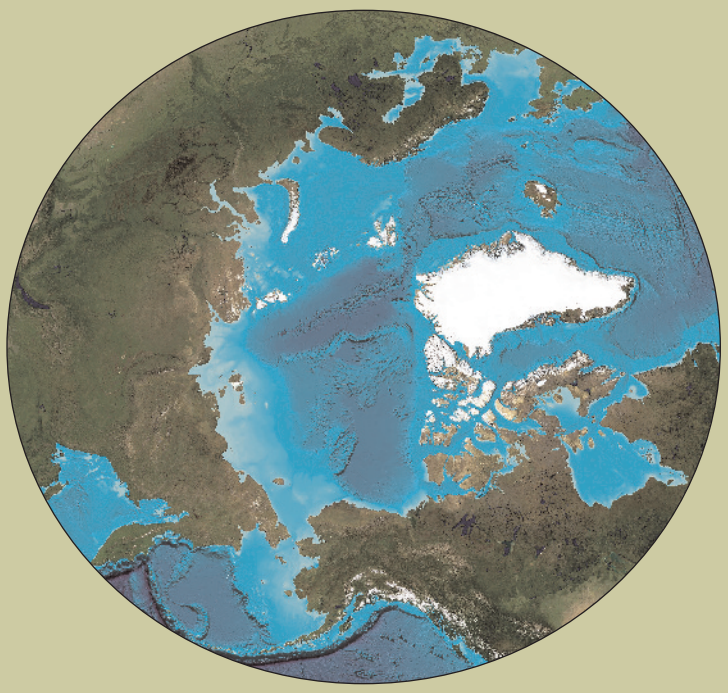
U.S. Arctic Research Commission



Report on Goals and Objectives for Arctic Research 2007

for the U.S. Arctic Research Plan

Cover Photo Credit: Dr Martin Jakobsson
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Eyes Shift North

The Arctic is capturing our attention as never before, and for good reason. The impact of global warming is greatest at the poles. These regions, once considered remote, desolate, and perpetually frozen, are now rapidly evolving. Diminishing sea ice conditions in the Arctic Ocean are changing ecosystems, most conspicuously for polar bears. This also creates unprecedented access for ships that will bring people to the north, and will significantly shorten global marine transportation routes. Nations are claiming new territory in the Arctic; based on international law, Russia, Canada, Norway, and other nations are seeking sovereignty claims over wide swaths of the Arctic Ocean and so too might the U.S. An abundance of natural resources is being discovered in these areas. The Arctic is thought to contain 25 percent of the remaining oil and gas reserves in the world, and the Bering Sea currently provides 50 percent of the fish consumed in the U.S.

Our stewardship of the Arctic and the policies that we establish require an underpinning of knowledge that can come only from scientific research. As such, this report identifies and conveys to President Bush and to Congress the nation's high-priority goals and objectives for Arctic research. In short, the goals are to renew our mission in Arctic research through novel investments and by reorganizing, revising, and reprioritizing existing assets and opportunities. We must strengthen Federal Arctic research programs, and initiate a few new ones. In so doing, we must also engage and encourage the cooperation and collaboration of Federal, State, local, and Native governments and international partners. The Commission's five specific research foci for the U.S. Arctic Research Plan in 2007-2009 are:

- Environmental Change of the Arctic Ocean and Bering Sea
- Arctic Human Health
- Civil Infrastructure
- Natural Resource Assessment and Earth Science
- Indigenous Language, Identity, and Culture.

These themes span a wide range of basic and applied research topics, from earth system science, to human health initiatives, to the social sciences, and to engineering and technology development. Arctic changes and their relation to global climate change is the thread that weaves together all five.

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This goals report coincides with the beginning of the first International Polar Year (IPY) in 50 years. From March 2007 to March 2009, the IPY will concentrate the efforts of scientists from over 60 nations to initiate, conduct and share the results of polar scientific research, and to create a legacy of human resources and infrastructure that will provide an enduring benefit to mankind. The IPY will demonstrate that while the poles are geographically far from centers of global population, they are proximal in terms of consequence. For example, only eight nations directly ring the Arctic, but all nations are affected by global sea level rise from the melting of polar ice sheets. If, for example, Greenland's ice sheet melts completely, how will humanity respond to a global sea level rise of 21 feet? Scientific research, and dissemination and use of the results, will determine our options for preventing, mitigating, or adapting to changes in the Arctic.

Renewing Our Mission in Arctic Research

The International Polar Year will dramatically increase our knowledge of the Arctic and will establish a legacy for future generations. As a research leader, the U.S. must renew and vigorously sustain its Arctic scientific research programs and infrastructure. Maintaining preeminence will protect our citizens and our environment, enrich our lives, and prepare us for the challenges and opportunities of a changing Arctic.

