and interpretation of geophysical data to reduce uncertainty of the subsurface environment.
- Hydrates: Modeling and experimentation is advancing knowledge on hydrates, a well-recognized safety concern in offshore and Arctic environments.
- Autonomous Underwater Vehicles (AUVs) and Remotely Operated Vehicles (ROVs) and three-dimensional data: Several projects have targeted improving the capability and reliability of AUVs and ROVs, which can collect three-dimensional imaging data on the integrity of underwater systems and hazardous conditions, including sea ice.
- Metocean (weather and ocean-related) Hazards: DOE researchers are investigating improvements to modeling and prediction of severe climate and ocean conditions to better plan and design offshore equipment, including floating platforms. Improved designs will allow offshore systems to better accommodate challenging conditions found in the Arctic.
- Real-time Data: Research and development projects are improving the capability and reliability of collecting and transmitting real-time drilling data through sensors and smart materials. Faster and more reliable data can increase safety and environmental sustainability through improved integrity and isolation.
- Human Factors: DOE research is identifying and mitigating issues associated with the human-machine interface, which can increase safety of personnel in any environment, including the Arctic.
- Wellbore Materials Integrity: DOE's National Energy Technology Laboratory (NETL) conducted research on metallic systems and foam cement. NETL's findings may increase understanding of the effect of Arctic conditions on wellbore integrity and zonal isolation, including corrosion of metal-based systems and the performance of cement.
- Risk Assessment: NETL's expertise in modeling and numerical simulation may be adapted and applied to risk assessments for Arctic conditions.

## Line of Effort II. Pursue Responsible Arctic Region Stewardship

Preserving Arctic resources and cultural heritage will continue to require responsible stewardship through active conservation of resources, balanced management, and the application of scientific and traditional knowledge to physical and living environments. To support this priority, those implementing this line of effort focused on conserving Arctic ecosystems; improving hazardous material spill prevention, containment, and response; implementing Integrated Arctic Management; furthering activities lead by the Interagency Arctic Research Policy Committee; and charting the Arctic region.

The following discussion describes in more specific detail activities undertaken to advance responsible stewardship of the Arctic.

### Conserve Arctic Ecosystems

**NOAA identified a base set of criteria for incorporation into the annual Arctic report card. The report card, which considers a wide range of environmental observations throughout the Arctic, is a timely and peer-reviewed source for clear, reliable and concise environmental information on the current state of different components of the Arctic environmental system relative to historical records.** The base set of criteria used in the report card likely will be expanded at the Third Meeting of Scientific Experts on Fish Stocks in the Central Arctic Ocean in April 2015. Additionally, implementation of the Distributed Biological Observatory, which coordinates observations linking biological changes to physical drivers in the rapidly-changing Pacific Arctic marine ecosystem, is a key component of the coordinated approach to baseline exploration and monitoring.

### Improve Hazardous Material Spill Prevention, Containment, and Response

**The Spill of National Significance (SONS) Executive Steering Committee concluded its three-year focus on Arctic oil spills by establishing interagency working groups to address significant gaps identified in the 2013 SONS Exercise series, including logistics planning, communicating the science of spills and response options, and presenting a unified Federal message during a response.** An interagency working group led by the Coast Guard is developing an Arctic Logistical Concept of Operation Guidance document with a regional gap analysis of logistical needs during an Arctic SONS. The Guidance will be completed in 2015.

To identify existing technical and reference documents on the effectiveness of dispersants in Arctic waters, technical experts from industry and academia attended an interagency meeting and workshop at the International Oil Spill Conference in May 2014. This work has already been conducted in Alaska under the leadership of the Alaska Regional Response Team<sup>2</sup> (ARRT). A final product will be completed in 2015.

The ARRT made significant progress in developing an Oil Dispersant Use Plan for Alaska which provides the Federal On-Scene Coordinator with pre-authorization to use chemical countermeasures for an oil spill response in a specified area. The draft plan is publicly available

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<sup>2</sup> Coast Guard, EPA, USDA, Forest Service, DOC/NOAA, DOD/Alaskan Command (ALCOM), DOE, DHHS, DHS/FEMA, DOI, DOJ, DOL/OSHA, DOS, DOT/FAA, GSA, and the State of Alaska

on the ARRT website at

[www.alaskarrt.org/Files/ARRT%20Oil%20Dispersant%20Authorization%20Plan\\_Draft%209-25-13.pdf](http://www.alaskarrt.org/Files/ARRT%20Oil%20Dispersant%20Authorization%20Plan_Draft%209-25-13.pdf).

The plan will be released after the team completes an Endangered Species Act Section 7 consultation with the natural resource trustees (e.g. Alaska Native Villages).

**The National Academy of Science published its Arctic Spill Response Assessment in August 2014** ([www.dels.nas.edu/Report/Responding-Spills/18625](http://www.dels.nas.edu/Report/Responding-Spills/18625)). In November 2014, the ARRT completed a plan to incorporate the assessment's recommendations. The document will be reviewed by the Interagency Coordinating Committee on Oil Pollution Research and the National Response Team for adoption in 2015.

