

United States Arctic Research Commission



**Annual Report
Fiscal Year 2004**

**Members of the
US Arctic Research Commission
January 1, 2004**

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(Serving during Fiscal Year 2003)

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January 31, 2005

To: The President
The President (pro tempore) of the Senate
The Speaker of the House of Representatives

It is my pleasure to forward the Annual Report of the US Arctic Research Commission for Fiscal Year 2004 as required by the Arctic Research and Policy Act (ARPA) of 1984 (as amended).

Fiscal Year 2004 was an extremely successful year for the Commission. Its events reflected our increasing interaction with Arctic research entities at the local, state (Alaska), national, and international levels. The Commission's autonomous office in Anchorage, opened in August 2003, continued to facilitate in meeting our objective of support of research in America's Arctic.

A summary list of the "Highlights of Commission Activities-FY-04" follows. It briefly summarizes the Commission's expanding role as a proactive and integral force in the planning and implementation of the nation's Arctic research policies, as mandated by the ARPA and as articulated by the Interagency Arctic Research Policy Committee through the National 5-Year Arctic Research Plan.

As Commission Chair, I am both privileged and proud to lead this agency whose achievements, I submit, belie its size of seven (part-time) Commissioners and three full-time staff.

Very respectfully submitted,

A handwritten signature in black ink, appearing to read "George B. Newton, Jr.", written in a cursive style.

George B. **Newton**, Jr., Chair
U. S. Arctic Research Commission

**Annual Report
of the
UNITED STATES ARCTIC RESEARCH Commission
to the
PRESIDENT and CONGRESS of the United States

Fiscal Year 2004**

*United States Arctic Research Commission
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Preface

The Arctic Research and Policy Act of 1984 as amended (Public Law 101-609) requires that the US Arctic Research Commission, which was established by this Act, submit to the President of the United States and the Congress, not later than 31 January of each year, a report describing its activities and accomplishments during the immediately preceding fiscal year. In fulfillment of the provisions of the Act, the Commission presents the following report for fiscal year 2004 (1 October 2003 through 30 September 2004). For a description of the activities of the Commission in previous years, see its Annual Reports (Table 1 on inside back cover).

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Highlights of Commission Activities, Fiscal Year 2004

- Conducted three public meetings: two in Washington DC, at the National Academy of Sciences (jointly with the NAS/NRC Polar Research Board) and the State Plaza Hotel, and one at the University of Alaska Fairbanks. The full Commission and scientific staff participated in a field trip to Iceland to review and understand that nation's science, technology and research policy, its research infrastructure in fishing and alternative energy sources and methods of energy delivery.
- Produced and distributed two reports viewed as critical research areas by the Commission:
 - "Climate Change, Permafrost, and Impacts on Civil Infrastructure" was completed in December 2003 by a Task Force of nine members assembled by the Commission
 - "Advancing Oil Spill Response in Ice Covered Waters" was completed in March 2004 as a joint effort with the Prince William Sound Oil Spill Recovery Institute in Cordova, Alaska.
- Negotiated the additional release to the public of Arctic Ocean Bathymetry collected by the US Navy nuclear submarines during the period 1988-1993. The data came from 18 cruises covering approximately 50,000 track miles under sea ice. The Commission's contributions to the international hydrographic community in gaining data release for public and research use were formally recognized at the annual meeting of the General Bathymetric Charts of the Oceans (GEBCO) organization held in La Spezia, Italy, in April 2004.
- Located and arranged release of updated position information derived from the Science Ice Exercise (SCICEX) cruises conducted aboard USS Hawkbill in 1998 and 1999. These data will substantially improve their bathymetry/hydrography accuracy of the two cruises.
- Continued proactive support for US ratification of the United Nation's Convention on the Law of the Sea (UNCLOS) treaty, working with both committees and individual members of the Senate, and various offices of the Executive Branch. Was invited to submit written testimony to the Senate Committee on Foreign Relations incident to their hearings on ratification.
- Continued liaison with Canada and Denmark in efforts to acquire US bathymetry data of the Arctic Ocean for use in preparing each nation's claim to extend the outer limits of their continental shelf, as authorized under Article 76 of UNCLOS.
- Wrote an Op-Ed piece for the Anchorage Daily News, January 2004, addressing the importance of US ratification of UNCLOS to the State of Alaska and its citizens.

- Undertook co-sponsorship of the seventh annual workshop on “Alaska Port Engineering.” It was held at the University of Alaska Anchorage in January.
- Continued to submit recommendations to oversee implementation of improvements to the Arctic Maritime Safety Information (AMSI) database system, as the International Arctic Ocean equivalent to the temperate ocean Notices to Mariners system, managed by the National Geospatial-Intelligence Agency (NGA).
- Played an influential role in US participation in Arctic Council affairs, especially with the Arctic Climate Impact Assessment, and working groups on Protection of the Arctic Marine Environment, Sustainable Development Working Group/Circumpolar Infrastructure Task Force, and Arctic Monitoring and Assessment Program.
- Continued leadership of a working group of international experts examining issues related to ‘Scaling in Arctic Terrestrial Systems.’
- Participated as a member of the North Pacific Research Board and the Alaska Ocean Observing System.
- Served as a non-voting member of the North Slope Science Initiative.
- Stimulated a study by the National Academy of Sciences to develop a long-range plan for the study of the Bering Sea Ecosystem.
- Served as a contributor and principal advisor to the chair on Arctic marine issues for the Arctic Climate Impact Assessment conducted in 2001-2004 and released in November 2004.
- Acted as co-convenor of an international experts workshop on 'Future Arctic Marine Transport' held at Scott Polar Research Institute, University of Cambridge, United Kingdom 28-30 September 2004.
- Participated in the 2004 conference of the Standing Committee on Parliamentarians of the Arctic Region held in Nuuk, Greenland.
- Supported the development of the Arctic Council's 'Arctic Marine Strategic Plan.'

In addition, the Commission’s Anchorage office, during its first full year of operation with a full-time staff and in its own office location, expanded its interaction with US agencies, Alaskan offices and academic research communities throughout the state of Alaska.

Major Research Priorities

During Fiscal Year 2005, USARC published its biennial *Report on Goals and Objectives for Arctic Research*, which is required by The Arctic Research and Policy Act of 1989 (as amended). The 2005 edition contains five major research priorities.

Studies of the Arctic Region and Global Change: The Arctic Research Commission supports the growth of the Interagency SEARCH program into a fully developed program with a common research agenda and an integrated budget approach. It also encourages US researchers to collaborate and coordinate with international colleagues. In addition, the Commission recommends an international program to promote the recovery and/or re-establishment of the most important hydrometeorological monitoring stations for systematic detection of contemporary and future environmental change.

Studies of the Bering Sea Region: The Commission encourages planning activities of the North Pacific Research Board and the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYKSSI) related to the Bering Sea and its watershed and recommends a Bering Sea Ecosystem Summit. It also supports immediate expansion of the BERPAC program to include annual research cruises and appropriate support for related research both within NOAA and through extramural funding paths.

Research on Health of Arctic Residents: The Arctic Research Commission supports the implementation of the third focused, interagency program to coordinate and emphasize research on health concerns in the Arctic and to build links to the health research programs of other Arctic nations. It also supports the continuation and expansion of the NIOSH program for reduction of injury and death in Alaska's important industries.

Research on Civil Infrastructure: The Commission recommends continuing support for the US Army Cold Regions Research and Engineering Laboratory and encourages their participation in infrastructure research in Alaska. It also recommends the implementation of the recommendations in the *Report on Climate Change, Permafrost and Impacts on Civil Infrastructure*. In addition, the Commission recommends that the Department of the Interior and the National Geospatial-Intelligence Agency take steps to acquire and make available precise geospatial data for maps of the US Arctic.

Natural Resources: The Arctic Research Commission recommends that Federal agencies immediately commence a comprehensive program of research on oil in ice based on the Commission's Special Report, *Advancing Oil Spill Response in Ice-Covered Waters*. It also recommends that the affected agencies include new research funding in their requests for re-authorization of OPA 90.

Background

The main purposes of the Arctic Research and Policy Act as amended (Public Law 101-609, see Appendix B) are:

- 1) to establish national policy, priorities and goals and to provide 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 establish a US Arctic Research Commission to promote Arctic research and to recommend Arctic research policy
- 3) to designate the National Science Foundation as the lead agency responsible for implementing the Arctic research policy
- 4) 4) to establish the Interagency Arctic Research Policy Committee (IARPC) to develop a national Arctic research policy and a five-year plan to implement that policy.

The Arctic Research and Policy Act of 1984 was amended in November, 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 resource development 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.

The Commission staff consists of an executive director in Arlington, Virginia; the Alaska office director in Anchorage, Alaska; an administrative officer, and a secretary in the Arlington office. The regional office of the Commission is located in Anchorage, Alaska.

The Commission holds business meetings and conducts public hearings in Alaska and elsewhere to receive input, and makes site visits and field trips to research facilities and projects throughout the Arctic. It published an annual report and co-sponsors a publication with the Interagency Arctic Research Policy Committee, the *Journal Arctic Research of the United States*. Major recommendations of the Commission on Arctic research policy, program priorities, and coordination efforts are published in the series *Findings and Recommendations* (Table 1), as well as in letters to appropriate agencies.

Funds for the operation of the Commission are appropriated by the Congress in the National Science Foundation budget and expended by the Commission with administrative support from the General Services Administration. The budget in FY 2004 was \$1,129,633.

Response to Mandate, Fiscal Year 2004

For the effective accomplishment of its mandated duties, the Commission must identify problems, needs, and make recommendations on basic and applied Arctic research. Most of the issues to be addressed emerge from public meetings regularly held in Alaska, Washington, D.C, and from field visits to relevant sites in the Arctic and institutions conducting Arctic research.

Meetings during Fiscal Year 2004:

November 18 - 20, 2003, 70th Meeting, Washington, DC

March 16-18, 2004, 71st Meeting, Washington, DC

June 2-4, 2004, 72nd Meeting, Fairbanks, AK

The minutes of Fiscal Year 2004 Commission meetings are given in Appendix A. Appendix B is a list of other meetings attended by Commission members and staff.

**Appendix A: Minutes of Commission Meetings
Fiscal Year 2004**

**70th Meeting, November 18-20, 2003
National Academy of Sciences
Washington, D.C.**

In attendance:

Commissioners

Mr. George Newton, Chairman
Mrs. Mary Jane Fate
Dr. John Hobbie
Mr. Duane Laible, P.E.

Mr. Jack Roderick
Dr. Susan Sugai
Mr. Mead Treadwell

Staff

Dr. Lawson Brigham,
Alaska Office Director

Ms. Kathy Farrow, staff

Others Present

Dr. Syun Akasofu, International Arctic Research Center (IARC); **Dr. Craig Dorman**, VP Research, University of Alaska (UA); **Ben Ellis**, Institute of the North; **Dr. Karl Erb**, Office of Polar Programs (OPP), National Science Foundation (NSF); **Dr. John Norton Moore**, University of Virginia; **Dr. Walter Parker**, Circumpolar Infrastructures Task Force (CITF); **Drue Pearce**, Department of Interior (DOI); **Mat Paxton**, Senator Stevens's office; **Dr. Robert Smith**, Department of State; **Dr. Robert Wharton**; OPP, NSF; **Bill Woolf**, Senator Murkowski's office.

Tuesday, November 18, 2003

The Commission attended a joint meeting with the Polar Research Board. USARC **Chairman George Newton** remarked that it might be useful to conduct a joint meeting the every two years.

Wednesday, November 19, 2003

Chairman's Report

Newton briefed the staff of the Senate Foreign Relations Committee on August 8, 2004 about Article 76, the Law of the Sea Treaty, and its impact on the Arctic Ocean. On August 12 he met with staff from the National Imagery and Mapping Agency (NIMA), the Maritime Safety Division, and the Arctic Maritime Safety Information (AMSI) database to review their efforts and discuss the location at NIMA of additional submarine bathymetry data that the Navy had agreed to declassify. Approximately \$40,000 is needed to have the data fully released. **Newton** explained that the bathymetric data is a result of using single beam sonar that pings off the ocean bottom and records the depth at specific locations. The ship's location is also noted and those two parameters enable hydrographers to make charts and maps of the bottom of the ocean. The information also helps to define ocean currents and other important information.

Commissioner Jack Roderick asked about whether the US is sharing information with the Russians. **Newton** said that US bathymetric data has been declassified and made available. The Russian bathymetric data still remains classified. He continued to say that he made recommendations to have links established on the NIMA website so that people can go to Applied Physics Laboratory's web site at the University of Washington (APL-UW) and gain the latest information of floating hazards for ships in the Arctic Ocean.

Newton read a report about Georgia's main fishery that included fishermen's complaints about unsatisfactory management. This report contrasts significantly with the positive messages (about the fisheries management council) that the Commission heard in Unalaska/Dutch Harbor demonstrated by the fishermen's willingness to accept the quota system. **Newton** called Bill **Broad**, chief science writer for the New York Times, and described this fact to him in detail in an e-mail hoping that more positive stories would be generated.

Commissioner Duane Laible said that if the Ocean Commission is successful in eliminating the Magnuson Act, then that system is dead. **Newton** said he thinks that the Magnuson Act will be reauthorized this year. He also said that it may take a long time for the story to appear, but he is confident that it will appear in the future. He prompted that John Norton **Moore**, Walter L. Brown Professor of Law; Director, Center for

National Security Law; Director, Center for Oceans Law and Policy at the University of Virginia, would be speaking with the Commission on November 20 about the Law of the Sea.

Newton recommended the Commissioners read the handout *Limiting the Juridical Continental Shelf in the Arctic Ocean, The Confluence of Law, Science, and Politics*. There is a question as to whether the Lomonosov Ridge and the Alpha Mendeleev Ridge are part of the Asian continent as the Russians claim. The US cannot comment until signing the Law of the Sea Treaty. The Commissioners spoke about the ramifications of signing the Law of the Sea Treaty.

Newton explained that the Treaty was originally signed in 1982. Various countries had to go back and have it ratified by their governments. In 1994 there was an international meeting to amend the Law of the Sea Treaty and this is the time it went into effect. The Treaty will be open for amendments this year, 2004. **Lawson Brigham**, USARC Alaska Office Director, added that the Commission should ask Professor Moore about Article 234. This article in the Law of the Sea Treaty allows coastal states of Arctic countries with ice-covered waters to have special regulations for marine environmental protection and marine safety. Canada has now signed the Treaty and was the lead country in promoting Article 234. It will become necessary for all circumpolar countries to standardize the Arctic shipping rules for future access in Arctic waters.

Newton suggested the need for an accurate bathymetric survey done in the southeastern corner of the Beaufort Sea so that both nations can agree on a common database. It may be useful to have representatives from the United States, Canada, Denmark, and Norway aboard a submarine to witness the collection of the bathymetric data. These data can provide the initial basis for an informed negotiation between interested countries. If the US makes a claim for the extension of the shelf, Article 76 recommends the data be submitted with the bathymetric readings from the country's coastline. Also, that submission must show resolution of disputed areas with neighbors' territorial boundaries as a separate issue. A nation can submit a single claim, so the internal boundary negotiations do not have to become part of the submission. It is in the US's best interest to line up together with other countries. However, Canada and Denmark have minor disagreements between Ellesmere Island and Greenland.

Newton said it was interesting to hear the international community's discussions about the conflict of interest that the members of the commission have on the limits of continental shelf. Many people have vested interests in the claims. In Iceland, a Russian delegate stated plainly that the issues really revolve around money and potential fossil fuel resources!

Announcements

The founder of UNISEA, Dick Case, died. Many Alaskans know that he started the Grand Aleutian Hotel.

At Lamont Doherty Earth Observatory's, considerable discussion has recently focused on climate change. Some scientists believe that the Gulf Stream is affecting temperatures. However, a scientist at Lamont believes the air from Alaska along the Rocky Mountains is affecting climate changes. **Commissioner John Hobbie** said that he is concerned that other scientific findings from the paleoclimatic record in the ocean off the coast of Europe show tremendous shifts in the temperature over the last 40,000 years. The polar front was in Iceland (where it is now) and it shifted down to Spain. This is hard fact.