Renew the Mission by Reinvigorating, Revising, and Reinvesting

Reinvigorate the Interagency Arctic Research Policy Committee (IARPC)

The primary objective of the 1984 *Arctic Research and Policy Act* was to produce and implement a comprehensive national policy and plan for Arctic scientific research. To this end, the Act created the U.S. Arctic Research Commission, which develops and recommends to Congress and the President an integrated national Arctic research policy, and biennially publishes a *Report on Goals and Objectives*. IARPC responds to the report by formulating a five-year *U.S. Arctic Research Plan* and by revising it biennially.

Recent transitions of key personnel and growing interagency relationships are reinvigorating IARPC under the leadership of the Director of the National Science Foundation. In light of evolving national priorities, this interagency effort is transforming, participants are becoming actively engaged, and IARPC is strengthening its internal partnerships. We encourage regular meetings of IARPC, and active involvement with USARC and representatives from the Executive Office of the President (specifically Office of Management and Budget, the Office of Science and Technology Policy, the Council for Environmental Quality, and the Natural Security Council). In its efforts, IARPC should engage the public and endeavor to improve its strategic planning and integration of Arctic research across federal agencies. We also encourage IARPC to work closely with the National Science and Technology Council that plans and oversees other interagency research initiatives.

IARPC Participating Agencies

National Science Foundation	Department of Health and Human Services
Department of Commerce	National Aeronautics and Space Administration
Department of Defense	Environmental Protection Agency
Department of Energy	Smithsonian Institution
Department of the Interior	Department of Agriculture
Department of State	Department of Homeland Security
Department of Transportation	Office of Science and Technology Policy

The Commission recommends that IARPC expand its membership to include new, significant entities that fund Arctic research, for example, North Pacific Research Board, North Slope Science Initiative, and Prince William Sound Oil Spill Recovery Institute. These organizations--all created by Congress--bring together agencies and others to provide significant funding to Arctic research.

Revise U.S. Arctic Research Plan

Integral to the success of Arctic research is a visionary, transparent, and effective U.S. Arctic Research Plan that establishes clear organization and core-funding goals for programs to be conducted by Federal agencies. USARC suggests a comprehensive review and reworking of the plan that would institute:

- benchmarks for research
- multiple-year funding plans
- agency accountability
- research infrastructure plans and investment commitments
- an appropriate balance between agency intramural and extramural research funding
- interagency communication and program links

USARC also recommends implementing crosscutting agency budget analysis to effectively prepare an integrated, coherent and multi-agency budget as required by the *Arctic Research and Policy Act*. This practice would allow the U.S. to uphold and foster its world-leading science endeavors and to better manage the tremendous challenges of the Arctic region.

Sustainable Programs Build Human Capacity

It's all about people. Despite broad support for the president's 2006 *American Competitiveness Initiative*, and increasing Arctic science budgets in some agencies, there has been a decline in the level of federal and state funding for peer-reviewed, investigator-driven, extramural Arctic research. That trend has limited scientific research and the pursuit of knowledge. The current "pipeline of people" is insufficiently supported. It is depleted at the source and leaking in the middle. Only a vibrant research and educational enterprise attracts a new generation of scientists to Arctic research and sustains them by ensuring an environment in which they can contribute in significant and lasting ways. USARC believes Arctic research will help the U.S. reach and maintain national competitiveness goals.

Federal Agency Support for Extramural Research

Sustaining a strong and vital government-sponsored Arctic research program requires Federal agencies to set clear goals and objectives, to establish strong leadership and to develop long-term, coordinated extramural support for research conducted by academic scientists. In light of budget challenges, however, many of the mission-focused government agencies have retrenched, and have cut support for extramural programs, or reorganized, in order to maintain internal initiatives. This does not necessarily serve the greater interests of Arctic research. The Commission reminds agencies of the following clause in public law, "All Federal agencies shall consult with the Commission before undertaking major Federal actions relating to Arctic research." [*Arctic Research and Policy Act*, SEC. 105. (c).] The USARC will redouble efforts to work closely with agencies to encourage

greater balance between extra- and intramural Arctic research. The USARC commits to working with IARPC to ensure that this aspect of the law is followed, calling for an open budget process and a comprehensive and balanced approach.