**The U.S. Coast Guard Research, Development, Test and Evaluation (RDT&E) Program conducted demonstrations and exercises in the Arctic Ocean and Great Lakes to improve oil response capabilities in ice-impacted waters.** The RDT&E Program assessed the effectiveness of existing procedures and equipment as well as the application of alternative technologies. The demonstrations and exercises provided the interagency operational community with practical response experience in ice-impacted waters and identified response gaps and limitations. In 2015, the RDT&E Program will continue to investigate enhanced Arctic response technologies to address identified limitations.

#### **Use Integrated Arctic Management (IAM) to Balance Economic Development, Environmental Protection, and Cultural Values**

**A review of interagency efforts related to natural resource management in the U.S. Arctic was completed, identifying 17 interagency efforts or types of interagency efforts (such as permitting) related to natural resource management.** The report clarifies the roles and responsibilities of federal agencies and will be used to improve interagency efficiency and coordination and help clarify interaction with State and local authorities, industry and the public. Interagency efforts in the Arctic range from active, multiple-agency enterprises, such as the ARRT, which plans for and coordinates responses to releases of hazardous substances, to agreements between two agencies. As an example of the latter, a BOEM and NOAA agreement ensures that decision-making related to developing outer continental shelf energy resources is based on relevant scientific information. The agreement leverages expertise from both agencies to fulfill the Arctic stewardship responsibilities of each.

**Significant progress towards drafting a Memorandum of Understanding for the incorporation of Integrated Arctic Management (IAM) into agency activities was made; it is on track to be finalized in early 2015.** The MOU will strengthen the consistent application by agencies of science and knowledge to support economic growth, efficient decision-making, and healthier and more resilient ecosystems with the goal of strengthening local economies. To support this effort, the Department of the Interior held extensive informal discussions with the State of Alaska and Alaska Native communities prior to and during draft development. The Federal Government continues to develop key partnerships with the State of Alaska and is reenergizing engagement opportunities with the incoming administration.

Action items related to ecosystem-based management are tied to implementation of the National Ocean Plan and are applicable nationally. Further progress in the Arctic must also resonate and

be coordinated with implementation in other bodies of water; the additional alignment requires a longer timeline. The National Ocean Council has created a Legal Working Group to address these items, and will complete the work in 2015.

### **Increase Understanding of the Arctic through Scientific Research and Traditional Knowledge**

The IARPC, a subcommittee of the National Science and Technology Council, is responsible for coordinating research in the Arctic. As such, **IARPC integrated efforts to increase understanding of the Arctic through scientific research and documentation of traditional knowledge.** In February 2013, IARPC released the *Arctic Research Plan: FY2013-2017*; 12 topical collaboration teams coordinated implementation of that plan ([www.iarpcollaborations.org/index.html](http://www.iarpcollaborations.org/index.html)). IARPC's collaboration teams made major contributions to advancing the *Strategy* discussed in the following sections.

### **Develop a Framework of Observations and Modeling to Support Forecasting and Prediction of Sea Ice**

**Scientists completed a set of coordinated, intensive observation and process studies to investigate sea-ice characteristics and processes, and atmosphere-ice-ocean interactions and feedbacks.** These efforts will improve our understanding of changing sea-ice cover and directly contribute to improved sea-ice forecasting capability to aid in safer operations for anticipated increased sea traffic by shipping and fishing industries; oil, gas and mining companies; naval vessels; and tourism operations. The Office of Naval Research completed a marginal ice zone field experiment that included an array of instruments and platforms deployed on, in, and under the pack ice of the eastern Beaufort Sea. By the end of the experiment, the array comprised almost 100 instruments and platforms, including automatic weather stations, ice-mass-balance buoys, wave buoys and floats, ocean-flux buoys, ice-tethered profilers, an acoustic communication and navigation system, polar-profiling floats, seagliders, wavegliders, and moored wave and current meters.

Program participants supplemented the *in situ* autonomous observation program with remote sensing from space, which included an unprecedented collaboration with the intelligence community to collect and declassify high-resolution, visible-band images. The Korea Polar Research Institute (KOPRI) was also a key collaborator, providing berths aboard the R/V ARAON in July for ONR investigators to deploy a final cluster of instruments in the pack ice.

**The ONR operation included two small ice camps, which were also used by NASA Operation IceBridge and ESA (European Space Agency) CryoVex investigators.** While they measured snow depth, ice freeboard and ice thickness along transects on ice floes, aircraft flew overhead and measured the same variables with lidars and radars. Operation IceBridge flew a total of 30,642 km during 15 missions over the Arctic Ocean in March and April 2014, repeating its annual sea-ice thickness measurement program at the time of the sea-ice extent maximum. Data from these missions are available at the National Snow and Ice Data Center ([www.nsidc.org/](http://www.nsidc.org/)).

**NASA also completed the Arctic Radiation - IceBridge Sea and Ice Experiment (ARISE) project** using a C-130 airplane to measure sea-ice properties, radiative fluxes and atmospheric variables, particularly clouds, near the end of the Arctic sea-ice melt season. Information from these experiments will help determine heat flow from ocean to atmosphere during freeze-up and the impact on regional atmospheric temperature and pressure. In turn, this information will contribute to the understanding of how Arctic atmospheric phenomena influence mid-latitude weather.