A research chair has been established at Lamont Doherty in the name of Bruce Heezen, a noted marine geologist.

Brigham distributed copies of the *Oil and Gas Assessment letter* from AMAP to the Arctic Council proposing this assessment as well as information about the Arctic Climate Impact Assessment (ACIA) policy document he received during the recent Arctic Council Meeting. He also made available research and development priorities from the Oil and Ice Workshop held November 4 and 5 in Anchorage.

The Shackleton exhibit was held at the Anchorage Museum in February 2004. The exhibit highlighted science and exploration in the Antarctic. The brochure outlined upcoming museum speakers including **Brigham** who will discuss crossing the Arctic Ocean in 1994 during the Arctic Ocean Section Expedition.

The University of Alaska Anchorage (UAA) School of Engineering conducted workshops regarding Shorelines and Marine Transport on January 7 and 8, 2004. **Newton** spoke about the Law of the Sea Treaty and Brigham discussed future Arctic marine transportation

Commissioner Reports

With the President of Iceland on his visit to Washington, D.C., **Commissioner Mead Treadwell** met with Senator Ted Stevens, Senator Tom Harkin, Senator Judd Gregg, and James Billington, Library of Congress. They went to a conference at the Heritage Foundation and **Treadwell** gave a summary of Arctic research and US efforts on global climate change. They met with the House of Representatives, with Congressman Don Young, Congressman James Leach, Senator Hillary Clinton, and Senator Lisa Murkowski.

He attended the meetings of the Sustainable Development Working Group Arctic Council and Senior Arctic Officials (SAO). It was determined that the Senior Arctic Officials will develop all policy. Sally **Brandel**, SAO, said she hopes that the

Commission can assist with Study of Environmental Arctic Change (SEARCH) and other programs. Brandel is happy to have Dave **Garman**, Assistant Secretary, Energy Efficiency & Renewable Energy, US Department of Energy (DOE), as the lead on the International Program for Hydrogen Economy. The White House sponsored a *Global Summit on Environmental Observation* last summer and there is belief that a \$100 million budget available for this program.

Brandel also spoke about the US commitment to the International Polar Year (IPY) and she mentioned potential focus issues as hydrogen economy, SEARCH, Observing Summit and looking at climate change. **Treadwell** believes that it is important for the Commission to identify what capabilities the US needs to continue research on climate change and other SEARCH projects. **Newton** indicated SEARCH has been separated out then asked about the Arctic Observing Network. **Treadwell** thinks that SAOs believe that SEARCH is beyond the scope of the Arctic Council process. It would be good to find ways to strengthen the modern network and cooperation in this area. There is a suggestion that the US can commit to pay for these data gaps.

Treadwell continued to report that the Circumpolar Infrastructure Task Force (CITF) group was trying to schedule a program of experts for some time in the spring. A pressing issue is the resolution that **Commissioner Mary Jane Fate** brought up at the Commission's last meeting regarding mapping. Drue Pearce, Department of Interior (DOI); has been trying to get the elevation models out of NIMA. How can the data be released? A letter was prepared and sent to **Garrett Brass**, USARC Executive Director, with a list of the kind of digital elevation model that is required. **Newton** said that as it has been over a year, he would try to get permission to have the data released. **Treadwell** then asked to attend the Protection of Marine Environments (PAME) meeting in Helsinki in February 2004.

Laible said that he did not have a long report since he only recently assumed his role as a Commissioner. He stands ready to be a member of the USARC's taskforce on future Arctic marine transportation issues.

Commission Susan Sugai explained that the Alaska Sea Grant Program is a congressional program. In the recent past, she became the program's Interim Director. One of the problems with funding is that strategic planning costs more in Alaska than in other states because of its size and increased of transportation costs. Where Federal Sea Grant funds designated for Alaska are \$1.4 million, nationwide the total is \$65 million, leaving Alaska with a fairly small portion of total funding. It would be interesting for **Ron Baird** (then-Sea Grant National Director) to come to a USARC meeting so he could explain the funding. **Newton** said he would like **Sugai** to be on the agenda at the upcoming USARC meeting in March to talk about the Sea Grant program.

Brigham said that the document **Sugai** provided is an example of an excellent publication. The USARC report on permafrost, currently in production under a memorandum of agreement with Cold Regions Research and Engineering Laboratory (CRREL), offers USARC an opportunity to create a similarly attractive document. **Treadwell** asked about the final publication of the Goals and Activities Report. **Newton** said that Kathy Farrow, USARC, is working on it at the Arlington office and he will have to ask **Brass** about the progress on that report. **Brigham** said that the Fiscal Year 2003 USARC *Annual Report* would be similar in format to that of past issues. Its *Report on Goals and Objectives* should be a glossy publication with photos as it is the publication with the most marketability.

Hobbie remarked that he attended a meeting in Denmark regarding Arctic lakes and presented a paper on the results of the ACIA freshwater report. There were thresholds met as the climate changes in the lakes of the far north. For example, the lakes become warm enough to stratify. Then new fauna come in and the zooplankton change. Also, the tree line shifts farther north when the conifers move in. This is known as a result of the large sampling transects in Canada. Conifers create organic matter in the waters and therefore lakes become darker. There is less productivity because light cannot penetrate the water as deeply as it can in other times. There are eight or nine other interesting things that can be documented to demonstrate thresholds that change. **Hobbie** also said he attended the SEARCH meeting held in Seattle and hosted a Scaling Workshop with **Brigham** assisting.

Roderick reported that the Energy bill was passed. The Arctic National Wildlife Refuge (ANWR) was not in it. Research activity seemed to be moving west and there was discussion of building a bridge across the Colville River. BP and Exxon are moving out, but Conoco Phillips is staying. There is a new phase west towards the foothills. **Roderick** believes the fields contain more gas than oil. Right now there are challenges and not very much enthusiasm by the oil companies.

Fate reported that she attended meetings at the Alaska Museum in Fairbanks for its expansion that should be done in 2005. **Sugai** commented that a behind the scenes tour would be very interesting. **Fate** added that the Museum does research, community outreach, and has teaching and instructional services as well. **Brigham** suggested that a reception be held at the Museum when the Russian delegation visits in the summer in Fairbanks.

Fate noted that the Alaska Federation of Natives completed their annual convention. Topics covered at the convention included health and related health problems in the north. **Fate** said there was a feeling by some that global warming may be overplayed. She heard people questioning whether available research dollars were increasing the prominence of the issue, overlooking perhaps the theory that it is likely a natural cycle.

Another concern is that the villages are comparable to third world countries. Suicides rates are climbing. She is unaware of any science research investigating this problem.

Brigham responded that the Arctic Climate Impact Assessment is looking at the extraordinary climate changes in the Arctic during the past 50 to 150 years. **Fate** said she believes the gas line will be developed. **Newton** said he thought the gas line might be 10 years from being a reality.

Alaska's Senatorial Influence

Bill Woolf, Senator Murkowski's office, discussed working on the reauthorization bill for the highway program. The Senate has been working on a bill to target expenditures over the next six years of \$255 billion. Some of the money may come from an excise tax on ethanol fuel, but there is some controversy with this approach. Senator Murkowski was successful in adding a separate research effort regarding permafrost issues to what is being done by the Department of Transportation. An amendment is still on the table to look into cyclical, freeze-thaw changes, and how it affects roads and bridges.

Woolf informed the commission of a meeting planned in St. Petersburg, Russia in June 2004 to deliver a brief talk about Alaska and the Law of the Sea Treaty. Specifically Woolf was asked to speak about the northern boundaries and he interprets that to mean the possibilities for marine transportation and relationships to the Law of the Sea Treaty.

Effects of A Warming World

Dr. Syun Akasofu, Director of the International Arctic Research Center (IARC) in Fairbanks, discussed concerns surrounding global change. Over time, carbon dioxide seems to be increasing. The question is whether this is man-made, natural, or both.

The central reason for doing this work in the Arctic is that all the models suggest that if the 'greenhouse' effect is evident, the Arctic is where the effect will be most prominent. Scientists are developing theories concerning the sharp increase in surface air temperatures. They are also trying to discover the mechanics receding glaciers in Alaska, Canada, and Greenland. Scientists believe that the ice retreat began about 300 years ago. This could be before man-made effects became serious. There are also good permafrost records and permafrost appears to be melting. Scientists have found that snows falling in the warmer winters protect the permafrost.

Akasofu continued to talk about the decrease of water flowing into the Arctic Ocean. He said the North Atlantic Oscillation (NAO) is part of the reason this is happening. The NAO also affect winds that cause ice to melt. However, the ice shrinking caused by winds is not necessarily an indicator of greenhouse warming. A team of scientists is working with a Russian icebreaker where the North Atlantic seawater meets the ocean. This seawater does not mix well with the Arctic Ocean water and it is flowing into the Arctic Ocean about 300 meters deeper. The effects are not yet known.

To help in the study of these issues, **Akasofu** said they have access to a super computer but that the modeling is being worked out. **Brigham** said he understands that Dr. John Walsh is working on a range or set of Arctic models. **Akasofu** explained that the US Arctic Research Commission was very helpful from the very beginning of IARC and he really appreciates the support. He said there are 20 professionals on staff and only five are paid through National Science Foundation funds. There are scientists from many nations including Korea and China.

Treadwell asked about the Real Time Satellite Data Program and who are the main users. **Akasofu** said most of the funds supporting this project come from Japan.

Other Issues

Brigham spoke about attending the Scaling Workshop at the end of the SEARCH meeting. He provided an overview of sea ice changes and increasing access in the Arctic Ocean. Within the Arctic Climate Impact Assessment (ACIA) some attempt is made to use the available models and calculate future navigation seasons for the Northern Sea Route. The Northwest Passage is much more difficult to study since the models cannot resolve geography.

Dr. Craig Dorman, VP Research, University of Alaska (UA) asked what about not using the Barents Sea and taking the oil out of Laptev Sea and eastward. **Newton** answered that in order to extend the shoulder of time to travel, that ships would need substantially ice strengthened hulls and the question is whether the cost to research and build these ships will realize financial benefits for the longer seasons the ships could navigate. **Dorman** asked if the models accounted for natural variability and **Newton** responded that the ships would need to be designed stronger than the current models indicate because of natural variability. **Hobbie** said that some studies might not be completely unbiased since the models themselves can be biased.

UNCLOS' Formulas

Dr. Robert Smith, Department of State, gave a presentation about maritime boundaries and the Law of the Sea Treaty. In the early 1980s, the US claimed Extended Fisheries Zone, declared in 1977, and made it into an Exclusive Economic Zone with a proclamation in 1983 by President Reagan. He defines boundaries as something done with neighbors and limits as something done unilaterally. Both are issues in the Arctic. At about the same time, the Law of the Sea Convention concluded and most countries had signed on except the United States, Canada, and others. At this time the US had concerns with Part XI that discusses Deep Seabed Mining, a section of the Law of the Sea Treaty that has been changed by new negotiations. Since the US has not signed the Law of the Sea Treaty it is outside of the proceedings pertaining to it in international law.

However, the 1983 proclamation by President Reagan, in addition to claiming an EEZ for the US declared an announcement for the US to view the Law of the Sea Convention as reflecting customary international law. Therefore, the US has been acting accordingly that a good part of the Law of the Sea Convention remains the same as the 1958 Geneva Conventions with some new additions. Most importantly is that the Article 76 Continental Shelf definition changed from what it was in 1958. Under Article -76 there is a quasi-scientific approach as how to define the continental shelf. There are terms that were created in the 1958 convention and it may be important to maintain those terms, like continental shelf. So the term continental shelf as presented in the Law of the Sea Convention is a legal term. People have tried to give scientific aspects to the term such as sediment thickness and 2500 isobath. It is a combination of legal and scientific languages. Ever since the 1980s, the US has acted in accordance with the Law of the Sea Convention even though the US is not a party to it.

John Norton Moore, who spoke later at this meeting, had recently been a negotiator for the US in the 1970s. Last month he gave testimony to the Senate Foreign Relations Committee. Unless something dramatic happens, he predicted. The US will probably sign the Law of the Sea Treaty by mid-summer 2004.

Because of the key aspects to the Law of the Sea Convention, there are several international institutions that have been created including the Commission on Limits to the Continental Shelf (CLCS). Once a state becomes party to the convention a claim to an extension of the continental shelf beyond 200 nautical miles from the baseline must be submitted to the CLCS within ten years. This claim must meet the extensive requirements Article 76. The CLCS will not submit a claim for anyone, nor will it dictate the extent of the shelf limit. That is up to the coastal state. There is a significant continental shelf off of the coast of Alaska in the Arctic well beyond the 200 mile limit. When the US determines the outer limit of the shelf, not only for Alaska but also for the whole nation with supporting scientific documents, the CLCS will determine whether it meets the requirements of the CLCS and of Article 76.

Last year Russia was the first coastal state to put forth a continental shelf claim to the Commission. The CLCS has published the outer limits but not the supporting scientific evidence that led to the claim. Japan has submitted an objection to Russia's claim and Canada and Denmark have also put forward objections. The CLCS is moving slowly as it works to gain credibility in the international community and has asked Russia to present more facts, figures, and background to support its claim.

Dorman asked if a claim has to be finalized and approved by the end of the 10 years. Smith said that once the Commission asks for more information, the clock is stopped. 10 years is not a lot of time when you consider the budget cycle and the fact that it takes four or five years to plan for the availability of a submarine with the correct instrumentation to gather the scientific data. This past September the USCGC HEALY

was used for 10 days to gather such data. Larry Mayer, University of New Hampshire, received a grant last year for a broad-based analysis of what data exists for the US, including the Arctic. Much of the information including a new seamount they discovered is on their web site.

Roderick asked if some of the information would be confidential. Smith said he would personally like to see unclassified data released to support any and all claims. A potential problem is not the Navy data but commercial and proprietary information. The Department of Interior's Mineral Management Program grants permits to companies on the basis that DOI receives the data. All of the data is locked away, and therefore, part of the information may be classified. Smith said that most of the submissions that have been made end in 2009. If the US becomes party to the Law of the Sea Treaty, the clock will end in 2014. As of yet the clock has not started. Many countries do not have the issues of ice to deal with and a few countries do not have the money to invest in the survey work. From a personal standpoint Smith said he was concerned that only five or so UN Commissioners really understand the work to be done and the other 17 Commissioners do not have such understanding. Some countries do not have a history of doing offshore work. The US will need to have a submission based on indisputable science. He suspects that Australia's position will be a superior submission. There may be some disputes over ridges and some Antarctic issues. In the Arctic, Iceland is going to pose a problem with an island being formed due to tectonic forces that is part of the Mid-Atlantic Ridge.

During the 1980s the US negotiated a maritime boundary with the Soviet Union based on the 1867 Convention when purchasing Alaska. The boundary agreement is not enforced but is being provisionally applied. Smith referred to a packet he gave the US Arctic Research Commissioners that showed areas of dispute with Canada in 1977 when each country claimed different lines for fishery jurisdiction and later again with EEZ claims. This stems from historic interpretation issues between Canada and the US for the 1820s and later in 1867 between Russia and Britain. Oil and gas is another issue. In Prudhoe Bay there have been two lease sales by the US that are being held in escrow pending a solution of the boundary dispute between Canada and the US **Brigham** asked Smith to go over the position of the US as compared to Canada's or Russia's position.

Smith said that in general the US has the philosophy that navigational freedom is better for all countries. It is better for the US to be able to go from point A to point B without legal battles. Specifically, Canada is claiming a whole set of Arctic Islands within the system's straight baseline. The US believes the Northwest Passage is a set of international straits. Similarly, the former Soviet Union claims straight baseline through parts of those islands that effectively made a deeper passage impossible without going through waters claimed by the Soviet Union. The US has protested this claim. **Treadwell** asked if there was a resolution. Smith answered that at this time these issues are manageable. Over the past 2 ½ decades Canada and the US have met to talk about

fishery jurisdictions but rarely spoke about boundary issues. **Treadwell** said he perceives a lot of the concern as to whether ships in the Northwest Passage will follow environmental issues and perhaps Article 234 will relieve these concerns. Smith said that this is possible. Canada is the 144th country to become party to the Law of the Sea Treaty. The US may be next.