Grow and Sustain Arctic Research Infrastructure

As noted in recent reports from the National Research Council, Arctic scientific research objectives frequently depend on platforms such as observatories, ships, submarines, satellites, aircraft and other technologies to detect natural phenomena and to collect data. The Arctic presents a wealth of opportunities to test and employ research platforms on land, in the sea, and in the air. Much of this infrastructure, however, lacks support and long-term commitment. The need is especially keen when international consensus and investments are involved. Coordination will reduce costs and increase effectiveness. Therefore, the USARC recommends that IARPC help lead an international assessment of Arctic research infrastructure needs, and then work with public and private institutions to make appropriate investments in new platforms to support the nation's Arctic research program. The Commission supports the following infrastructure opportunities as vital; the first three have been the subject of recent reports by the National Academies of Science. For icebreakers and satellites, the NAS reports have shown that the U.S. is quickly losing vital current capacity.

- Arctic Observing Network (AON)
- Icebreakers
- Satellites
- Alaska Regional Research Vessel (ARRV)
- Alaskan Permafrost Observatory
- Barrow Cabled Observatory
- Barrow Global Climate Change Research Facility
- Hydrogeological Sensor Systems
- Technologies—Telemedicine, Communications and Wireless Sensing Networks
- Unmanned Autonomous Aircraft and Underwater Systems

Engage Arctic Residents and the General Public

Many Arctic residents, and particularly indigenous peoples, contribute significantly to the success of scientific research efforts. It's time to return the favor by improving the manner by which the newly gained knowledge is brought back to the communities that often benefit most directly from it. Higher priority must be placed on scientific research issues that impact Arctic residents. Research results from studies of climate change, ecosystems, oceanography, human health, resource assessment, polar technology and infrastructure must be communicated and disseminated to Arctic residents in a manner that best serves their needs. The USARC is disappointed that Federal support was terminated for the Alaska Native Science Commission, which was established to bring together research and science in partnership with indigenous communities. The USARC recommends that IARPC agencies develop new mechanisms to create stronger collaboration with Arctic residents and the public at large.

Review and Revise U.S. Arctic Policy and International Commitments

A dozen years ago, when the U.S. last revised Arctic policy, circumpolar cooperation was just getting started. The Arctic has changed significantly since then, primarily in light of climate change, and as such, U.S. policy interests and affiliated research issues must be reviewed and revised accordingly. We now know that climate change will produce impacts on research, civil infrastructure, energy supplies, indigenous cultures, fisheries, national security, and global transportation – to name a few. This requires an integrated U.S. response which will allow us to better adapt our goals and international commitments in the areas of research, safety, search and rescue, environmental protection, economic development, health and ecological risks, biodiversity, offshore oil and gas development, shipping activities, marine pollution and cultural tourism. A review of domestic Arctic policy will naturally involve consideration of international implications and commitments.

Legislation Pertinent to Arctic Research

The USARC monitors Congressional activity affecting Arctic research:

- Proposed legislation to create a NOAA Organic Act
- Marine Mammal Protection Act (MMPA)
- Magnuson-Stevens Fisheries Conservation Act
- Senate Ratification of the UN Convention On The Law Of The Sea (UNCLOS)
- Oil Pollution Act of 1990 (OPA90)
- Arctic Research and Policy Act (ARPA) amendments
- Conceptual Legislation on International Regimes for Arctic Shipping
- Persistent Organic Pollutants (POPs) Treaty
- Senate Ratification of the Polar Bear Treaty
- Arctic Waters Pollution Prevention Act
- Migratory Bird Act
- Snyder Act (granted full U.S. citizenship to America's indigenous peoples)
- Indian Health Care Improvement Act
- No Child Left Behind Act
- Native American Languages Preservation Act

The Commission is compiling a list of treaties and other international agreements which serve as drivers of U.S. Arctic research. Most of these agreements promote cooperation through mechanisms such as the Arctic Council, treaties and conventions. USARC recommends that IARPC review these international commitments and fully understand our associated obligations and opportunities.

Strengthen and Initiate Federal Arctic Research Programs

Five major research priorities are proposed for the *U.S. Arctic Research Plan, 2007-2011*.

Environmental Change of the Arctic Ocean and Bering Sea

The Arctic region is primarily defined by the ocean and bordering seas that link eight Arctic nations. This marine framework provides scientists with a unique context for exploration and research. As the Arctic Ocean and Bering Sea are home to great, and often untapped natural resources, fisheries and energy, and as the Arctic emerges as a new global transportation pathway, this marine realm is an obvious priority for scientific research. Closer coordination between the North Pacific Research Board (NPRB) and the National Science Foundation's Bering Sea Ecosystem Study (BEST) are benefiting ongoing efforts in the Bering Sea. The Study of Environmental Arctic Change (SEARCH), an enduring, interagency effort to understand the nature, extent, and evolution of system-scale Arctic variations is now being internationalized, through the International Study of Arctic Change (ISAC), and broadened to include the Arctic Observing Network (AON), itself a component of the Global Earth Observation System of Systems (GEOSS). USARC recommends increased support for SEARCH programs, such as NOAA's Russian-American Long-Term Census of the Arctic (RUSALCA). This and other such programs continue to deepen our understanding of the complicated dynamics of Arctic environments. USARC also recommends support for forthcoming programs as well as integration with other efforts such as the U.S. Climate Change Science Program and the U.S. Climate Change Technology Program.