**NSF continued development of an array of observing networks that measure and transmit accessible information about the Arctic marine and sea-ice environment.** Variables include atmospheric conditions; measures of water mass transformation including heat, salt, and momentum fluxes; riverine inputs and ocean acidification; fluxes of greenhouse gases across the ocean-ice-atmosphere transition; as well as the motion, thickness, and deformation characteristics of sea ice across the Arctic. Coupled investigations of biological and physical parameters gave insights into the health and abundance of plankton stocks in the Bering and Beaufort Seas in changing sea-ice conditions. SIZONet investigators delivered sea-ice products relevant to stakeholders, including information about the stability and strength of ice in the coastal zone.

**Through NCAR, NSF continued to improve the polar climate portions of the Community Earth System Model (CESM)** to increase understanding of ongoing warming in the Arctic and associated loss of summer sea ice. These improved models can be used to project future ice conditions under differing scenarios.

**NSF supported the establishment of a SEARCH (Study of Environmental Arctic Change) action team to improve understanding, advance prediction, and explore consequences of changing Arctic sea ice.** The team will include agency personnel and both national and international stakeholders with a range of disciplinary backgrounds and perspectives (including physical, natural, and social scientists). Core activities include assessing the predictability of summer Arctic sea-ice extent, thickness and properties on seasonal-to-decadal timescales and improving ice forecasts; and exploring consequences of the changing ice cover on Arctic ecosystems, the global climate system, and people.

**Implement the Pilot Distributed Biological Observatory (DBO) in the Pacific Arctic**  
**In 2014, scientists completed year five of the DBO pilot study, with field-sampling contributed by colleagues from 11 projects representing six countries.** The DBO provides a framework to focus and coordinate sampling and analytical efforts that link biological changes to physical drivers in a rapidly changing Arctic.

A key science achievement is the ability to track shifts in sea-floor community biomass and structure occurring with measures of annual sea-ice persistence in the five DBO regions. In addition, an east-to-west gradient in zooplankton populations that vary with water mass type through the season has been observed, including a more frequent occurrence of temperate whale species between Pt. Hope and Siberia.

An important physical oceanographic achievement through occupation of the DBO stations near Barrow Canyon is the observation of seasonal seawater freshening and warming of water transiting northward on the eastern and surface layers of the Chukchi Sea, with the maximum temperature observed in September.

All of these accomplishments were presented at various national and international science venues. DBO is an international collaborative effort with US funding support from AOOS, BOEM, NOAA, and NSF.

**Other key accomplishments include the creation of DBO-focused satellite sea ice, sea surface temperature, sea surface height and ocean color products by NASA, and the initiation of a DBO data workspace on the Alaska Ocean Observing System (AOOS) website.** Both of these products provide a foundation for data sharing among DBO contributors and collaborators. The data workspace also functions as the first link to the DBO data archive, under development at the Earth Observing Laboratory (EOL) as part of NSF's Advanced Cooperative Arctic Data and Information Service (ACADIS). A draft DBO Data Policy describing anticipated metadata standards and the means to contribute DBO data were discussed at the DBO Data Workshops in 2013 and 2014.

Internationally, the DBO continues to benefit from the organizational capability of the Pacific Arctic Group (PAG), especially with regard to sampling in Russian Arctic waters via the Russian-American Long-term Census of the Arctic (RUSALCA) program. Scientists attending the international RUSALCA conference held in St. Petersburg in May 2013 discussed the expansion of DBO sampling to new regions in the northern Chukchi Sea. DBO colleagues from the BOEM and international colleagues from Japan, Korea, and Canada also are discussing possible expansion of DBO sampling sites to regions of the Beaufort Sea. DBO participants expect to discuss new regions at the second DBO data workshop, to be held in 2015.

#### **Develop Integrated Ecosystem Research in the Beaufort and Chukchi Seas**

**Chukchi and Beaufort Sea research focused on the marine ecosystem in general, and on an increased understanding of its functioning, structure, and sensitivities to changes in physical and chemical environmental conditions in particular.** This information will improve model prediction capabilities and better inform management decisions. This scientific information has societal implications in key areas, e.g. ecosystem services, climate change research and biodiversity.

**A report titled “Developing a Conceptual Model of the Arctic Marine Ecosystem” in 2014** detailed the results of a workshop that involved ecologists, social scientists and Arctic experts and provided advice about the development of an Arctic conceptual model. The report is available on the IARPC website ([www.iarpcollaborations.org](http://www.iarpcollaborations.org)).

A number of synthesis projects are close to completion. The Pacific Marine Arctic Regional Synthesis (PacMARS [www.pacmars.cbl.umces.edu/](http://www.pacmars.cbl.umces.edu/)) final report will be available in early 2015. Special issue publications are in development that will report the results of the Synthesis of Arctic Research (SOAR [www.arctic.noaa.gov/soar/](http://www.arctic.noaa.gov/soar/)) and the Russian-American Long-Term Census of the Arctic (RUSALCA [www.arctic.noaa.gov/aro/russian-american/](http://www.arctic.noaa.gov/aro/russian-american/)).