It is interesting to note that commercial companies want certainty when they develop oil and gas and do not prefer one country over the other. **Treadwell** said that while he supports ratification of the Law of the Sea Treaty, he is concerned the US will have less access to Russian waters unless that is resolved first. Smith disagreed and said the US will probably have more leverage if they are part of the Law of the Sea Treaty even though the US can submit a dispute as a non-state party now, it would be better to be on the inside.

Dorman asked if the Department of Defense had shifted its position regarding the Law of the Sea Treaty and Smith said that everything was moving forward. **Newton** added that there was one exception regarding military exercises and that this issue could be worked out in the coming year.

IPY Focus

Dr. Karl Erb, National Science Foundation (NSF), introduced Dr. Robert Wharton, Executive officer of Polar Programs. Erb continued to speak about the SEARCH Science meeting held in Seattle October 2003. About 400 scientists from all over the world attended this meeting and he said the US is in a leadership role in focusing attention on the Arctic. Also, IPY was discussed with a number of organizations including IASC and SCAR, to have 2008 as the 50th anniversary. Events will start in IPY 2007. There is some time for planning, but not very much time. The US SEARCH is planning a major activity in 2007 because NOAA and NASA are both committed. NSF will also join in on some plans for the IPY. The SEARCH framework can accommodate a very broad range of scientific endeavors but all focused on understanding environmental aspects of climate change. He believes there is large support to have the Secretariat at the University of Alaska and also believes that the Secretariat was the driving force that moved the ACIA forward.

Newton remarked that the Commission is fully supportive of IPY. It seems, however, that IPY is having difficulty gaining traction. It may be important to separate IPY apart from other concurrent meetings and allow it to have its own identity. It may be important to craft a brainstorming session in Washington to bring out who should be invited. Good ideas need to be sought and they need to be approachable.

Sugai commented as a related issue that 1999 was the Year of the Ocean and the Consortium for Oceanographic Research and Education (CORE) invested some money in the National Ocean Science Bowl in order to create an increased awareness of ocean

issues and marine science to high school students. The money was used to sponsor competitions throughout the country and it increased the awareness of the event. A similar method may be valuable to use for IPY. The students create terrific presentations that amaze scientists and involve interests important to the students' communities. Erb said that Bob Wharton is looking at education activities for all grade levels. He suggested that there be some regular interaction because it is important to have students interacting with scientists and it is important to see them enthusiastic about science. **Sugai** said it is also important to work with the teachers because teaching philosophies work differently in rural and urban settings. Dr. Erb ended his presentation by saying he believed that as SEARCH is developed, it would become one of the centerpieces of IPY.

Thursday, November 20, 2003

Alaska Issues

Dorman spoke about the Arctic Climate Impact Assessment as being in the draft stage under review. He said there are three documents to come out of ACIA:

- 1) a science document
- 2) an overview with document
- 3) a policy document.

The policy document was to parallel the scientific document. All eight nations and all six permanent participants were available to create the first draft in Copenhagen. The participants believed the first draft was not a balanced report in three major areas and the second draft is much more straightforward.

Brandel and Dorman met with Admiral Lautenbacher, Administrator of the National Oceanographic and Atmospheric Administration (NOAA). This huge organization with 600 people in 42 locations needs one individual assigned as a regional coordinator or director. If there is an issue involving two groups, at present, the only recourse is to go to Lautenbacher or his deputy. A regional coordinator would simplify contacts. Dorman also said that while this regional assessment is being formulated it might be beneficial to use the Arctic and Alaska as a test base in order to establish a standardized set of observations.

On another topic, the proposal for IARC has to be rewritten with the concern largely regarding management as opposed to the science of the proposal. John Walsh is the chief scientist and there is a process now of forming an external review group to advise both NSF and the University of Alaska. Dorman said the proposal is for three years instead of five. He continued to say there are two sides: a US side sponsored by NSF and a Japanese side sponsored by Frontier. Each is a separate entity. Both sides pay for a certain amount of faculty and staff. There are bridge funds that will last through October and then the 3-years will be covered with \$5 million per year not including the Japanese funding.

Dorman explained as the UA Vice-President for Research he reports to UA President Hamilton. All of the institutions as well as academic and instruction are run by the chancellors at the individual major academic units and the major administrative units. Paul Reichardt is responsible for the international science side. It is important to speak to the chief scientists such as John Walsh regarding specifics about the projects. The key program in IARC is the Camp program. Walsh will give a presentation to the Commission in June. In the meantime there is a major leadership change at the universities for new chancellors. There are many qualified persons for positions to keep the system stable. It is important to find a chancellor in Fairbanks who is interested in research. Overall, it is important to have someone on all campuses that can work in conjunction with each other. President Hamilton has worked hard on this issue.

Laible asked about the industry component of research. Dorman said it was a challenge in the State of Alaska where research and development is funded by industry at less than 7 percent compared to 70 percent funding by industry nationwide in most states. Alaska does not have the industry that other states have. However, Dorman continued to say that the University has some Department of Defense funds to work on the Defense, Manufacturing, and Electronics Agency (DMEA) whose responsibility is to insure that DOD can fix legacy electronic systems and acquire new technology in order to work on a program designed to build a multi-sensor for the Army. The university is entering into nanosensor technology and micro electronic programs. North Dakota University has 400 people working in a factory and they are in close communication with UA. In Anchorage, Tom Case, Dean of the College of Business and Public Policy, is working on establishing a Logistics Center, Global Supply Chain. As a result there is logistics capacity coming from Anchorage and technical development coming from Fairbanks that may grow into something because of the good management teams.

Brigham asked about the Environment and Natural Resources Institute (ENRI) at UAA. Dorman said ENRI was currently looking for a director and he believes the institute will continue to do well.

Dorman said that he chairs a Governance Committee for the Alaska Ocean Observing System (AOOS) and Molly McCammon is the Executive Director. The partners are National Marine Fisheries Service (NMFS), Pacific Marine Environmental Laboratory (PMEL), UA, Prince William Sound Science Center, Exxon Valdez Oil Spill Trustee Council, Alaska Sea Life Center, the Barrow group, and USARC is invited to become a member. A member must contribute to the operational expenses. One last point is that on March 8 and 9, Monday and Tuesday is a meeting for ACIA in Seward at the Sea Life Center.

Treadwell made a motion that the Arctic Research Commission be authorized to join the Alaska Ocean Observing System to the spending level at \$5,000 and other staff and

Commissioner support as required. **Fate** seconded the motion and the motion passed by unanimous consent. **Newton** commended Dorman for all the good work. **Treadwell** said he would like to see a paper that shows contributions of Arctic programs by agency. **Treadwell** also thought it would be beneficial to invite the Japanese polar commission that parallels the USARC and share information. **Newton** said that idea was appropriate in light of the increased role of Japan in the Arctic. It is as valuable as meeting with the Russians.

DOI Funding

Drue Pearce, Department of Interior (DOI), said that US Geological Survey (USGS) Alaska received an increase in the budget of 1.5 million for additional instruments for work on volcanoes in the Aleutian Islands. This is important because of defense systems location on the Aleutian Island chain. 1.5 million dollars was added for the final year of the Minerals at Risk program. Mapping funding was maintained at \$1 million and is extremely important for the ability to insure timely mapping for lease sales, exploration, and seismic activity. Bureau of Land Management (BLM) received a major add-on for North Slope activities. \$9 million came from Senator Stevens to speedup surveying state lands and Alaska Native Settlement Claims Act lands. The new project date is 2009. Land remains closed until the process is completed. The Denali Commission has helped with surveys and surveys represent a large cost factor.

USGS also received \$250,000 for science on the North Slope for research and monitoring. There is a resource evaluation meeting called the North Slope Management Oversight Board and includes entities such as BLM, MMS, Fish and Wildlife, DNR, Fish and Game, the State, and the North Slope Borough to work with DOI on planning the science initiatives.

Hobbie said that one of the long-term interests of the Commission has been the lack of knowledge in the government science community about what the academic community was doing. It is also true that the academic community is not aware of work being done by government scientists. Pearce said they are reaching out to the different communities to communicate with each other, but it seems that they need to be paid to talk to each other. **Brigham** said that there are excellent DOI programs that relate to SEARCH and when the department comes to the table at IARPC, perhaps DOI can identify programs that are SEARCH related. Pearce said there are millions of dollars that fit with SEARCH and it is challenging to pull all of the pieces together. People do not understand the large size of the State of Alaska. Pearce continued to speak about interest in putting money in the budget to work on access and right of ways for utilities for the future. This is a great opportunity for DOI to identify corridors. One more item is that the Fish and Wildlife Service is marking their 100th anniversary of the refuge system. They just completed a multi-year effort to digitize land status and boundaries of refuges across the country. It is now important for the Forest Service, State Park Service, BLM, and the ANCSA to digitize their lands. This feeds into several mapping questions. It is important that all

use the same methodology in order to have a comprehensive picture of Alaska that will match data sources.

UNCLOS and the World's Continental Shelves

Dr. John Norton Moore, University of Virginia; said that one important item was the fact the US was moving forward on the Law of the Sea Treaty Convention. The US won some important items in the Law of the Sea Treaty negotiations; one regarded security for the US and US naval mobility to bring oil and gas in to the US and to have commercial shipping freedom around the world. The US was also able to extend the coastal state fishery jurisdiction out to 200 nautical miles and to obtain the resources of the continental margins for use by coastal nations.

It is important for the US to have a commissioner on the International Commission on the Limits of the Continental Shelf. It is set in Article 76 of the convention and that negotiation is over. But pursuant to the framework in that negotiation, every state in the world that is a coastal state will be giving its definition of the outer limit of its continental shelf to that U.N. Commission. The U.N. Commission reviews it and can accept or reject what is submitted. The country can re-submit and submissions could volley for quite a while. It is important that submissions and claims by other states are not something that will be prejudicial to the submission of the US. The first presentation made to the U.N. Commission came from Russia and it involved a substantial claim in the Arctic Ocean. This submission is available to members of the U.N. Commission only.

After the US adheres to the Law of the Sea Convention there is a 10-year period to submit what the US claims as the outer continental shelf. Moore brought handouts called *Understanding Article 76 in the 1982 Convention*. The continental margin is the area where gas and oil can be found. Moore said that hydrates might be the most important resources in all of the oceans to be developed. Manganese nodules are a feature of the abyssal plane and areas beyond the shelf's slope and rise. This may be handled by the international authority. Hopefully the US will be engaged in one or more joint ventures with the international authority in that area. However, now the critical resources of the continental margin are totally under coastal state control just as the fisheries are under coastal state control.

There is no change from the 1958 Continental Shelf Convention in the fact that fisheries and living resource jurisdiction is up to the coastal state. There is complete coastal state sovereignty over the living resources of the continental shelf. Moore then spoke about the legal continental shelf that is actually the geological shelf slope and rise, the submerged portion of the continental plate, and the sedimentary deposits on them. This is a huge geological feature. Somewhere under the slope and rise is the sort of interface between the oceanic plate and the lighter continental plate. The question is how to decide what the coastal state has. One scenario is to look at the area where the continental shelf slope and rise, the legal continental shelf, is located. In many cases this

is less than 200 nautical miles. For another scenario Moore showed a chart with the 200 nautical mile exclusive economic zone marked on it. The geological continental margin is different from the legal continental shelf. The legal continental shelf is simply another name for the area that is under national jurisdiction in relation to resources. This started in the 1958 Shelf Convention in the Truman Proclamation right after World War II when the US was considering resources on the continental shelf.

There are three systems for determining the extent of the continental shelf beyond the 200 nautical mile limit. The first requires the determination of the base of the continental slope. The boundary is then placed 60 nautical miles seaward of this line. This is known as the Hedberg Formula after Hollis Hedberg who was a petroleum geologist. He looked at all the margins of the world and calculated that most oil and gas was within 60 miles of the base of the slope where the thickest sediments lay.

Ireland submitted a proposal for an even broader margin and developed the Irish Formula. The Irish Formula starts at the baseline and proceeds to a point where the thickness of the sediments is less than one percent of the distance from the baseline. It is a relationship between the distance seaward and the thickness of the sediments and is designed to pick up most of the potential oil and gas in sediments.

The third formula draws the limit 100 nautical miles seaward from the 2500 meter isobath on the continental slope. The isobath is a depth contour.

The absolute limitation is 350 nautical miles from the baseline.

In addition and of particular relevance to the Arctic, the US negotiated the last limiting factor. Submarine ridges may not be included in the claim if they ridges are not submarine elevations that are natural components of the continental margins such as plateau, rises, caps, banks, and spurs. This was negotiated in part because the US believes some oceanic ridges (i.e., the Gakkel Ridge in the Arctic) are not continental in origin.

Moore showed charts with shaded areas where certain states will be able to claim beyond 200 nautical miles. These did not consider the area within the 200-mile Economic Zone. These charts described those areas that are beyond 200 miles which might be claimed. The last chart in color described the potential for a US claim. There is a large area in the Bering Sea, the Arctic Ocean and a substantial area off of the East Coast of the US This work was compiled by Dr. Larry Mayer at the University of New Hampshire from publicly available resources. This chart showed the area of a potential US claim beyond 200 nautical miles in the Arctic Ocean.

At this time it is very important for the US to officially seek the careful kinds of analysis of sedimentary depth deposits and other scientific information needed to determine the

outer limits of the US continental margin for submission to the UN Commission. It is also important to know what is available to be leased. Industry has been held at bay because the US has not signed the convention.

Moore said he had the privilege to be the ambassador to the Law of the Sea negotiation in the 1970s. It was clear that the US was a leader in the oceans and now it appears other nations are ahead. Russia has already submitted to the Commission. Australia and Brazil will submit shortly. New Zealand has an excellent presentation on their continental shelf project that shows able mapping about the coordinates of their shelf. Countries are realizing the enormous importance of the resources in these areas.

Newton said he attended a meeting in Iceland sponsored by the college of Ocean Law and Policies that had significant international impact. The main issues of concern are resources and money.

Fate made a motion for a resolution from the Commission to formally go on record in support of the US accession to the Law of the Sea Treaty. **Newton** said that he would direct the Executive Director of USARC to draft this resolution and circulate it via e-mail to the Commissioners.

Newton asked Moore if he had seen the article by Ron Macnab published by the Canadian Polar Commission regarding the discrepancies revealed in the Russian submission. Moore had not seen this article and so **Newton** requested a copy. Also, **Newton** said that Brass had gone to a meeting in New York in 2001 where the Russians gave a preview of their submission and he was surprised by the lack of supporting data. The lack of data detracted from the credibility of their submission, but the Russians did not have available funds for research. **Newton** said that good data is essential to making a valid and acceptable submission.

Brigham asked Moore about the future of Arctic marine transportation and the relationship to Article 234. As Arctic sea ice retreats, there is renewed interest in the impacts of Article 234.

Moore said that he was personally involved with the negotiation with Article 234. The starting point is that the US has a strong interest in maintaining navigational freedom not only for the Navy but also for commercial interests.

One of the challenges is that states bordering the straits may want to assert control over the straits. For instance, Spain has an interest in Gibraltar and Canada has an interest in the Northwest Passage. Another problem threatening navigational freedom is the effort of coastal states to totally control standards for shipping in relation to the environment within the 200-mile Exclusive Economic Zone. Potentially that means there can be 120 standards because there are 120 coastal states. If the states can set the standards then

they will be potentially able to modify the standards. Therefore the US insisted that the standard setting for ship construction and operations be done through the International Maritime Organization (IMO).