Arctic Human Health

USARC recommends that the U.S. develop an Arctic human health research plan. A great start in this direction has been the National Institutes of Health's Arctic Human Health Initiative (AHHI), a major U.S.-led contribution to the IPY. U.S. Arctic residents are susceptible to a wider range of physical and behavioral health issues when compared to their counterparts in the lower 48. Life expectancy among the indigenous population of 125,000 is shorter in the "cold and dark" and infant mortality rates are higher. While the move away from a traditional subsistence lifestyle toward generalized modernization has brought economic change and new technologies, it has also increased the prevalence of chronic diseases such as diabetes, hypertension, obesity, cardiovascular illness and mental health challenges. Study has just begun on the impact of environmental pollutants and climate change on food safety and health consequences. Because the Arctic is a unique environment for managing health issues, it requires a distinctive approach to effectively meet the health care needs of its people.

Civil Infrastructure Research
Climate change is impacting civil infrastructure by melting permafrost, reducing sea ice, by strengthening storms and by eroding coastlines. The implications of thawing permafrost on the Arctic's transportation, communication, energy, and community infrastructure networks are considerable by any measure, largely because long-held engineering standards assumed that the permafrost regime would be perpetually stable. Realization that permafrost might thaw significantly during the lifespan of a building, a pipeline, or a road system requires research to develop new ways to design and construct infrastructure. As protective winter sea ice retreats from the coastlines, storm surges reach the shore making it vulnerable to erosion. For example, in the village of Shishmaref, inhabited for 400 years, climate change is destroying homes, the water and sanitation systems and other infrastructure, which requires relocation of the entire village. Finally, research and innovative engineering solutions are needed to create new infrastructure that will be required for a comprehensive transportation system to address the demands of an increasingly accessible Arctic, whether by land, sea, or air.

Natural Resource Assessment and Earth Science
As has been clear since the building of the Trans-Alaska Pipeline System, the U.S. Arctic is ripe with natural resources from oil and gas, to minerals, to fisheries, to wildlife-rich ecosystems. Further assessments of living and non-living resources are needed in the Arctic. Specifically, the U.S. Geological Survey should implement its "Resource Assessment Program" (AMRAP) required by law. Earth science initiatives should continue to incorporate fundamental geophysical and geological research (especially in the Arctic Ocean) so that as a nation, we understand our land, its value, and the extent of our offshore sovereignty beyond the current Exclusive Economic Zone through the Extended Continental Shelf Mapping Initiative. Emphasis should also be placed on oil-spill prevention and response in the Arctic and sub-Arctic, better Arctic mapping, gas hydrate research, studies of contaminant fluxes and impacts, and long-term funding for the North Slope Science Initiative.

Indigenous Language, Identity, and Culture
Language helps us define the cultural diversity of our planet, allowing us to separate one population from another. Although critical, language is one of the most vulnerable elements of our cultural heritage. Of the thousands of known languages, less than 10 are used by nearly 60 percent of the global population and more than 500 are extinct. In the Arctic, language vulnerability is especially acute where loss stems from separation of indigenous people from their cultural past. Without a research plan to address Arctic language preservation, the path to language extinction is likely to shorten. This plan should incorporate:

- regular, permanent census processes to understand the diversity of languages spoken by Arctic people, and the viability of those languages for future generations;
- documented procedures to ensure that languages and place names spoken and given by Arctic people are recorded and preserved; and
- defined policy options and processes for language preservation that have succeeded in the Arctic and elsewhere that are made available to Arctic policy makers and residents.

Engage Federal Agencies Cooperation and Commitment

According to the Arctic Research and Policy Act, "all Federal agencies shall consult with the Commission before undertaking major Federal actions relating to Arctic research." The Commission is developing new ways to fulfill its statutory requirements to review Arctic-related research programs and work with agencies to ensure that the required consultation takes place, in a regular and transparent manner. In the full goals report, the Commission provides agencies with specific recommendations. Most of these are associated with agency participation in the five goals, organization of agency Arctic programs, and investment in Arctic research infrastructure.

U.S. Arctic Research Commission

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