The Chukchi and Beaufort Seas Ecosystem Collaboration Team authored a framework document that identified two overarching goals and five interlocking science themes that members agreed should be prioritized for future funding. The document recommended better research coordination in the Chukchi and Beaufort seas and discussed mechanisms for facilitating coordination and collaboration among funding partners. CBCT members have initiated a policy paper based on the framework document.

**BOEM led the initiation of a five-year, multi-agency-supported Marine Ecosystem Study (MARES)** of the Beaufort Sea shelf. This is discussed in detail in the Line of Effort I section of this report.

**NSF continued its support of the decade-long Beaufort Gyre Observing System (BGOS).** This ongoing observing activity is focused extensively on physical oceanography and sea ice characteristics, but includes biological and geochemical studies. It involves a significant amount of international collaboration, particularly with Canadian scientists. A major result of this study is the observed increase in freshwater storage in the Beaufort Gyre. If released impulsively to the Greenland-Norwegian Seas, the ensuing impact on the climate of the North Atlantic region is challenging to predict, but of potentially significant importance.

### **Improve Understanding of Glacial Dynamics**

**Scientists published the international workshop report titled “Understanding the Response of Greenland’s Marine-Terminating Glaciers to Oceanic and Atmospheric Forcing,** which defined the essential variables to be observed for process studies and “megasites.” The latter are potential sites where the research community would coordinate the simultaneous collection of the full range of glaciological, oceanographic, and atmospheric observations necessary to characterize and understand the intrinsically connected ice-ocean-atmosphere system. The report defines the components of a Greenland Ice-Ocean Observing System (GrIOOS); it also emphasizes the importance of a comprehensive, international data archive related to Greenland glacier-fjord processes through an appropriate, freely accessed portal. Process study results are being fed into Earth system models, and a recent international workshop was held to initiate a model inter-comparison project on ice sheet models.

The research community continues to build understanding of and interactions with related international activities focused on glacial dynamics. They will continue to seek the appropriate mechanism for developing a living document concerning an Arctic land-ice monitoring system, including NASA’s Operation IceBridge mission, which studies the glaciers of Greenland and Alaska, and the continued development of the Ice, Cloud, and land Elevation Satellite-2 (ICESat-2).

**NSF supported the establishment of a SEARCH (Study of Environmental Arctic Change) action team to improve predictions of future land-ice loss and impacts on sea level.** The team will include agency personnel and both national and international stakeholders with a range of disciplinary backgrounds and perspectives (including physical, natural, and social scientists). Core activities include facilitating the establishment of a Greenland/Arctic land ice/ocean/atmosphere observing network; and a Greenland/Arctic land-ice relevant database of

physical (initially) oceanic, atmospheric, and glaciological fields to serve the needs of the broad international community (including the modeling community).

**NASA initiated a five-year program of observations** to include ship-based and airborne measurements of fjord and shelf bathymetry, radar surveys of elevation at the edge of the ice sheet, and summer surveys of shelf hydrographic characteristics around the coast of Greenland. These observations are responsive to many of the recommendations contained in the Greenland ice sheet report mentioned above.

### **Understand Terrestrial Ecosystem Processes**

**An interagency team created a standardized syntax for project metadata (information about projects) in 2014;** the metadata is currently maintained by the North Slope Science Initiative (NSSI), NSF, USGS, the Arctic Landscape Conservation Cooperative, and non-governmental groups. Multiple agencies and organizations have adopted the International Organization for Standardization metadata standard. The Alaska Data Integration Working Group ([www.adiwg.org/about/](http://www.adiwg.org/about/)) developed a set of flexible, open-source tools that organizations can integrate into their existing workflows and computer systems to generate ISO metadata without having to master the complex ISO standard.

**Additionally, the Wildlife Potential Habitat Forecasting Framework (WILDCAST) project developed projections of potential land cover and habitat changes in Northern Alaska.** This project was a combined effort of the USGS, NPS, and USFS, and resulted in three formal publications and multiple presentations (see [alaska.usgs.gov/science/program.php?pid=53](http://alaska.usgs.gov/science/program.php?pid=53) )

**A subgroup was formed to identify local traditional knowledge on village subsistence and food security and to incorporate it into geographical information systems.** This information will be matched with integrated climate model layers to help scientists understand the relationships among climate, land use changes, and important Native ecosystem services. This effort is complex due to the proprietary nature of local known food gathering areas.

**An interagency group agreed to concentrate on developing a pan-Arctic analysis of permafrost-dominated Arctic and boreal regions to:** identify gaps in our understanding of the magnitude and distribution of permafrost carbon stores; and identify areas of permafrost that are potentially most vulnerable to carbon loss with continued warming. DOE, DOI, and NASA have been designated as lead agencies for this initiative with a target completion date of 2015.

**A distributed system of ground-based and airborne platforms catalogued changes in the terrestrial system,** including thawing permafrost, associated carbon fluxes, shifts in vegetation characteristics, phenology, freshwater hydrology and biogeochemistry, and ecosystem function.