Canada took exception to the US experimental voyage of the *SS Manhattan* and potentially shipping oil through the Northwest Passage. Canada unilaterally passed a 100 mile environmental area that asserted control over ship construction and operation in that strait. The US said that was illegal and did not accept it. Canada withdrew their jurisdiction. Moore discovered later that most coastal states have to travel through the Exclusive Economic Zones of other coastal states and it would be counterintuitive to restrict shipping through these areas. As for Canada's claim, the US worked on Article 234 to say there will be some special permission of the coastal state to protect the environment in ice-covered areas. Basically, the US won complete and full navigational freedom for all the strait's transit passage in the strait channel. In ice-covered areas the coastal state is going to have limited ability to set ship construction and operation standards. That also means that the US has rights within the 200-mile zone in that area. However, US warships would not be governed by this set of ship construction and operation standards. Canada is still trying to gain control over areas that it cannot claim.

Newton asked if Moore felt that Canada's position would change if they submitted to the Law of the Sea Convention and Moore said he doubted that. **Newton** then commented that the Canadian government invited the US to conduct surveys in the Canadian Exclusive Economic Zone in the Arctic using submarines. **Newton** is assisting with leading discussion with the US Navy and two federal departments in Canada. Moore said that the US and Canada have a huge range of common interests including the Arctic.

Transporting Goods in the Arctic

Walter Parker, Circumpolar Infrastructure Task Force, said there would be a greater need for air transportation between oil and gas centers in Canada, Russia, and the US. Parker continued to say that Russia is building a pipeline similar to the one in Valdez, Alaska. With the enhanced oil recovery methods and new Western partners they expect to expand production dramatically.

Two pipelines have been proposed out of Central Siberia; one to China and the other one along the Trans Siberia Railroad down through Manchuria and over to Korea (sub-sea section). In Sakhalin the western partners have different transportation and delivery systems. Exxon at the north has a short pipeline and then to an ice-impacted port. Shell is building a 430-mile pipeline that will pass through the island down to an ice-free port on the south end. BP is talking about offshore loading but will probably do something more as it can be further offshore. Right now they are all operating in fairly shallow waters.

Also, Parker met with postal officials regarding rerouting the mail. At this time all mail between the US and Russia is routed through New York and Moscow and then distributed. It seems that there should be some other western points where mail destined for the Russian Far East could be routed. Parker is the co-chair of the Information Technology and Telecommunications committee presented this content at a recent at a Russian-American Pacific Partnership meeting. The economics will soon support this badly needed service as industry builds.

Parker said he had briefed the Arctic Council about Capstone and how much it offers for small-scale aviation to small communities. He explained that Capstone is a virtual presentation in the cockpit that brings the data stream from GPS. Another information stream from the low earth orbit satellite at present that gives you weather, terrain data, and shows a map for the pilot. **Treadwell** said that Capstone is a major Federal Aviation Administration research project in Alaska with a primary purpose to develop and integrate technologies to make the cockpit smarter. FAA placed the research in the Arctic because safety in the Arctic is such an issue. There are two demonstration project areas, one area that is flat and one area that is in a mountainous area. Capstone is working really well in both areas.

Parker continued to speak about the Northern Sea Route and the fact that the shorter routes through the north could save a lot of money providing there is not additional expense for breaking through ice.

As far as telecommunications goes, a workshop was in held in Anchorage in September collaborating with the University of the Arctic. People came from Russia, Greenland, Norway, Canada, and the US AT&T, GCI, and ACS gave presentations. Also, Charlene Gerry, at FAA, spoke about aviation and their need for better telecommunication.

Russia's Far East has a visionary governor who was able to take phone services in the rural areas from practically zero to providing telephone and television in all small villages. This is the same strategy Alaska took 30 years ago. They have broadband in the eight regional centers and in the capital, Anadyr. Currently they are asking AT&T for support by satellites. Canada invested 120 million in telecom in communities and is also part of a vision for a more connected Arctic. Ted Smith is heading a special consortium at the University of Alaska to continue to find better ways to do this. Alaska has a strong telehealth group and they are meeting in early March in Anchorage. If oil is going to be part of sustainable development, then communications has to be in place and the oil industry can help various areas with this development. Telecommunications in Russia are weak because of deregulation; many telecommunication groups are created and many fall apart. In the north, telecommunications need to be subsidized as the market is simply not large enough. It is the same idea as for aviation in the U.S where rural aviation is paid by postal subsidies and a good part of the telecom bill is paid by subsidies for distant education and telehealth.

Brigham explained that one job by USARC is to draft a research agenda for future Arctic marine transportation. This agenda would be passed to many US federal agencies. Walter Parker will be a member of the Task Force so as to link with what the Arctic Council and CITF are doing.

United States Arctic Research Commission
71st Meeting, March 16-18, 2004
The Ambassador Room, The State Plaza Hotel
Washington, DC

In attendance:

Commissioners

Mr. George Newton, Chairman
Mrs. Mary Jane Fate
Dr. John Hobbie
Mr. Duane Laible, P.E.

Mr. Jack Roderick
Dr. Susan Sugai
Mr. Mead Treadwell

Staff

Dr. Garrett Brass, Executive Director
Kay Brown, Administrative Officer

Dr. Lawson Brigham, Alaska Office Director

Others Present

John Calder, Director Arctic Research Office, National Oceanic and Atmospheric Administration; **Mr. Dave Garman**, Department of Energy (DOE); **Steve Johnson**, Vice President of Communications and Development, The *US Glacier Society*; **Chuck Myers**, Office of Polar Programs, National Science Foundation; **Bill Woolf**, Senator Murkowski's office

Tuesday, March 16, 2004

Commissioner Reports

In addition to meeting with **Craig Dorman**, VP Research, University of Alaska, Fairbanks (UFA), **Chair George Newton** met with the Senate Foreign Relations Committee to clarify key issues about UNCLOS. He reported that the bathymetric data he requested has been declassified and the Navy is committed to declassifying bathymetric data within five years instead of waiting the normal ten years. The data includes information from the first Nautilus cruise in 1957 to 1992 declassified in the data release area of the central Arctic Basin. Additional information is being declassified up to the year 1999.

Newton found the data at the National Geo Spatial-Intelligence Agency (NGA). **Newton** said he is working on obtaining data pertaining to the Bering Sea. He also went to NGA to discuss their role in the Arctic Maritime Safety Information System. There are still a number of deficiencies in the system that makes it difficult for researchers to find out what hazards exist. There may be those in the research community who are not fully aware of the system and as a result, there are a lot more hazards out there than are reported. It is important to bring an awareness of operations in order to protect the Navy ships.

Newton requested data collected within Denmark's EEZ. This bathymetric data effects travel through the Fram Strait, a place that could be utilized by submarines and one of the critical areas in the Arctic. He served as an advisor at the International Conference on Arctic Margins on March 9th in Halifax and talked about oil prospects in their waters. The Canadians gave **Newton** a copy of the briefing and it included people who are interested in oil. Perhaps the Canadian Archipelago will be the next Prudhoe Bay. The Senate Foreign Relations Committee asked **Newton** to send copies of a resolution to Senator Richard Lugar and Senator Bill Frist. **Newton** has been working to explain the importance of the Law of the Sea to opponents.

Newton was invited by the University of Virginia at the Center for Coastal Ocean Policy Law to speak on the same agenda as Bill Woolf at St. Petersburg—the Law of the Sea. The Secretary of Defense office, International Security, called USARC about a meeting with the Secretary of Defense planned with the Danish ambassador. They talked about the EEZ, bathymetric data, and issues related to the Law of the Sea.

Commissioner Duane Laible reported that his firm worked on oil and gas issues. He mentioned that the research vessel from Alaska was inadvertently left out of the budget. **Brass** said the National Science Board (NSB) provides some oversight for the National Science Foundation (NSF) and agreed that it should be in a major research budget. NSF had been asked to send up the list of items for the budget line and prioritize them. In

any case, the original research budget was wiped off. The Commissioners discussed the fact that the first \$50 million for it was planned for next year's budget. **Brass** said the drill ship might be back to the 2006 year's budget.

Commissioner Susan Sugai reported about a Sea Grant Extension scientist stationed in Unalaska, Dutch Harbor who will look at the community and impacts of the Steller Sea lion. Some salary will come from the Alaska Marine Safety Education Association, AMSEA. The scientist will work with high school students, fishermen on occupational safety issues, and will be a contact person from the university. He will act as liaison between the research community and the community there. He will also be a faculty member within the community advisory program. This position was established as a direct result of the Commission's visit to Dutch Harbor.

Commissioner Mary Jane Fate said she worked with Alaska legislators and the Energy Council in Washington, DC. HR-6 Energy Bill passed the House but did not pass the Senate. It came into the Senate as SB-2095. This is an important bill for energy states and the Arctic. **Fate** also said that State of Alaska funds for education will probably not come from general funds, but will come out of the Constitutional Budget Reserve.

Commissioner Mead Treadwell explained that the Constitutional Budget Reserve (CBR) is separate from the Permanent Fund. **Treadwell** said he heard that it would be dangerous to let the CBR go below \$1 billion.

Commissioner John Hobbie said his group submitted a proposal into the Office of Polar Programs for continuation of a privately funded 15-year continued program where the Marine Biological Laboratory brings in 15 or 16 science journalists from across the country and encourages them to experience science projects and laboratory work. This is done so they can address subjects such as DNA or global change from a standpoint of knowledge. The elective courses will probably take place in Alaska. Information about this program is on the website.

Hobbie is submitting a new proposal to support the Landscape Characterization and Restoration (LCR) program. He noted the Arctic Natural Sciences does not have a permanent panel to judge proposals so they rely solely on reviewers. For instance, a panel could have representatives from several fields including a physical oceanographer, climatologist, and biologist making it difficult to achieve a consensus on priorities. They need an advisory group like other programs that have a long-term view. **Brass** said the Commission should speak with **Karl Erb**, National Science Foundation, about the structure. It may have been an effective system in the past and may need to be revised. **Brass** said that besides looking at science, one also needs to look at the outreach. A meeting once a year is not enough.

Hobbie continued to say that another program ongoing is the IARC Teaching Program through John Walsh, at the University of Alaska, paid by an IARC grant. The group will

study environment, climate, and other issues. They will also visit Toolik Lake for a week that will include four days of Antarctic Commission meetings in order to see how Antarctic-related problems are being approached. This session will include some graduate students, post-doctorate candidates, and faculty, and a Geographic Information Systems (GIS) expert from United States Geologic Survey (USGS), Anchorage. Participants will also give a 20-minute talk concerning their specialty.

Hobbie explained that there are five types of tundra systems in the area of Toolik Lake and he is proposing a 20-year long-term study in order to look at the whole landscape, the differences, and the connections. This area has glacial agents that are 10,000 years old, a 60,000 year-old mountain, and 90 miles away is a 300,000-year old surface. **Brass** asked if the oil companies ever contact **Hobbie** directly. **Hobbie** said that the oil companies typically contact Princeton. He is interested in making contact with government scientists. One problem that still remains is the fact that good money is being applied to good research, by an oil company for instance, but there is no requirement to publish it. The information never goes through a review process. **Hobbie** said that some of the best information on streams was gathered as part of the pipeline environmental research. It was published and it is used often. **Fate** said it should be necessary to publish research reports. **Newton** said it would take one line in the contract to make publishing reports mandatory.

Then the Commissioners spoke about the National Polar Research Board budget and direction of research. **Brass** said that it is a good idea to let the agencies use the money where they think it is best directed. He also said about five percent of the money has been assigned for Arctic Research Commission peer review and publishing.

The Commissioners discussed the importance of developing natural gas resources in Alaska. **Commissioner Jack Roderick** gave a brief overview and said that Bristol Bay may be opened after 25 years but that the North Slope is still important as is the National Petroleum Reserve. There are potential resources in Cook Inlet. However, offshore development is an unknown entity. Some issues have to be worked out. There was more discussion about the possible routes of a pipeline.

Brass asked if the pipeline will have a federal guarantee and **Roderick** said that guarantees were not needed. **Treadwell** said Exxon indicated they do not need the guarantee for gas. BP, Arco, and Conoco said they need it. The State of Alaska said they would pay for the pipeline. **Brass** said the Commission might be able to help by getting all interested parties together so the correct needs could be assessed.

Treadwell reported he attended several meetings, one of which included a briefing about the International Polar Year (IPY). The President of Iceland asked if the United Nations could be a part of the IPY production and said it may be useful to have the US Session on the Arctic. In February he met with **Roderick** and Wilson about geothermal

activity in the Arctic. **Treadwell** continued to report that there might be a way to assess the Arctic Research budget. Dorman from the University of Alaska is working to organize a statewide research committee. Lt. Gov Lehman has been asked to be one of the chairs of this committee. This may help in understanding the research priorities in the State of Alaska.

Newton said that he recalls SGR-44 focused on development of long-term economic development plans for the state. **Treadwell** said that Hammond wrote a section in the report that contained an analysis of venture capital and research for development. **Newton** said that the Commission has not been asked to look at the report yet, but it may be beneficial. **Hobbie** said this might be another way to interact with the State. There is a state committee, but rather than be a member on the committee, **Brass** said that the Commission can act as liaison with agencies and the committee.

Treadwell went with Parker, Ellis, and Alaska office director **Lawson Brigham**, Director of the USARC Alaska office, to the Arctic Council meeting. It resulted in a plan that calls for an Antarctic Comprehensive Reassessment. The Circumpolar Infrastructure Task Force (CITF) scheduled a meeting in June in Seattle. Also, a meeting is planned late September in Cambridge, England regarding marine transportation issues. **Treadwell** attended the Arctic Climate Research Assessment (ACIA) meeting in Seward, Alaska. Several of the authors presented their findings at this meeting. Dr. Jim Berner gave a presentation on health and the fact that the climate change may affect the migration of birds into new areas in the Arctic. Diseases may be transmitted, viral influenza for instance, by birds to people.

On another note, Prince William Sound Science Center is recognized by EVOS to receive money for research capabilities. Also, **Treadwell** attended, through the Institute of the North, a meeting with security experts.

There are some issues with the Law of the Sea treaty that may affect how the State of Alaska can conduct research. **Newton** said the US is an island nation and the oceans are such a fundamental element of survival and existence that the US needs to join the other 125 countries that have signed it. The US needs to have a seat at the table in order to act on important issues.

Readying the GLACIER for Arctic Duty

Steve Johnson, The Glacier Society, has been working on the Glacier project for the last six months. GLACIER was originally a naval vessel. It served after 1966 as a Coast Guard vessel. Now the objective is to add navigational equipment, replace its diesel engines, and return it to the polar seas to work in the Arctic. GLACIER will facilitate medical and other research. Johnson spent several days in Anchorage and Barrow to obtain feedback from the people who would be most likely to interact with the vessel. Efforts are normally focused on getting Federal funding from several potential sources.

Besides meeting with the Institute of Circumpolar Health at the University of Alaska Anchorage, Johnson also met with Walter Parker, Elmer Rasmuson, and the fellows from the Institute of the North. There is also a group in Texas that may prove to have funding for this project.

Newton noted the importance of defining health or medical requirements of people who are isolated in Alaska communities such as Nome, Barrow, and Kotzebue where there is a need for services. There are over 200 coastal villages in Alaska. Besides the need of medical delivery in remote areas, **Brass** said that research regarding such issues as the prevalence of diabetes in a community could be facilitated by the medical experts on the GLACIER. **Fate** said suicides have been on the increase in several communities and that could also be researched.

Sources of Energy

Assistant Secretary Dave Garman, Department of Energy (DOE), discussed energy systems: electricity and hydrogen. Both of the energy carriers are clean and available. There is also flexibility of production. Hydrogen and electricity can be produced in large and small scales, in large centralized locations or very small, decentralized locations. The energy can also be produced with near zero emissions. This energy represents a range of renewable and hopefully sustainable systems.

At this point development of nuclear fission fusion is a long-term issue because of its current inefficiency. Developing nations such as India, China, and other countries with large ample fossil fuel resources will probably continue their use. It is in the national interest to find better ways to use fossil fuels to reduce greenhouse gases in the atmosphere.