**NSF supported the establishment of an action team under SEARCH (Study of Environmental Arctic Change) to document and understand how degradation of near-surface permafrost will affect Arctic and global systems.** The team will include agency personnel and both national and international stakeholders with a range of disciplinary backgrounds and perspectives (including physical, natural, and social scientists. Core activities include improving observation and prediction of the nature, timing, and location of permafrost thaw;

improving prediction of how degradation of near-surface permafrost will influence the dynamics of the Arctic landscape; and improving prediction of how permafrost degradation will influence fish, wildlife, and human communities. This effort leverages those of the Permafrost Carbon Network, an established international network of more than 200 scientists from 88 institutions in 17 countries.

### **Investigate Wildland Fires in the Arctic**

**IARPC's Wildfires Collaboration Team developed an inventory identifying existing knowledge and quality of data on wildfire frequency, extent and severity in the Arctic. They also created an inventory of NASA fire sensors.** Both databases are available at the IARPC collaborations website ([www.iarpccollaborations.org](http://www.iarpccollaborations.org)).

### **Understand Atmospheric Processes to Improve Climate Predictions**

**To improve knowledge and understanding of atmospheric processes specific to the Arctic, a group initiated a set of coordinated intensive observation and process studies and increased observational capabilities.**

**NASA's Arctic Radiation -- Ice Bridge Sea and Ice Experiment (ARISE) completed 16 successful flights to acquire well-calibrated data sets using aircraft and surface-based sensors.** These data sets support the use of NASA satellites and other assets for developing a quantitative process-level understanding of the relationship between changes in Arctic sea ice and regional energy budgets as influenced by clouds.

**DOE scientists completed the Biogenic Aerosols – Effects on Clouds and Climate (BAECC) field campaign in Hyytiälä, Finland, to investigate the formation and evolution of organic aerosols from northern boreal forests.** In addition to short-term campaigns, DOE, NOAA, and NSF have maintained, and are expanding as available, long-term observatories for clouds, aerosols, and short-lived climate forcers. Observatory locations include Barrow, Alaska (NOAA, DOE); Eureka and Alert, Canada (Canada and NOAA); Tiksi, Sakha Republic, Russia (Russia, NSF, and NOAA); Summit Station, Greenland (NSF, NOAA and DOE); and a new site at Oliktok, Alaska (DOE).

**The IARPC Atmosphere Collaboration Team conducted two black carbon webinars in 2014.** The first webinar focused on an Arctic black carbon mitigation initiative with the Russian Federation organized by the Department of State. The second webinar focused on *in-situ* ground sensing, remote sensing and transport modeling. Both were well-attended with diverse audiences.

**The International Arctic Systems for Observing the Atmosphere (IASOA) used a highly leveraged approach to design and populate a data access portal based on harvesting the relevant metadata from existing collections.** Most IASOA observatories – e.g., the Global Atmosphere Watch (GAW) and the Baseline Surface Radiation Network (BSRN) – are active partners in global networks with robust data management capabilities. IASOA observatories are also funded and maintained by sponsor agencies with their own long-term repositories.

### **Support a Circumpolar Arctic Observing System**

**Ongoing, collaborative conversations amongst Arctic observing funders, coordinators, and implementers have resulted in significant progress.** The Office of Science and Technology

Policy (OSTP) held a meeting focused on observing assets and metrics for measuring success relevant to agency and national priorities. Several evaluation models were demonstrated, and from that meeting a longer-term discussion within the Arctic Observing Collaboration Team (AOCT), and with the broader observing community, resulted in the commission of an Arctic Observing Assessment.

The assessment builds on lessons learned from the U.S. Group on Earth Observation (GEO) and NOAA Technology, Planning and Integration for Observation (TPIO) assessments of observing priorities and products to provide connectivity between the various approaches to Arctic information management and the scientific needs that underlie high-level priorities.

With input from IARPC, the international Sustaining Arctic Observing Networks (SAON), the US and international GEO, and the broader community, the AOCT is building a relational database and visualization package to trace the path from strategic priority, to user needs, to product and information stream delivery through documents and databases. Thirteen observing priorities range from food security to environmental safety and sustainable economic development, representing key areas where scientific observing information is needed to assess the current status and inform future decisions.

The metadata and hierarchical structure developed for this effort will be fronted by a user interface on the ArcticHub ([www.arctichub.net](http://www.arctichub.net)). The interface will allow searches, data exports, and graphical interpretation to highlight the connectivity, inform about gaps, and demonstrate the broad applicability of many observational data sets and products about the Arctic environment, residents' health and well-being, and socio-economics. These tools will allow funders, implementers, and the public to explore and communicate their interests in Arctic observing.

**Interagency co-funding and inter-organizational collaboration on observing and assessment activities expanded to include international partners** through mechanisms such as the Belmont Forum to encourage circum-Arctic coordination of observing activities. The first Belmont Forum Collaborative Research Action for the Arctic was led by NSF, the Research Council of Norway, and the National Sciences and Engineering Research Council of Canada and included partners from 15 funding bodies, including agencies representing all Arctic nations, China, India, Japan, Germany, and France. Awards from this competition are expected to be announced in winter 2015. AOCT member leadership within Arctic Council bodies, including several observing-related programs within the Arctic Council Committee on Arctic Flora and Fauna (CAFF), have increased during the lead-up to U.S. chairmanship of the Arctic Council. An exploration of best practices and governance for long-term observing has led to more active discussion at the international, national, and state level regarding standards for observing, common metadata, and accessibility of information. The exchange on these topics has been bi-directional, with international standards being embraced more at regional levels, and national requirements for timely data access influencing considerations abroad for revised data policies.