Solar energy costs about \$2 per kilowatt-hour in 1980 in terms of the power produced at the site. Today that cost is about 20 or 30 cents per kilowatt-hour. The average residential cost of electricity is around 7 cents a kilowatt-hour. One research and development goal is to bring the cost down to around 6 cents a kilowatt-hour.

Electricity generated by wind is important in Alaska. The current cost is 4 to 6 cents a kilowatt-hour. This is at the bus barn and not distributed electricity. One problem is that most of the populated areas and load centers are along the coast and there is not an efficient way to take the wind and generate it to the coast without high rates. At present there is a wind resource offshore that shows great potential because it is closer to the population load centers. New technology needs to be developed. Another item of interest is the need to develop technology to better use lower winds. The larger the wind turbine, the more efficient they will work.

Geothermal is about 5 to 8 cents a kilowatt-hour in Alaska. There are some direct applications such as Chena Hot Springs but the heat is probably not hot enough for

commercial applications. Fish processors in Dutch Harbor have tremendous electricity load needs. However, they are not going to sign a 20-year power purchase because their resource site may change. Geothermal heat resources are related to volcanic activity and may change as well. At this time it is expensive to develop geothermal resources but there is great potential.

Garman remarked that many items can be made with oil and natural gas such as paints, plastics, adhesives, chemicals, and dyes with the biomass feed stock, although this process is more expensive. So when thinking about alternatives for oil that have a very long-term role, chemical feed stock is one possibility. Hydropower produces about seven percent of the nation's electricity. DOE is focused on improving the efficiency of existing turbines and diminishing their environmental impact, making them more fish friendly and reducing their impact downstream.

The United States uses about 100 quadrillion BTUs a day and it is estimated that use will increase to about 144 quadrillion BTUs. President Bush spoke about hydrogen-powered automobiles in his 2004 State of the Union address.

Currently cars use most of the oil for transportation. 99 percent of the transportation sector of the economy is dependent on oil. It is important to diversify this energy sector. Geologists have been asking how long the oil can last. Matt Simmons spoke at the Center for Strategic and International Studies (CSIS) a couple weeks ago and said the performance of the Saudi fields is not known definitively.

Hydrogen cell vehicles are a potential solution to the use of oil for transportation. The strategy is to develop technologies for mass production of affordable hydrogen power fuel cell vehicles and the infrastructure to support them. It does not mean giving up on hydroelectric or diesel energies. It is difficult to store gaseous hydrogen on board the vehicle to give the vehicle the kind of range the consumer expects. Today, hydrogen fuels have been developed that will allow travel up to 150 miles. Other methods of storage are in development.

Hydrogen costs have to be competitive with gasoline prices. This may be able to be demonstrated in 2010. Today the mass-produced type of fuel cells on the market costs about \$300 a kilowatt. Five years ago they were \$2000 a kilowatt and this represents a good price reduction curve on the fuel cell costs. Garman noted that the fuel cell outside the Anchorage Post Office sorting facility at the airport (one megawatt fuel cell) has proven to provide reliable power. The target date for commercialization of hydrogen power is 2015. Industry and government need to work on this vision because development for use of hydrogen will affect cars and the infrastructure for fuel. Industry is committed to the development. The development of hydrogen as an alternative energy will also help to stabilize greenhouse gas concentrations. In the future people

could generate hydrogen from their homes. The US is working on cost-share incentives for development of alternative technologies.

Another issue for development of energy is the design of the cars, the image. What they developed was really clever. It was a fuel cell vehicle, a chassis, a staple, 8 inches thick. In this 8 inch chassis is everything necessary to run the vehicle. One idea is to sell a chassis with the option of changing the body of the car as needed. With the newer development of wire and electric braking, etc., the future cars planners can be much more flexible with design than the current design of traditional automobiles.

Hydrogen safety is being researched and it is not a big problem. If hydrogen breaches it dissipates very quickly in the atmosphere and research is being conducted to make solid-state storage. In any case, there will need to be public education for the transition to a new fuel.

In addition, Solar makes sense in a lot of applications. In an area that does not have access to power, a power company may charge \$25.00 a foot to extend the power line to the land. However, citizens can purchase a 2.5-kilowatt tracking solar array on a pallet with battery storage and a 7-kilowatt generator for backup. For some remote areas solar makes a lot of sense.

The Commissioners discussed Kyoto and Garman said that it makes sense to develop technology that does not contribute to carbon emissions. In that way the US will be in a better position in years to come. He said they are amenable to the Arctic Council participation in the IPG and a report will probably result that talks about impacts of climate change on ecosystems. Garman is chair of the IPG steering committee and works very closely with Iceland. He said that Brandel said the US will be committed to continuing the global monitoring process, to keep International Arctic Science Committee (IASC) from internationalizing Study of Environmental Arctic Change (SEARCH), and to keep researching hydrogen.

The Arctic Research Budget

Chuck Myers, Office of Polar Programs (OPP), updated Commissioners about the US Arctic Research Plan. Legislation states that the plan is to be submitted through the President to the Congress, not directly to Congress. The plan was sent to the White House in July 2003. It was written for a lay audience rather than a scientific audience. The Office of Science and Technology Policy (OSTP) suggested the plan have a number of scientific references that were basically editorial changes. It is back at the White House clearance process awaiting approval.

The plan contains five Commission concerns as its priorities:

- study of environmental change
- Bering Sea

- Arctic health
- civil infrastructure
- resource assessment.

Newton explained that the role of the Commission is to prepare a draft of the goals and objectives for Arctic Research. This report is submitted to Interagency Arctic Research Policy Committee (IARPC) and becomes the start for the biennial revision mandated by the Arctic Research Policy Act. **Brass** said the next report is due in nine months. Then the Office of Management and Budget (OMB) will decide on the budget.

Myers said the President reviews the actual budget in February. In general there has been no dramatic change in the Arctic Research budgets across the agencies. However, Myers also noted that it would be difficult to get a crosscut of the Arctic budgets throughout the agencies. In the meantime, his office can have an impact on the process in a timely manner. He has asked OMB to include some of the goals and objectives in the pass-back. It has been one of Myers priorities to hire a person to work part-time in the USARC office that can follow the budget and track the funds so his office knows where the money is at each level of the process. The only Arctic program to be tracked is the OPP's NSF section. The other numbers on the list are from 12 agencies. For example the Park Service has a research budget. Some of that money is for research on wildlife in the parks or park management. OPP has to go directly to the various managers and ask how much of the budget is Arctic related. Not everything in Alaska is considered Arctic so that has to be defined as well.

Brass noted that the OPP publishes the Arctic research numbers of the agencies every year but it is after the fact. Myers publishes the numbers in a spring issue of the *Arctic Research in the United States* and that gives the community an idea of where the money is being spent. It is easier to find budgets on Arctic projects through National Science Foundation (NSF) because one can research any particular discipline, any field, and find the projects. The NSF Arctic Program is only about two-thirds of what NSF spends in the Arctic. One of the jobs that Myers does is ask, for instance, what fraction of NASA's satellite imagery studies are Arctic?

Newton asked when the next IARPC Senior's meeting is being scheduled and offered to chair the meeting.. Myers said that one was scheduled before Rita Colwell left it was postponed.

Myers stressed the importance of understanding the budget in three stages of the process:

- 1.) the budget the President proposes
- 2.) how Congress appropriates it
- 3.) how the agency spends the money.

In this way the numbers can be reviewed at each stage and the numbers can be tied back to the policy goals developed by the USARC and IARPC. This would add to the ability to manage the results because there never was a crosscutting policy group before. This seems to be a transparent process. The USARC can look at their priorities and see it helps their process. Again, all OPP has for the agencies' budgets are after-the-fact, because Myers's office has to collect information from the agencies based on what was spent.

Newton recommended that a staff person from OMB attend a USARC meeting to help the Commission understand possible crosscuts. **Newton** said it is important to know what funds are being spent in the Arctic so he or she can understand what may be needed. **Brass** said the agency publishes the President's request every Spring and the agencies report in the Fall what their appropriations actually were, so those numbers are available every year.

Myers agrees with the concept but still needs to figure out how to obtain the correct numbers. It is important to note that the agencies are listening to recommendations made by USARC and looking at the research needs of the Arctic. He suggested meeting with USARC again to talk about this issue and perhaps have it planned at a future Commission meeting to look at the budget timeline and status of Arctic research funds.

Wednesday, March 17, 2004

Alaska Sea Grant Program

Sugai spoke about the Alaska Sea Grant Program. The school was founded in 1986. A portion of the funds is dedicated to research and a portion is for education that is tied to research. In general, Sea Grant programs need to provide an assurance that the federal dollars are being cost effectively. All federal funds received through omnibus Sea Grant awards must be matched by no less than 50 percent of non-federal dollars.

Approximately 50 percent of overall core funds should be directed toward peer-reviewed research projects. Also, federal dollars spent to administer the program should generally be less than 10 percent of the total core funds.

Some of the National Sea Grant (NSG) strategic issues are to provide economic leadership for marine biotechnology, fisheries, aquaculture, seafood safety, and coastal economic development. One way to address economic leadership is to make Alaska fishery resources sustainable and competitive. It is important to increase the value of the seafood industry by enhancing quality, safety, and encouraging development of new products.

NSG strategic issues include enhancing coastal ecosystem health and public safety related to water quality, coastal habitat, and coastal hazards. An important aspect of the

coastal ecosystem health and public safety is to prepare for and respond to natural coastal hazards and climate change in coastal communities. Another strategic issue is in creating a highly trained work force, and scientifically and environmentally informed citizenry through efforts in education and human resources.

There are two forums in the education program. First there is the educational program of Masters and PhD level students. Then there is the level of addressing K through 12 and the citizens of Alaska who, as a group, have an impact on management decisions with regard to the State's natural resources.

Most of the Sea Grant Programs in Alaska have two or three extension agents associated with that program. In representing the entire Alaska coastline there are about twelve extension agents who are full-fledged faculty in the School of Fisheries and Ocean Sciences.

Sugai stated that her base research budget is \$750,000. She showed a chart of how the programs funds are divided. Out of the \$57 million, 83 percent is core and 17 percent is for the national strategic investments. The USARC Commissioners discussed the Sea Grant budget in Alaska with **Sugai**. She said that in developing their strategic plan they look at items to cut that are competitively funded. She looks at the important roles that can be played in that scenario. Proposals are submitted to **Sugai's** office, reviewed, and receive funding on merit. In her view the state programs should reflect national issues.

There are real problems with the location of the fisheries. Rather than putting a Washington state idea in Nelson Island, **Sugai's** team is working with the communities to resolve problems. **Brass** asked if there are a number of entities working on similar problems, should the program be spending money on improving quality when that is being done in the fisheries laboratory in Kodiak. **Sugai** said no. The people on staff at NITC are University of Alaska Fairbanks employees funded by grants.

Toolik Lake's Ecosystem

Hobbie addressed the scaling project the Arctic site at Toolik Lake along the Pipeline Road. Among the measurements being taken were photosynthesis, hydrogen, carbon, and others. The model is one meter square. Remote sensing of the site can be accessed via satellite. Some similar data should be a part of SEARCH, therefore one of the reasons for these data collections.

The carbon study at the site is one of the most coherent carbon studies done through the Arctic program. Calculations of carbon dioxide transferred into the vegetation or out are taken. At the beginning of the year these leaves shoot up because there are tremendous amounts of available carbon, and then the nitrogen is pulled up through the roots.

Important climate factors affecting the ecology of Toolik Lake's ecosystems include the

- 1) low temperatures in the air and soil that affect the metabolism of all the biota but especially cause a reduction in the microbial decomposition of plants
- 2) 8-month snow cover that allows only a very short growing season for plants
- 3) reduced amount of light energy for photosynthesis because plant growth does not begin until after half of the annual radiant energy input has occurred
- 4) completely frozen streams from mid-September until mid-May that reduce the fish diversity to one species
- 5) long duration of the ice cover of lakes (from the end of September until mid-to-late June) that reduces the light available for photosynthesis.

One consequence of the climate at Toolik Lake is the lack of significant trees in the vegetation. The fundamental ecology at the Arctic Long Term Ecological Research (LTER) site is set by the long-term climate that determines such things as the makeup of the plant communities, the length of the growing season in tundra, streams, and lakes, and the hydrologic cycle.

But important clues about ecosystem function and controls also arise from observations of the ecosystem response to short- and long-term climate changes. In the Arctic, there are many aspects of short-term climate variability, including year-to-year snow cover duration, the variation in lake temperatures from year to year, the effects of air and soil temperature changes from year to year, the ecosystem changes caused by stream flow and stream temperature differences from one summer to another, and the changes within a lake related to irregular stream flows caused by rain events. Of the possible long-term changes in climate, an increase in air and permafrost temperatures is the only one detected thus far.

Analyzing Climate Observations

John Calder, Director Arctic Research Office, National Oceanic and Atmospheric Administration (NOAA), discussed the program's focus on climate observations and analysis. The name of the program he is working on is Arctic Climate Observing System that represents long-term stable activities that should span decades. Through this program new deployment buoys have been released in the Russian sector of the Arctic.

The Arctic Council, one of the sponsors of the Arctic Climate Impact Assessment, ACIA, is preparing to focus on assessing oil and gas activities in the Arctic. This will be another circum-Arctic assessment of all aspects of oil and gas activities including exploration, production, transportation, environmental impact, socio-economic, ethics, and policy. The US and Norway have agreed to be the lead countries and the US Department of Interior (DOI) will be involved. A report to the Arctic Council Ministers is planned for October 2006. Calder said they are interested in having involvement from individual representatives of indigenous groups. There are six chapters, each chapter will have been written by a team of scientists, one from each of the Arctic countries.

Additionally, Calder said that last year NOAA signed a memorandum of agreement with the Russia Academy of Sciences. Also, the NOAA Weather Service has decided it wants to focus on technology and rebuilding some of the Russian weather stations. There is continued work on the Climate Network reference Stations in the State of Alaska. These are elevated weather stations in Barrow and Fairbanks. The goal is to build up to about 80 to 100 sites throughout Alaska. One last item that Calder mentioned was the funding from NOAA this year to start phase one of a project in Barrow.

Wednesday, March 18, 2004

The Commission spent the morning in executive session.

United States Arctic Research Commission
72nd Meeting, June 2–4, 2004
University of Alaska Fairbanks
International Arctic Research Center and UA Butrovich
Building
Fairbanks, Alaska

In attendance:

Commissioners

Mr. George Newton, Chairman
Mrs. Mary Jane Fate
Dr. John Hobbie
Mr. Duane Laible, P.E.

Mr. Jack Roderick
Dr. Susan Sugai
Mr. Mead Treadwell

Staff

Dr. Garrett Brass, Executive Director
Kay Brown, fiscal officer
Ms. Kathy Farrow, staff

Dr. Lawson Brigham, Alaska Office
Director
Ms. Amanda Saxton, Anchorage staff

Others Present

Dr. Syun Akasofu, International Arctic Research Center (IARC); **Dr. Brian Barnes**, Director, University of Alaska Fairbanks (UAF) Institute of Arctic Biology; **Dr. Mike Castellini**, UAF Institute of Marine Science; **Dr. Bernard Coakley**, UAF Department of Geology; **Doug Dasher**, State of Alaska Department of Environmental Conservation; **Dr. Craig Dorman**, UA President for Research; **Richard Glenn**, President Board of Directors, Barrow Arctic Science Consortium; **Dr. George Happ**, UAF; **Harley Hightower**, LCMF, Anchorage; **Carl Hild**, UAA; **Dr. Larry Hinzman**, UAF; **Dr. Glenn Juday**, UAF; **Oscar Kawagley**, UAF, Board Member, Alaska Native Science Commission; **Dr. John Kelley**, UAF; **Dr. Jerry Mohatt**, UAF; **Dave Norton**, Barrow Arctic Science Consortium (BASC); **Dr. Terry Quinn**, UAF; **John Payne**, BLM; **Vladimir Pavlenko**, Academy of Sciences, Russian Delegate; **Karen Perdue**, UA Health; **Dr. Victor Prokopenko**, Russian Delegate; **Brent Sheets**, Department of Energy; **Dr. Roger Smith**, Director, UAF Geophysical Institute; **Dr. Steve Smith**, Chief Technology Officer, University of Alaska (UA); **Dale Stock**, UIC; **Kenneth Toovak**, BASC; **Dr. John Walsh**, IARC

Wednesday, June 2, 2004

UAF and Alaska's Developing Research Priorities

The meeting was held in dual locations on the University of Alaska in Fairbanks (UAF) campus with today's events occurring at the International Arctic Research Center. After **Chair George Newton**, US Arctic Research Commission (USARC) Chairman, introduced the guests from Russia: Dr. Victor Prokopenko and Vladimir Pavlenko, he recognized Dr. Craig Dorman, UA Vice-President of Research, who welcomed the Commission to the University.