**Several planning efforts addressed future observing needs relevant to Federal (U.S. GEO), regional (Arctic Ocean Observing System (AOOS), and academic (AON Open Science Conference) interests.** Increasingly, online collaborative workspaces, such as the ArcticHub and social media, are sourcing input for planning activities while also building capacity and

connectivity for sharing best practices and co-developing observing approaches. To capitalize on the growing interactivity of the observing community, developers have created several online tools to enhance awareness of available resources for visualizing and evaluating observing information and networks, as well as to connect researchers across disciplines and continents to collaborate on proposals, observing efforts, and community papers.

Community input also will be a crucial part of the assessment as the ArcticHub crowd-sources relevant document and data streams into the relational database for a richer representation of observing activity.

### **Integrate Arctic Regional Models**

In response to this broad area of interest, the Modeling Collaboration Team (MCT) developed a long and diverse list of milestones for itself and has been working to categorize and address milestones in groups of similar topics. The new milestones can be viewed at [www.iarpcollaborations.org/teams/Modeling](http://www.iarpcollaborations.org/teams/Modeling).

The MCT established relationships between numerous interested Federal agencies and program managers and other Arctic stakeholders, and focused on establishing and expanding relationships among agency representatives, expanding connections to the interested stakeholder community, and updating the group on scientific progress through presentations (webinars) from key scientists in this area.

#### **MCT accomplishments include:**

- FY 2013 joint call for carbon cycle science proposals from NASA, DOE, USDA and NOAA that included an Arctic topic as a “critical ecosystem” and encouraged closely coupled modeling and process research proposals.
- Coordinating ongoing Federal research initiatives. Several recent Federal initiatives that focus on understanding and projecting Arctic ecosystem responses and societal implications in a changing world are being coordinated under the auspices of the IARPC and its sister CENRS subcommittee, the US Global Change Research Program (USGCRP).
- Sea Ice Prediction Network (SIPN). The SIPN activity highlight is shared by the Modeling and the Sea Ice Collaboration Team.
- NASA and DOE continue to connect ice sheet models relevant for sea-level rise estimates into global climate models.
- DOE, ONR, and NSF continue support for development and validation of a regional Arctic system model (RASM).

### **Improve Arctic Community Sustainability, Well-being, and Cultural and Linguistic Heritage**

The general task of the Arctic Communities Collaboration Team (ACCT) is to assess strengths and vulnerabilities of Arctic communities facing the impacts of climate change and to assist in identifying adaptation strategies and tools to maximize sustainability, well-being, and cultural and linguistic heritage. The ACCT met its goal to facilitate socio-economic research to understand the impact of warming climate on ecosystem services by publishing a major report by

the Arctic Social Indicators Project that contained recommendations on ways to adapt and minimize impacts.

ACCT held webinars to address food security research and establish a working framework that can be used to coordinate research in the future. ACCT also facilitated development of a digital repository providing access to a world-renowned collection of Native American language documentation housed at the University of Alaska, Fairbanks' Alaska Native Language Archive. ACCT discussions on Arctic languages helped to focus Federal agency efforts on this topic, and encouraged funding for the archiving project. This is a critical milestone in Arctic language preservation. When completed, the digital archive will provide the foundation for a new era of language and culture scholarship in the Arctic.

### **Understand Human Health in the Arctic**

**The Human Health Collaboration Team (HHCT), which includes individuals from the State, academic community, and other external partners, made significant progress towards coordinating better comprehension of health and survival rates of Arctic indigenous people.** The team accomplished the following:

- Completed a study to demonstrate the acceptability of fecal immunochemical test (FIT) for the early detection of colorectal cancer in Alaska Native people
- Published a paper that described the formation of a circumpolar working group to monitor and conduct research on climate-sensitive infectious diseases
- Held the Fourth Alaska Native Health Regional Conference. The theme, "Research for Healthier People," brought together people from Native communities interested in health to talk about health research initiatives. Details and presentations can be found at: [www.signup4.net/public/ap.aspx?EID=20133021E&OID=50](http://www.signup4.net/public/ap.aspx?EID=20133021E&OID=50).

### **Chart the Arctic Region**

**In July 2014, NOAA released chart 16145 for the Delong Mountain Terminal, a shallow draft port servicing the Red Dog Mine,** one of the world's largest producers of zinc concentrate, on the western coast of Alaska. The chart provides new survey data for historically sparse depth measurements, and offers a more usable format, with updated shoreline measurements and newly acquired NOAA hydrographic information. The chart identifies dozens of depth measurements, based on thousands of soundings, to give the mariner accurate depths for navigation.

**The National Oceanic and Atmospheric Administration continued to test and develop an Arctic water-level gauge.** A prototype buoy, which works in conjunction with a bottom-mounted water-level sensor to deliver real-time water-level information, has been designed for deployment in less harsh areas and is being tested in East Coast waters.

**In 2014, NOAA completed data acquisition for 953 miles of Arctic shoreline, and expects to gather 483 miles of data in 2015.** Additional NOAA hydrographic operations were cancelled due to resource limitations in 2014; however, NOAA and the USCG continue to work together to assess USCGC HEALY trackline datasets to support charting initiatives.

NOAA plans to send two vessels to the Bering and Beaufort Seas in 2015 to gather data to support a potential routing measure in the Bering Strait.

The acquisition of U.S. Arctic elevation data and geoid<sup>3</sup> model development (GRAV-D) out of Juneau, which was to cover southeast Alaska, was unexpectedly canceled due to aircraft problems and short weather windows. The survey will be rescheduled as a high priority in 2015. NOAA plans to conduct Arctic surveys in 2015 around the following communities and locations in Alaska: Bechevin Bay, St. Paul Island, Kuskokwim, Kotzebue, Point Hope, Wainright, and Barrow.

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<sup>3</sup> The geoid is the shape that the surface of the oceans would take under the influence of Earth's gravitation and rotation alone, in the absence of other influences such as winds and tides.

### **Line of Effort III. Strengthen International Cooperation**

Advancing sound policies and strategies in the Arctic will continue to require international coordination and collaboration. To strengthen international cooperation, Federal agencies focused on the following activities: promoting oil pollution preparedness, prevention, and response; enhancing search and rescue; preventing unregulated high seas fishing; reducing transport of contaminants; identifying and assessing invasive species risks and impacts; promoting scientific research and monitoring with international partners; developing the U.S. agenda for the Chairmanship of the Arctic Council; reducing black carbon; acceding to the Law of the Sea Convention; delineating the outer limit of the United States extended continental shelf; developing the International Maritime Organization Polar Code; and promoting waterways management. To further these international efforts in the Arctic, Federal agencies carried out activities as described in the following section.

#### **Promote Arctic Oil Pollution Preparedness, Prevention, and Response Internationally**

**The United States participated in a series of Canada-hosted notification exercises.**

Participants documented and submitted lessons learned to the Arctic Council for discussion. The United States will build on the exercises during the U.S. Chairmanship of the Arctic Council by further exercising the Agreement on Search and Rescue.

**The United States and Canada conducted a joint table-top exercise in September 2014 in Juneau, Alaska.** The scenario was a futuristic well blowout along the Canada-U.S. Arctic border that impacts the U.S. shoreline. Lessons learned will be used to strengthen partnerships with Canada and other Arctic nations.

**The United States led efforts to establish an Arctic Ocean Regulators Forum,** a group wherein oil and gas regulators can share experience and expertise on how to prevent oil pollution in the Arctic Ocean. The Arctic Council Task Force on Oil Pollution Prevention will develop a framework plan for cooperation and encourage foreign Ministers to endorse it in 2015.

#### **Prevent Unregulated Arctic High Seas Fisheries**

**The United States developed a declaration by the five Arctic coastal States to restrict commercial fishing by their vessels in the high seas portion of the central Arctic Ocean until there is adequate scientific information and an international fisheries management agreement.** The Arctic coastal nations also agreed to pursue a joint research plan and to invite a broader range of States to participate in negotiations on an agreement.

#### **Reduce Transport of Contaminants**

**The Administration continues to support U.S. ratification of the Stockholm Convention on Persistent Organic Pollutants.** The Convention protects human health and the environment from harmful chemicals that persist in the environment and enter the food chain. The Convention is particularly important for the people of Alaska, whose environment and foods are impacted by persistent organic pollutants (POPs) transported by air and water from other parts of the world.

**The Arctic Council Project Support Instrument Committee provided preliminary approval for two mercury reduction projects.** Project participants will share information on emissions-control techniques for sources of significant mercury emissions that impact the Arctic, consistent

with requirements under the Minamata Convention on Mercury. Preparations, including co-financing arrangements, continue for both projects.

### **Identify and Assess Invasive Species Risks and Impacts**

**An interagency group of Federal, State and Alaska-based academic participants worked to identify and assess invasive species pathways, risks, and ecosystem and economic impacts to the Arctic region, and to identify current data and baseline needs for future progress.**

The interagency group coordinates with U.S. delegations to Arctic Council working groups to develop cohesive strategy on invasive species actions, deliverables and strategy; create more effective and efficient use of staffing and resources; prevent redundancy of effort; and enhance international invasive species collaboration.

### **Promote Scientific Research and Monitoring**

**The Arctic Council Ad Hoc Task Force for Science Cooperation worked to develop a binding agreement to promote international cooperation among scientists in the Arctic during the U.S. Arctic Council Chairmanship.**

### **Develop a Robust Agenda for the U.S. Chairmanship of the Arctic Council**

**The United States will emphasize the theme “One Arctic: Shared Opportunities, Challenges and Responsibilities,” which has 15 chairmanship initiatives divided among three key pillars: Arctic Ocean Safety, Security and Stewardship; Improving Economic and Living Conditions; and Addressing the Impacts of Climate Change.** The theme and the initiatives were developed in consultation with the State of Alaska and Alaska Natives during multiple trips to the state by the U.S. Special Representative to the Arctic. The United States will assume the Chairmanship of the Arctic Council in April 2015.