Dorman announced that two chancellors were named in the University of Alaska (UA) system: Dr. Elaine Maimon in Anchorage and Dr. Steven Jones in Fairbanks. Dorman stated that an anomaly in the State of Alaska results in most of the research being conducted through the universities and 90 percent of that research is done at the UAF. Research at UAF is funded through several sources. Also, UAF is enhancing the capabilities of its biomedical and health programs in order to attract research funding from the National Institute of Health (NIH). Dorman continued to state that an interesting statistic is that UAF ranks 12th in the nation in Federal funding for mathematics and competition science. This is an area of study and research that can also be expanded. Also, there is interest in commercial-oriented research and industrial development technology transfer.

Biomedical Research Infrastructure Network (BRIN) and the Experimental Program To Stimulate Competitive Research (EPSCOR) state committees are transitioning to one State Committee for Research. Dr. George Happ, EPSCOR state director, would describe this merger later in the day. The State of Alaska will play a larger role in research as a result of this committee. Lieutenant Governor Leman will send a letter to all Commissioners about this fact.

Dorman then discussed the State of Alaska's important policy principles in response to the Ocean Policy Commission's (OPC) report. The emphasis of this report was on a new organizational structure and did not address differences among various regions. As a result, issues regarding the Arctic were not in the report—page 34, for example, did not reference the Arctic Ocean. It has been suggested that there be a national council that reports to the President and that this organization parallel the Regional Ocean Council responsible for the regional ocean information programs. The State Commissioners feel that the State is ultimately sovereign over these issues as well as the leadership responsibilities for managing the watersheds and the near shore oceans.

The Business Enterprise Institute at the University of Alaska, Anchorage (UAA) was developed to provide capacity in business planning. The Center for Nanoscience Technology is working on military-oriented, micro-electronic sensors that can be applied

for a variety of purposes including: tracking wildlife including fish or for use in seismic studies. There are tremendous capacities for this technology.

Reassembling Earth's System

Dr. Syun Akasofu, director of the International Arctic Research Center (IARC), explained IARC's two primary areas of emphasis:

- integration/synthesis in Arctic research in terms of climate change
- communication with the global community.

A key component of the Climate Change Science Program (CCSP) in the National Oceanic & Atmospheric Administration (NOAA) is to 'put back together' the pieces of the Earth system. CCSP will need to foster integration across research elements and disciplines, among observations, modeling and data management and in the development of comprehensive climate models. Akasofu noted gaps in knowledge and opportunities to fill them.

- Arctic climate feedback mechanisms remain poorly known.
- A coordinated and dedicated international effort is needed to improve the Arctic climate observing system.
- There is a challenge to foster international collaboration.
- Models should be used to assist in the development and deployment of observing systems or design field campaigns.

Akasofu said that the predictability of Arctic climate is still not well characterized and that it should be given elevated importance. This is an important mission for IARC.

The Arctic Ocean Model Inter-comparison project at IARC has a five-year cycle. In the first year the completion of a coordinated set of 50-year simulations will be studied to compare and identify models most suited to targeted experiments. This will lead to a determination of the causes of difference among the models. During the second year, a coordinated set of 100-year simulations will be studied. They will look at a comparative analysis of model output and analyze the Arctic Ocean variability over a 100-year timescale. This effort will lead to recommendations to the global modeling community on Arctic Ocean modeling in year three. In years four, five, and beyond, work will be done on interactive global climate modeling focusing on regional Arctic Ocean simulations and analysis.

IARC's Funding Sources

IARC has support from several sources including: \$3.5 million per year funding from the Japanese government; \$4 million per year from Japan for its share of the IARC building cost for the next 15 years; \$4 million for computer hardware for satellite data analysis; \$0.5 million for a study of satellite data from the Arctic; and \$385,000 from

Office of Naval Research (ONR) for a Young Investigators' Award. Akasofu also noted that \$1 million has been received by faculty from various Federal agencies. IARC also has use of the Japanese Earth Simulator at no cost. IARC has been awarded \$300,000 for a mass spectrometer. In addition, IARC has been able to fund the use of Russian icebreakers. Akasofu also noted that several other institutes are participating in integration projects and bringing their own funds including the National Institute of Polar Research (Japan), the Alfred Wegener Institute, and the Max Planck Institute in Germany.

The International Nature of IARC's Projects

Dr. John Walsh, chief scientist at IARC added that there are practical constraints on the type of science at IARC because it is a block-funded type of center that has achieved distinction focusing on international connections. Every project at IARC has international connections. Another hallmark of research at IARC is that projects need to be available for integration and synthesis. The coordination for one such project, the Arctic Climate Impact Assessment, was coordinated at IARC with Dr. Gunter Weller heading the secretariat. This climate assessment involved more than 300 scientists. A key activity at IARC is the construction and archive of output and climate change scenarios used in the assessment. On a website, users can download information from various models.

There are several ongoing science projects regarding the Arctic Ocean including Arctic Ocean model inter-comparison project; diagnosis of Arctic Ocean in global models; and Nansen-Amundsen Basin Observing System (NABOS)/Canadian Arctic Basin Observing System (CABOS). NABOS is a mooring program that places a set of moorings in the ocean. The Canadians have been deploying a mooring in the Beaufort Sea and the Norwegians will do likewise northeast of Svalbard. The scientific payoff of the sites for these moorings is their ability to track Atlantic water and its variability. One mooring's initial results, in place during 2002 and 2003, are the temperature and salinity profiles of Atlantic water and that of the water originating on the shelves. A scheme for integrating the Arctic Ocean project involves an observational component, the NABOS and associated mooring projects, regional model comparison, and the work of global climate models in the Arctic.

Some of the projects regarding atmospheric research include feedback affecting polar amplification; strategies for high-resolution modeling; and extreme events in a changing Arctic climate. Controlled experiments were performed cooperatively with Japan, Norway, and the United States.

Several permafrost projects include in-situ measurements, site-specific modeling, and spatially distributed modeling of frozen soils. Several of the Arctic biota/vegetation and snow cover projects focus on understanding the enhancement of simulated snow cover

and soil moisture in the Arctic, which may help to determine the potential impacts on regional and global climate.

Another research theme with the permafrost/vegetation/atmospheric projects is to determine a quantitative evaluation of influence of Arctic vegetation dynamics on the larger climate system. A project involving terrestrial-ocean modeling and trace gas flux measurements will interact with Japanese projects on trace gas measurements to better understand the effects of changes in Arctic freshwater and carbon fluxes on large-scale climate.

Dr. Garrett Brass, USARC Executive Director, asked if one of the practical aspects of understanding permafrost changes was the effect it would have on wildlife grazing areas in the Arctic. Walsh said that this was indeed one of the immediate uses of the data.

Commissioner Mead Treadwell asked if the research included integrating engineering and forestry issues to work on remediation and harvest cycles. Walsh said that much of the research was applicable to engineering and forestry issues and that he has heard of interest in developing these areas of research. Walsh said that the Arctic Climate Impact Assessment is conscious of the need to present a balance of changes in the Arctic and considers changes in marine access, growing seasons, and other phenomena. Akasofu said that there are several projects using the information from research at IARC including the effect of permafrost changes on the Alaska pipeline and delivery of crude oil.

Brian Barnes, director of the UAF Institute of Arctic Biology (IAB), provided an overview of the structure and programs at IAB. Its faculty identifies research focus areas. IAB advances basic and applied knowledge of high latitude biological systems through the integration of research, student education, and service to the nation and State of Alaska. Research areas include: ecosystems and ecology/wildlife biology; conservation and resource ecology; evolution and genetics; physiology, biomedicine, and health; and, computational biology and bioinformatics. The institute receives funding from the National Science Foundation, National Institute of Health, Alaska Department of Fish and Game, US Fish and Wildlife Service, National Park Service, National Atmospheric and Space Administration (NASA), Department of Agriculture, Minerals Management Service, Bureau of Land Management, and other Federal agencies.

The Alaska Cooperative Wildlife and Fisheries Research unit has been a program at IAB since 1950. Other programs include:

- Resilience and adaptive graduate training (National Science Foundation [NSF]-funded)

- Alaska Center for Environmental Statistics
- Center for Alaska Native Health Research (CANHR)
- Alaska basic neuroscience program
- Contaminants in subsistence foods/wildlife and zoonotic diseases.

Two major IAB facilities are Toolik Field Station and the Large Animal Research Station. The leading scientists, students, and staff of 131 universities and organizations used Toolik Field Station during the past three years. One goal is to develop the infrastructure that will allow year-round use of the station. In addition to these two facilities, other IAB entities include

- Genomics and Proteomics Core Lab at the new West Ridge research building
- IAB greenhouse, Alaska Geobotany Center
- Spatial Ecology Lab
- Animal Quarters and Hibernacula

The Changing Arctic Confronts Its Native People

Oscar Kawagley, University of Alaska (UAF) faculty member, is a Commissioner on the Alaska Native Science Commission (ANSC) board. Although he has seen many technological advances that impact the world, at the same time, life has become more difficult for those living in the villages. A house designed for states in the lower 48 does not fit the northern worldview or the climatic conditions in Alaska. Refrigerators, freezers, four-wheel drive all terrain vehicles, outboard motors, and aluminum boats, to name a few are all innovations that cause stress on the native people.

In the early days before 'contact,' even though times may have been tough, native people's lifestyles depended on the seasons and that gave those living in the north a focus. There were times of intense activity because fishing, weather disturbances, and berry picking would not wait. But between the frantic and leisure times, people worked on repairing hunting implements and houses. There was no set word for leisure, but the people had significant of free time. In Marshal Sahlins' book, *Stone Age Economics*, he estimates time spent on subsistence work per week was between 25 and 30 hours. This same work now has increased to 40 hours per week because of a variety of new jobs. But income sources are very limited.

The State of Alaska did research this problem but the native people were not informed of the results. The lack of involvement by the native people concerning issues related specifically to them is a primary reason that the ANSC was established in 1993. There are many native scientists and students who are gathering information. The native peoples have always observed nature closely because their survival depended on monitoring the environment. The stories relating this information were developed into an art and a science because it was a matter of survival. The ANSC wants to begin to document traditional knowledge and environmental changes so more people have

access to the information. ANSC has established two websites: the Alaska Native Knowledge website and the Alaska Native Science Network site.

Kawagley said he attended talking circles in various regions—Kotzebue with the Inupiat, Anchorage with the South Central Tribe, and one in Bethel. People speak from the heart and there are no interruptions or questions asked of the individual who is talking. People speak openly about the concerns and problems of their particular region or community. This is a great resource.

There are many concerns in the villages related to sanitation because native people have adopted the “throw-away-mindset.” For instance, barges that bring supplies for the winter are now taking aluminum cans on the return trip for disposal, a practice that was never considered when the native people ate off the land.

Kawagley wonders if it is possible that corporations could lease items to people and then take them back and recycle them? Is there anyway to solve this problem?

Worse yet, when village sanitation systems are not working, native people have gone so far as to dump their own human waste in their backyard. Antibiotics are routinely tossed into garbage dumps and old batteries, TVs, and broken vehicles are not disposed of properly, left to corrode throughout the towns and villages.

People will burn waste paper and occasionally waste plastic is mistakenly burned. The resulting smoke is horrendous and affects for the air.

In March 2004, Kawagley attended a meeting that was forced to close a day early because community ran out of drinking water. He was astounded that even though the workshop was located a few hundred feet from the Kuskokwim River, they were supplied with bottled water from Anchorage! Kawagley remembers carrying a drinking cup and dipping it in the river for a drink. It is unbelievable to think that this was no long an option.

Native people have noticed anomalies in fish, moose, and plants. Kawagley believes it is important to work with scientists and share the information with the people directly affected by the changes. Beaver are also becoming a problem since they are blocking the streams and the fish are prevented from going upstream to spawn. The hunters and trappers play an important role because they notice changes in the animals that others would miss.

Despite these changes and the native peoples’ concern about contaminants in the food, medical doctors still encourage them to eat the native foods as opposed to eating the processed foods available from outside the community.

At another meeting Kawagley attended, a scientist said that if the warming trend continued, the polar bear could be extinct in another 50 years not to mention the nearly one million species of plants and animals could become extinct.

The Elder Mentorship program remains a very important component of ANSC because the elders still retain the knowledge of their lifelong experiences and because their worldview is intact.

Geophysical Institute

Dr. Roger Smith, Director of the Geophysical Institute (GI) at UAF, provided an overview of the Geophysical Institute that was founded by an Act of Congress in 1946. The Institute has a \$30 million budget and a staff of 430. The mission of the Institute is to

- understand basic geophysical processes governing the Earth, especially as they occur in or are relevant to Alaska
- train graduates and undergraduates to play leading scientific roles in tomorrow's society
- solve applied geophysical problems and develop related technologies of importance to the State of Alaska and the nation
- satisfy intellectual and technological needs of Alaskans through public service.

GI focuses on seven main research groups including space; atmospheric science; snow, ice, and permafrost; seismology; volcanology; tectonics and sedimentation; and remote sensing. Remote sensing is the science of the next decade in geophysics and is a new development at GI with applications in many science disciplines. Remote sensing offers real time logistics, real time monitoring, operational monitoring, and real time or near time archiving capabilities.

Smith told the Commission that they could predict the arrival of a shock front from the sun. When the sun has an explosion on its surface, the shock front will propagate into interplanetary space. GI can see the shock front and calculate when its effects will impact on Earth. That will give warning of possible magnetic storms that have the affect of knocking out electrical supplies or damage satellites because of radiation fields. He also showed a picture tracking an ash cloud that resulted from the Cleveland volcanic eruption on the Aleutian Chain in 2001 as part of work done for the Alaska Volcano Observatory, the Federal Aviation Administration, and USGS. GI releases aviation warnings as the ash clouds can interfere with engines and instrumentation.

Commissioner Reports

Newton attended the recent General Bathymetric Chart of the Oceans meeting (GEBCO). He delivered a set of additional bathymetric data released by the Navy from 1988 to 1992. USARC received formal recognition for this work and a copy is in the Commissioner's meeting notebooks. He also went to the stakeholders meeting regarding

the preliminary report of the US Commission on Ocean Policy in Washington on April 19th. It was difficult to find any reference to the Arctic in the report. **Newton** attended several other meetings including a lecture at NSF by the former Administrator of the Northern Sea Route. He attended a Submarine Technology Symposium at the Johns Hopkins Applied Physics Laboratory in Maryland. On the 13th of May, he attended the Arctic Research Consortium of the United States (ARCUS) annual meeting and heard a presentation by **Dr. Lawson Brigham's**, Deputy Director of USARC, on Marine Transportation in the Arctic. **Newton** also attended a workshop in Arlington, VA concerning Shipping Noise and Marine Mammals sponsored by NOAA. On March 18th Dr. Olson said she had passed the five-year Arctic research plan by Interagency Arctic Research Policy Committee (IARPC) from the White House to Congress. The President endorsed the plan. On May 20th he had a second meeting with the graphic designer to discuss the preparation of the Commission's brochure. On May 27th, **Newton** attended the Department of State meeting concerning Article 76 and the Law of the Sea to discuss Brazil's claim submitted to the Commission on the limits of the continental shelf. He has worked with the National Geospatial Intelligence Agency over the past two months on final improvements to the Arctic Maritime Safety Information System. **Newton** has been invited to give a paper in St. Petersburg, Russia concerning Arctic maritime shipping and the Law of the Sea.