### **Reduce Black Carbon in the Arctic**

**Through the Arctic Council's Task Force on Black Carbon and Methane, the United States coordinated with the other Arctic states to complete a voluntary framework for a set of actions addressing these short-lived climate forcers.** The framework establishes a process by which, for the first time, all Arctic states will submit black carbon emission inventories and national reports on policies, programs, and best practices to address black carbon and methane. The task force anticipates the framework will be a key deliverable for the April 2015 Arctic Council Ministerial meeting in Canada. Once delivered, an expert group will review collective progress and report findings and recommendations for consideration.

**To complete a successful demonstration project to reduce black carbon emissions using cost-effective technologies, an interagency team completed a black carbon emissions inventory for diesel sources in Murmansk, Russia.** Additional demonstration project proposals have been approved by the short-lived climate pollutants expert group in the Arctic Council's Arctic Contaminants Action Program.

Several publications are forthcoming in 2015, including:

- A case study of a bus company's fleet upgrade to more energy-efficient, lower-emissions vehicles, reviewed in January by stakeholders and project partners in Russia and expected to be finalized and released in March.

- A report providing guidance on purchasing and financing cleaner, more efficient diesel-powered mining equipment, expected in April.

**The Environmental Protection Agency (EPA) updated the United States' black carbon emission inventory in 2014, and voluntarily submitted it to the Convention on Long-Range Trans-boundary Air Pollution, ahead of schedule.** The inventory is located at [www.ceip.at/ms/ceip\\_home1/ceip\\_home/status\\_reporting/2014\\_submissions/](http://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2014_submissions/). The EPA continues to be recognized as a global leader in this area and continues to refine methodologies used to calculate emissions in various sectors.

#### **Accede to the Law of the Sea Convention**

**This Administration is committed to joining the Law of the Sea Convention, as were the last three administrations.** Obtaining Senate advice and consent to accession remains a top priority. The continental shelf off Alaska is likely to extend more than 600 nautical miles. Only as a Party to the Law of the Sea Convention can the U.S. put our rights on the firmest legal footing and have access to the Convention's procedure that would maximize legal certainty and international recognition of the U.S. continental shelf that extends beyond 200 nautical miles.

#### **Delineate the Outer Limit of the U.S. Extended Continental Shelf**

**Experts made progress in processing, interpreting and documenting the seismic data collected on multiple missions in the Arctic Ocean and Bering Sea regions to establish the outer limit of the U.S. extended continental shelf (ECS) in the Arctic.** To more efficiently coordinate this work, the Department of State established an ECS Project Office in Boulder, Colorado.

#### **Expedite International Maritime Organization (IMO) Polar Code Development and Adoption**

**The United States successfully championed the approval and adoption of Polar Code amendments** to the International Convention for the Safety of Life at Sea (SOLAS) by the International Maritime Organization (IMO) Maritime Safety Committee (MSC), and approval of amendments to International Convention for the Prevention of Pollution from Ships (MARPOL) by the IMO Marine Environment Protection Committee (MEPC). The MEPC is expected to adopt the Amendments to MARPOL in early 2015. Once adopted, the Polar Code should enter into force in 2017.

#### **Promote Arctic Waterways Management**

**The United States Coast Guard completed a Waterways Analysis and Management System assessment of the North Slope and determined that no significant changes to the Aids to Navigation constellation were required.** In addition, the Coast Guard facilitated the establishment of an Arctic Waterways Safety Committee (AWSC). The AWSC is a focused non-governmental committee dedicated to addressing safety, security, subsistence, and environmental issues facing the Arctic. Stakeholders work collaboratively to solve Arctic waterway related issues without adding new regulations.

## NEXT STEPS

To advance the implementation of the *National Strategy for the Arctic Region* and achieve the vision articulated by the President, **the United States established the Arctic Executive Steering Committee (AESC) through the Executive order “Enhancing Coordination of National Efforts in the Arctic.”** The AESC will provide guidance to departments and agencies and enhance coordination of Federal Arctic policies. In addition, the AESC will develop a process to improve coordination and the sharing of information and knowledge among Arctic partners and stakeholders. The AESC will improve coordination efforts with Alaska Native tribal governments and similar Alaska Native organizations to ensure meaningful consultation and collaboration in the development of Federal policies that have Alaska Native implications. We remain committed to implementing all of the initiatives of the *Implementation Plan for the National Strategy for the Arctic Region*, and we steadfastly seek to resolve outstanding challenges in 2015.

In the first year, we have made significant progress in achieving the President’s vision to advance U.S. interests in the Arctic. The Secretary of State designated a Special Representative to the Arctic, and we enhanced our cooperation and coordination on Arctic issues with Federal, State, local, and tribal governments. The work must continue, as the *Implementation Plan* includes deliverables due in 2015 and beyond, which we will address in subsequent annual reports.