Commissioner Susan Sugai reported that she worked with **Brigham** on the Oil and Ice Report. **Commissioner John Roderick** indicated that oil fields will be found in Russia and that it will make a difference to the perception the press is giving that the world is running out of oil. **Commissioner Duane Laible** reported that he has worked on projects concerning transport of natural gas, an issue coming to the forefront. Issues being discussed now will have an impact on the distribution of oil. **Commissioner John Hobbie** attended the annual meeting of the ARCUS held in Washington, D.C. He also organized and held a meeting in Woods Hole, Massachusetts, on the Arctic Research Commission's white paper on Scaling in Terrestrial Ecosystems of the Arctic. **Commissioner Mead Treadwell** reported that he included two lengthy trip reports in the Commissioner's notebooks. One report reviews a discussion with the President of Iceland. The President of Iceland is interested in speaking to other heads of state to raise the visibility of the Arctic and the International Polar Year at the United Nations. The other report is an in-depth report on the Arctic Council meetings in Iceland. During Thanksgiving, the Arctic Council will meet in Iceland and then Russia will take the chair. Russia appointed a new ambassador for the Arctic, Ambassador Vitaly Cherkin. **Commissioner Mary Jane Fate** attended an energy meeting in Calgary. Affordable energy was discussed especially for people who live in rural areas. Alaska does not have a highly developed road system and finally a road will be built to tie-in the Eureka Road to Rampart. This will allow more access up and down the Yukon River.

Staff Reports

Brass reported that he attended several meetings in Washington D.C. He also attended Arctic Science Summit Week (ASSW) in Iceland and noted that there were many closed meetings. In order to attend a closed meeting, a person has to be a member of that group. **Newton** said he is also concerned about the number of closed meetings at ASSW. **Brass** continued to say that one of the meetings he was allowed to attend was the Pacific Arctic Group (FOARC) that includes the US, Canada, Russia, Korea, and China. Representatives discussed common interests for potential joint projects. One item agreed to was to sponsor a workshop at the next ASSW focused on the Pacific region. A portion of the meeting was devoted to the social sciences and Larry Hamilton, from the University of New Hampshire, spoke about historical reactions to climate change in relation to understanding future responses. Bob Corell also discussed the Arctic Climate Assessment Impact. In addition, participants discussed the upcoming International Conference on Arctic Research Planning, ICARP-II, scheduled for November 2005 in Copenhagen. ICARP-I was held in 1995 and is a once a decade planning session. There was discussion regarding the International Polar Year (IPY) in 2007 and 2008. The United States is planning IPY through the Polar Research Board.

The Forum of Arctic Research Operators and the Arctic Ocean Science Board meetings also met in conjunction with ASSW. Bob Dixon, from Scotland, gave a presentation on the Arctic/Subarctic Ocean Fluxes Program. John Claude Gossard, from France, presented the proposed instrumentation for the Arctic Ocean Deepwater Studies developed for the IPY, which included an array of ice-tethered buoys tied to ice flows circulating the Arctic Ocean. Global positioning system (GPS) receivers will allow researchers to track their paths.

Brass noted that the Oil Pollution Act of 1990 was up for reauthorization. OPA90 was passed in 1991 in 1992 the Coast Guard was originally funding research on oil spills and in years later, they purchased equipment. More research is needed and this message needs to be passed to Congress. Research needs to be done on oil spills in ice-infested waters.

Brigham reported that the new report, *Oil Spill Response in Ice Covered Waters*, published by the Commission and the Oil Spill Recovery Institute is being distributed to Russia, Sweden, Norway, Iceland, and Canada. It is on the USARC website (www.arctic.gov) and can be downloaded. More than 500 copies have been distributed. He also reported that the *Permafrost and Impacts on Civil Infrastructure* was available on the website and that the printed copy would be available soon. The 50-page report contains recommendations for USGS, NASA, NSF, BLM, MMS, and other agencies. It is a rigorous 2-year study by a Commission appointed taskforce, led by Fritz Nelson, permafrost geographer from the University of Delaware.

Brigham is also working with a group to study the future of Arctic marine transportation and the development of a research agenda for US Federal agencies and the State of Alaska. The main topic of interest is the changing sea ice, greater access in the Arctic Ocean, and what long-term strategies could be developed by Federal agencies. The Federal government and Federal agencies should include strategic planning/thinking on how to respond to the changing climate system in the Arctic. Brigham is also chairing a workshop in Cambridge, England regarding Marine Transportation co-hosted by the USARC, International Arctic Science Committee (IASC), and the Arctic Council.

Melding Science and Alaskan Natives

Dr. Jerry Mohatt, director of the Center for Alaska Native Health Research (CANHR) at UAF said the overall goals of the center are to :

- build a stable and long-term university infrastructure in the area of biomedical research including behavioral health focused on diseases associated with health disparities among Alaska Natives
- build stable and trusting relations between tribes and the university
- focus on obesity and its relationship to diabetes and cardiovascular disease.

The Center is also working on interdisciplinary research projects integrating genetic, behavioral, and nutritional factors of obesity including developing more effective methods for prevention and reduction of obesity, diabetes, and cardiovascular disease and increasing the number of NIH independent, investigator-initiated grants at the university.

Mohatt said that Alaska is ranked 50 of 50 states in the amount of NIH funded projects. It is important to generate a cultural understanding of health in the rural and urban communities. Two scientists at the UAF, Cecile Lardon and Christopher Wolsko, are developing tools for health promotion in rural Alaska. A behavioral study led by Mohatt and James Allen, UAF, concentrates on how and why Alaska natives do not abuse alcohol. This study also includes protective and recovery factors from alcohol abuse among sectors of Alaska natives. Mohatt said that the interdisciplinary research would help build a knowledge base to address health disparities of Alaska natives.

The Center for Alaska Native Health Research (CANHR) is also building a collaborative research enterprise in Alaska that will contribute by improving community involvement in all phases of the research. Mohatt invited everyone to visit the website at www.alaska.edu/canhr to see more detailed information about ongoing research.

Fate commended Mohatt on the alcohol studies in progress and remarked that other substance abuse problems including drugs and inhalants are at a crisis level. It is also a fact that the suicide rate in rural areas is very high. **Fate** said these issues need to be addressed. **Newton** thanked Mohatt for his presentation.

Improving Alaska's Health Care

Karen Perdue from the University of Alaska (UA), Associate Vice-president for Health, spoke about the university's role in improving health care in Alaska. Life expectancy at birth has increased and infant mortality and decreased. When the ages are grouped together, cancer is a leading cause of death. When the ages are broken into smaller groups such as 1 to 24, the leading causes of death are from accidents. In fact, unintentional injury is the leading cause of death and the number one killer for people between the ages of 1 and 44. The suicide mortality rate is high in Alaska where obesity is also a rising problem.

To make matters worse, Alaska has a shortage of people in the health care profession. When Secretary Tommy Thompson visited Shishmaref, Alaska, he acknowledged the importance of educating health care professionals from local communities in order to keep them in Alaska. UA has been training nurses and has many in its program now. It feels a duty to meet relevant health care needs. The University is working on a plan to meet applied and basic research health care needs in Alaska. A copy of the document is available in print.

UA and Biomedical Research

Dr. George Happ, UA, outlined the Biomedical Research Infrastructure Programs at the University of Alaska. Alaska SJR 44 has the target priorities as follows:

- 1) infectious disease
- 2) chronic disease
- 3) environmental health and toxicology
- 4) hibernation physiology and genomics,
- 5) Bioinformatics and systems biology.

Awards since 2000 for biomedical research have arrived from several sources including

- NIH Biomedical Research Infrastructure Network (BRIN)
- NIH Specialized Neuroscience Research Programs (SNRP)
- NIH Centers for Biomedical Research Excellence
- NSF Experimental Programs to Stimulate Competitiveness in Research (EPSCOR)

Most of the grants are renewable and competitive. **Happ** works with a network of research partners including the State of Alaska Health and Human Services, the Arctic Investigations Program in the Center for Disease Control, State of Alaska Environmental

Protection Agency, Fish and Game, and many others. Recruitment for students comes from UA's several campuses, Alaska Native Tribal Health Consortium, regional health corporations, and Alaska Pacific University.

Alaska is a key site in world health. It is on the direct route of avian transported diseases because of its huge bird population that migrates from around the world. Ducks flying from Asia and North America transport viruses to Alaska. Also, most of the contaminants in the Arctic originate in industrialized areas, are transported to the Arctic in the upper atmosphere, and are deposited in cold climates due to temperature-dependent condensation and precipitation. UA has already invested some two of million dollars in instrumentation to conduct molecular biology on the UAF campus.

There is a current project beginning, an outgrowth of BRIN/INBRE (IDeA Network for Biomedical Research Excellence) involving Tom Marr. Happ said they are using the Alaska supercomputing center to analyze final sequences. Scott Blaine, University of California School of Public Health is located at a major lab site. Nancy Cox, from Centers for Disease Control (CDC), has been researching the location of Asian-born virus sites. Jeff Hallinburger from the Armed Forces Institute of Pathology, is a senior scientist who worked out the sequences on the 1918 flu in South Carolina. There are several sets of problems highly relevant to Alaska and that are also top national priorities.

UAA Institute of Circumpolar Health

Carl Hild from the UAA Institute of Circumpolar Health, discussed the founding of the institute. In 1947, C. Earl Albrecht, Commissioner of Health for the Territory of Alaska, secured assistance in assessing the dismal state of Alaska Native Health. Several programs were founded including the Health Science Information Service (HSIS) by the Alaska Native Medical Center for remote hospitals and health care providers. In 1972 the Center for Alcohol and Addiction was established at UAA. The Arctic Investigation laboratory (AIL) was instituted at the Center for Disease Control office in Anchorage and the Institute of Circumpolar Health Studies (ICHS) was established in 1988 at UAA.

ICHS participates in Circumpolar Cooperation and Information Networking. It serves as a forum for research throughout the University, within the northern health community. It secures funds for researchers to attend international and professional meetings. ICHS also hosts international meetings on health research in biomarkers, telemedicine, injury, and climate change impacts. The Institute's faculty and staff are part of the National Library of Medicine Arctic Health website project to address Arctic health disparities among indigenous peoples. ICHS prepared a National Institute of Environmental Health Sciences (NIEHS) center grant that became a blue print for research of a series of programs funded by NOAA, Agency for Toxic Substances and Disease Registry (ATSDR), Environmental Protection Agency (EPA), NIEHS, and HIS dealing with the impact of Arctic contaminants on human health. ICHS is also involved in the CDC-AIP (Arctic Investigations Program) H. pylori research. Hild said the Institute received a

competitive Health Science Research Training grant from the National Center of Antarctic Health and Health Disparities. This grant will enable ICHS to train Alaska natives to become health researchers and to train non-natives to conduct research in a culturally sensitive way in native communities.

Hild said that teenagers in Alaska, Canada, and Greenland are killing themselves at alarming rates. There is a broader issue here that needs to be investigated.

Addressing Barrow's Science Interests

Richard Glenn, Barrow Arctic Science Consortium for the Ukpeagvik Inupiat Corporation, distributed brochures about the new Barrow Environmental Observatory (BEO). He said there is a huge swath of land that has been used as a research site for 50 years. The village corporation set aside the land and it is now called the BEO. A goal of the BEO is to increase research opportunities for students and scientists. This is the only US municipality that has land zoned for research. On the south side of the land are the gas fields. On the north side are Nelson Lagoon, the NOAA Climate Monitoring and Diagnostics Lab, the Department of Energy Atmospheric deck, and the oldest geomagnetic and seismologic observatory (USGS) in Alaska. Research partners include the communities, not just in Barrow, but also in Chukotka, Russia, the North Slope, and Canada. Many projects at BEO support national and international programs and form the basis for Barrow to be a location for the proposed Circum-Arctic Environmental Observatories Network (CEON).

Glenn introduced **Dr. Kenneth Toovak** who has been assisting researchers and scientists in Barrow and on the North Slope since the 1940s. Toovak spoke about a local priority in Barrow concerning the gravel on the shores and man made dikes. He said a storm easily washes the gravel and the dike back into the water and asks if the engineers are making the situation worse on the beach.

Also, sewage water has backed all the way up to one of the lakes. Toovak believes that science has the tools to address the problems they are facing in Barrow, but that the sewage problems, specifically the spoiled ponds, need to be addressed. Glenn commented that in the past, the Commissioners have talked about rural health and sanitation. There is a two-stage treatment process where raw sewage is treated underneath an ice-covered lake and after a year of time, it is transported to a second lagoon where it undergoes aerobic decomposition and turns green. Arctic Canadian communities praise the two-stage treatment. But Toovak wonders if this is the best that science can do.

Harley Hightower, architect for the new Barrow laboratory, said meetings have been held across the US and in Anchorage to develop a building that meets the science community's needs for modern laboratories in Alaska for scientists within government, state, and universities. The vision is to create a sustainable facility. Money used to

operate the older facilities will be transferred to manage new building. The old buildings will eventually be phased out of service.

Reaching Alaska Through Telecommunications

Steve Smith, Chief Information Technology Officer for the university system, discussed Alaska's environment for telecommunications, networking, and research. UA has the Arctic Regional Supercomputing Center, one of the best facilities in the country. However, outside the pipeline and railroad corridors, the rest of the state has severe broadband constraints. There are four submarine cables that service Alaska in addition to there is plenty of fiber optic capacity. However, the population is so small that the cost of the bandwidth is not affordable. Alaska has the population similar is size to Spokane and the land area covers one fifth of the nation's land. There is simply not enough population density. Research demands come from several different locations and agencies. Researchers come into a project, create the connectivity, and when the project is complete, they leave with their connectivity in tow. Several partnerships have been developed in Alaska to create better technology for researchers.

The Alaska Telecommunications Users Consortium (ATUC) was formed with the intention to create a sustainable model for telecommunications so that Alaska can develop affordable, sustainable broadband to every home. UA is on the board as are the Alaska Native Health Center, communities statewide, schools, and public broadcasting media groups.

Smith described the Wireless Arctic Network (WAN), a project being developed with Barrow Arctic Science Consortium (BASC), UA, National Aeronautics and Space Administration (NASA), AT&T and Richard Beck of the University of Cincinnati. The plan is to establish a prototype wireless network that will connect Barrow, Fairbanks, and have the capability to connect with a Coast Guard icebreaker. It will have mobile technology so that a number of field research projects can use it for temporary base camps. WAN will have applications in Alaska and the Arctic for researchers, educators, and industry.

Thursday, June 3, 2004

Commission members attended the Cooperative Institute for Arctic Research (CIFAR) review meeting at UAF. At the end of the meeting Chairman **Newton** presented a citation to Professor Gunter Weller, Director, NOAA-UAF CIFAR, thanking him for his more than 30 years of dedication to US and International Arctic research. Dr. Weller has retired and is moving to his native Australia.

Capability to Satellite Data

The meeting reconvened at the Butrovich Building on the UAF campus. **Buck Sharpton**, Director of the Geographic Information Network of Alaska (GINA) and the International

Observatory of the North (ION), UAF, introduced two facilities at UA that operate receiving stations. The GINA has real-time delivery and the Alaska Satellite Facility focuses on receiving station activities and archiving. Synthetic aperture radar (SAR) imagery provides a detailed view of sea ice that has a key role in the global climate system.

The Alaska Satellite Facility (ASF) receives data from foreign satellites: Radarsat 1 and the European satellites ERS-1 and ERS-2. Neither of the latter two are in operation now, and Radarsat 1 is failing as well. SAR measures the surface electrical properties so scientists can derive information about surface roughness, surface attitude, slope, density of material that make-up the surface, and the electrical conductivity of the surface. This is also an important tool for understanding earthquake and volcano deformation and is used in building digital elevation models in areas where there is little available information.

The other facility, GINA, focuses on satellite data in the visible to near-infrared range out to the thermal infrared range and even into the microwave range. They are all passive instruments in that, unlike SAR, they do not contain their own illumination capability. The data are collected by energy that is either reflected off the planet from the sun or is emitted from the planet due to its background heat. They deliver data over the web in a format compliant with the Federal Geographic Data Committee's metadata standards. The instruments allow scientists to measure and characterize organic processes such as the degree of photosynthesis. The density of a particulate material can be measured and many characteristics of land and ocean surface can be determined. They have the ability to measure surface temperatures on the oceans and ice. On land they can determine the surface temperatures but must also have some independent information on a parameter known as emissive derived from other information sources. With the vantage very close to the rotation pole, GINA is able to get good repeat coverage. The primary customer of the ASF is the National Ice Center.

Brigham asked how long it took to process the data from the satellite. Sharpton said that it takes several hours to process data. It is not as immediate as some of the passive microwave experiments and some of these optical experiments ASF tracks. Sharpton gave the web address, www.gina.alaska.edu, as the site to visit in order to get a good background on the programs capabilities. An audience member suggested that remote sensing is a system that could be developed to use as an emergency response tool in order to assist locating someone lost in the Arctic.

Sharpton said that Radarsat 2 will be operational very soon, but NASA had no involvement in the development of the launch because it is a semi-commercial Canadian program. Therefore there will not be data freely flowing from that instrument like there was from Radarsat 1.

Newton asked if SAR satellites are able to detect oil slicks. Sharpton said that under certain circumstances this could be accomplished, but not if the seas are rough. Basically, SAR data is surface data and rough seas or bad weather would break up the image. **Newton** asked if they could provide any mapping capability. Sharpton said that elevation is very difficult to determine from satellite data. It is also costly to do at the resolution everyone needs which is at 5 meter posting with 5-meter vertical accuracy. **Newton** asked if there was comparable facility in the US and Sharpton said no. The closest station would be the National Snow and Ice Data Center in Boulder, Colorado, but they do not have the receiving station capabilities. Sharpton continued to say that they have worked to expand their capabilities because of the enormity of the problems faced in the Arctic and the huge expanse of territory that needs monitoring coupled with the limited infrastructure in the State.

Brigham asked if Sharpton had a vision of how the system would work in the future of the Alaska Ocean Observing System. Sharpton said there were three ocean observing systems in Alaska. The one to the south focuses on sea surface temperatures, ocean color, and wind vector data, etc. Nearer to the North Slope, the focus is on sea ice properties and monitoring. The cost is virtually very low and it does tend to fill in the gaps between these very high-resolution, high-precision, in-situ observations like buoys and moorings located very sparsely throughout Alaskan waters.

The Future of Boreal Alaska

Glenn Juday, Forest Services Department at UAF, explained that the boreal region covers about 17 percent of the earth's land surface, a broad zone of mostly coniferous forest in a continuous distribution across the Eurasian and North American continents. He said that the boreal forests are a major storehouse of carbon in trees and soils containing approximately 20 percent of the world's reactive soil carbon, an amount similar to that held in the atmosphere. The forest and woodland in the Arctic nations (excluding Denmark) are mostly boreal forest, and in 2000, covered an area of about 3.9 billion hectares, or about 31 percent of the world's forest. Changes in temperatures in the Arctic are affecting the growth of trees. From his studies, Juday has reached several conclusions:

- the majority of Alaska boreal tree populations sampled have negative radial growth response to temperature, some of it caused by temperature induced drought stress
- reduced growth by high temperatures is common in tree line white spruce of western North America suggesting reduced potential for tree line movement under a warming climate
- the range of projected temperature increase to reach zero growth is 2 to 4 degrees Celsius
- a much different forest landscape may emerge in the future in boreal Alaska.

Gathering Bathymetry Data

Bernie Coakley, UAF, spoke about the importance of the SCICEX research missions in accessing data in the Arctic Ocean. Using a submarine allowed systematic and routine surveys in the Arctic such as is done in other oceans. The SCICEX program had five cruises annually up until 1999. This was very important to scientists working on climate change research. One real advantage was that maps were created in real time allowing for more intelligent surveying. Sonar that works at lower frequencies can penetrate into the sediments. A project has been supported by the NSF study the sedimentary record of the history of the Arctic Ocean.

There was a focus in the SCICEX Program on surveys of the basins and large ridges such as Lomonosov Ridge and the Gakkel Ridge. The Gakkel Ridge, the slowest spreading center in the world's oceans, is where most of the volcanic activity in the Arctic Ocean Basin is located. One of the discoveries made about the Lomonosov Ridge is that the top of the ridge was eroded by ice despite its depth of approximately 1000 meters below the sea surface. The SCICEX program produced clear images of the structures on the seafloor in the Arctic. The location of features is more accurate than the older maps.

Historically the Arctic Ocean has been considered to be two basins, the Eurasian Basin and the Amerasian Basin. The Eurasian Basin is younger than 60 million years and the Amerasian is Mesozoic in age. Currently the plate tectonic history is not well understood in the Arctic. This is key program for future research. Also, there has been minimal scientific drilling in the Arctic, but there are a couple of potential sites being considered.

The USCGC HEALY will sail across the Arctic Ocean in 2005 in company with the Swedish icebreaker ODEN. One of the projects is to collect a number of data sets including seismic, bathymetry, sub-bottom profiler data, and gravity data, as well. The US has a need to collect bathymetry data in the Arctic to define its coastal area in order to have an authoritative claim under UNCLOS (Article 76).

Researchers are also interested in the history of the Pacific water flux into the Arctic Ocean. Water only goes from the Pacific north in contrast to the Fram Strait where there is a two-way flow. The use of the submarine has been essential in building databases and has enabled a variety of scientific projects that really could not have been considered prior to submarine.

Educating Through Science

Martin Jeffries, Geophysical Institute at UAF, outlined several projects including Teachers in the Arctic (TEA); Observing Locally, Connecting Globally (OLCG); and the Alaska Lake Ice and Snow Observatory Network (ALISON). It is a fact that teachers in the Arctic experience considerable personal and professional isolation. This leads to high turnover rates that researchers believe affects student performance. Also, many teachers

do not have science content knowledge. Schools and students need well-qualified and continually renewed teachers who will remain active in their profession and communities. **Jefferies** said that part of the solution is for the teachers to have access to meaningful professional development opportunities including those in scientific research.

There is a large gulf between high school and university science and the programs allow a bridge between the two. TEA, OLCG, and ALISON, for instance, are programs that provide meaningful scientific research experiences for teachers and students. Several benefits of ALISON include useable data from observations, measurements, and record keeping of lake ice growth and decay and conductive heat flow in Alaska. Teachers and students benefit from practical applications of arithmetic equations, and statistics. They also benefit from developing graphs, data analyses and interpretation, and modeling. A professional learning experience is built and elementary through high school teachers and students learn to develop partnerships at a grass roots level. **Jefferies** said that now there is an unprecedented opportunity for Arctic scientists and science educators to collaborate for the benefit of K-12 teachers and students with the upcoming International Polar Year, 2007-2008.

Hydrology Concerns in Alaska

Doug Kane, director of the Institute of Northern Engineering, reacquainted the Commission with Water Environmental Research Center (WERC). The total annual budget last year was about \$2.4 million at WERC: 60 percent comes from Federal funds, 30 percent is from state funds, and 11 percent is from the private sector. Of the 12 faculty members, six have joint appointments in other academic departments for teaching and therefore the center has many graduate students who work on projects. Presently, much the funding is related to climate change and the impacts the of climate change on infrastructure including housing, roads, airports, etc. The center also studies impacts of climate change on ecosystems, both terrestrial and aquatic.

Forest fires are a dominant part of the northern environment. WERC has participated in studies from Fairbanks to the Seward Peninsula looking at the impact of fires and how these influence the hydrology. They have conducted several experiments to quantify the effects of fire on permafrost, surface energy balance, and stream flow dynamics. Larry Hinzman has taken part in studies looking at available data from 50 years ago. It is evident that lakes are shrinking in size and getting smaller with time. The disappearance of lakes and streams will impact wildlife in the area. It is important to note that in the Arctic, especially in Alaska, site engineering suffers because of a low number of meteorological and hydrologic stations. This statement is true for all high latitudes.

Kane mentioned a specific project on the physical, biological, and chemical implications in Mid-Winter Pumping of Tundra Ponds and oil exploration during the wintertime. The basic premise is that snow is plowed up and sprinkled with water; more water is

added until the ice roads are strong enough to support heavy equipment. The oil companies build 100 miles of ice roads. No one has looked at the true impact of pumping water from the lakes to build ice roads before. They have installed rafts with equipment including data loggers and solar panels that have the capability to measure chemical components or constituents under the ice in the water. Radio transmitters transmit these data back to campus.

Larry Hinzman also is involved with a project in collaboration with several other scientists to understand the primary storage components including glaciers, estuaries in lakes, ponds, and wetlands. Permafrost is an important factor in the performance of the groundwater system and the permafrost layer is undergoing change. The research focus is to define regional hydrologic regime and change; identify regional climate variations and trends; determine human impacts on flow regime and change; and to study snow cover hydrology of large Siberian rivers, such as snow cover seasonal melt and runoff generation. WERC is testing different snow gauge designs in Barrow from the US and Russia.

There is a severe lack of precipitation data north of 45 degrees. In Europe, data is accessible in many areas, but in Russia, Northern Canada, and Alaska the data points are sparse. Research goals include the need to evaluate and define the accuracy of precipitation measurement in the arctic regions. His (Kane's/Hinzman's) researchers and foreign colleagues also intend to implement consistent bias-correction methods over the pan-Arctic including Alaska, northern Canada, Siberia, northern Europe, Greenland, and the Arctic Ocean.

WERC is also looking at river discharges in Russia. There are significant changes in the flow regime of 3 major rivers: Lena, Yenisey, and Ob rivers. WERC is very lucky to have access to data from the 1930s. In comparison, studies were not started on North Slope streams in Alaska until the 1970s.

WERC is also planning a workshop in Victoria, British Columbia called the Synthesis of Water Balance Data from Northern Experimental Watersheds. Kane said that scientists have created 24 papers that will be published in the International Association of Hydrologic Science in the red book series.

Richard Glenn asked how many different types of snow gauges are used in the circumpolar Arctic regions. Kane said that there are about 8 to 10 designs in use. The National Weather Service (NWS), the US Department of Agriculture (USDA) and the Natural Resource Conservation Service all have different snow gauge designs. The Canadians use a model called the Viper gauge. Finland and Greenland also have different snow gauge models. Kane feels it is a challenge to create compatible data sets. He recommends more stations are needed for better data collection. Improved instrumentation is needed in order to provide high quality data.

Power To the Natives

Brent Sheets from the Department of Energy (DOE) explained that the mission of the office is to deal with oil and gas research and to work on development of sustainable power supplies for remote villages. Potential options for power are improved diesel, coal, natural gas, hydropower, nuclear, wood/municipal waste, solar, and fuel cells. They want to develop uses for excess power or energy for district heating, hydrogen production, greenhouses and industrial use. He said they are also concerned about environmental issues regarding energy.

Sheets' office has two industry panels that assist in the selection of projects. He will ask for one-page ideas from the university academia and from industry. The proposals would be ranked and reviewed and 10 proposals are selected depending on available funding. There is significant competition in this process. This is followed by meetings of industry panels that develop a consensus of what projects to recommend.

Sheets said that the US currently imports 50 percent of its crude oil. Projections show that by 2025 that number will jump to 70 percent. Alaska is critical in the development of increased crude oil supplies. In 1970 there were about 225 days open for oil exploration on the tundra. That has decreased to about 100 days. Sheets' office is also working on extending the number of days open for exploration with safety for the environment.

Investigating Influences on Biology in the Arctic

Dr. Mike Castellini, Director of the Institute of Marine Science (IMS), gave an overview of the Institute's ongoing work. The IMS is the oceanographic and marine biology research component of the School of Fisheries and Ocean Sciences. Their grant contract fund is approximately \$12 million and includes some of the ship operations in Seward. There are about nine to 10 principal investigators doing work from the Arctic to Antarctic. The disciplines break into five categories with marine biology and biological oceanography the two largest components. The others include physical, geological and chemical oceanography. IMS has been involved in the SCICEX submarine cruises over many years.

One expertise developed is how to perform laboratory work in the field. Safety is of great concern as IMS gathers specimens from cliffs and different areas. The institute is involved in near-shore census of animals from the Arctic to the Antarctic. For example close to Barrow and Palmer Peninsula research is underway to discover what is in the near-shore inter-tidal zone. Castellini is on the science panel for the Mineral Management Services and one of his major conclusions is there is considerable physical data and biological data that need to be merged.

The Virtual Tsunami Center uses IMS resources and also uses the Supercomputer housed at UAF. IMS will supply the computer code to create three-dimensional

modeling of tsunami events and upgrade the prediction capabilities in the State of Alaska and worldwide. IMS is also working on the Marine Mammal Co-Op to study Steller sea lions.

Treadwell asked if the Steller sea lion could be considered a proxy for other types of marine mammals. **Castellini** said that there is a concern that the fur seals are next. The question is whether there is an ecosystems problem, a fisheries problem, or something else? **Newton** asked what answers have been discovered in the past 10 years. **Castellini** said that IMS knows it is not a food-based problem and that a report explaining this position will be issued soon. He mentioned one concept in a recent paper that implied that humans took the great whales out of the North Pacific. The Orca did not have great whales to eat so they fed on the sea lions. When they ran out of sea lions, they moved on to harbor seals. There are many biological behavioral issues that are controversial. More research is being conducted on these and other topics, currently some of the work ongoing at IMS.

Newton asked how many tsunamis occur in Alaska. **Castellini** said that there is about one every two years with one about eight years ago causing major flooding. Depending on the location of the epicenter, the Tsunami Center may be able to give about a half hour warning to communities. There are also underwater landslides that can affect the water and that is very difficult to model.

Fishing Resources and Management

Terry Quinn, Juneau Center, School of Fisheries and Ocean Sciences at UAF, discussed sustainable use of fishery resources. He said that science plays a key role in management of fishery resources. Strategies for coping with environmental change and regime shifts need to be developed. A focus needs to be developed to preserve reproductive potential—there needs to be a change from establishing a target number to establishing a limit number for harvesting. A problem is that there is great misunderstanding of the basic science that goes into fisheries. Despite years of data collection, there is still an incredible lack of knowledge about how populations grow and interact with each other, interact with the environment, and how fisheries effect them. Habitat is becoming a bigger issue and there are discussions about having open and closed habitats throughout the entire Bering Sea.

Science plays a large role in fisheries management. Quinn has served on the Scientific and Statistical Committee (SSC) of the North Pacific Fisheries Management Council for 20 years. The Council is one of the eight regional councils established by the Magnuson Act in 1976. It includes 11 voting members whose function is to develop fishery management plans and regulations for ground fish, scallops, and crabs. The council meets five times a year with two advisory panels. The first advisory panel consists of harvesters and environmental groups. The second panel comprises a scientific group. Public testimony is taken at all meetings by the different groups involved.

The formula for sustainable fisheries, as it has evolved by the North Pacific council, is one where strong science and research programs have been utilized and cautionary and conservative catch limits have been implemented. They have a comprehensive observer program implemented by Alaska Sea Grant in 1990 and now the North Pacific Fisheries Observer Training Center is funded by a grant from NOAA.. **Sugai** said it is the largest in program in America. Quinn continued to say that effective reporting, in-season management and ecosystem considerations have been put into effect, have been put into place, and limited entry programs are now pervading almost all of the fisheries.

A key consideration is that the Scientific and Statistical Committee on the North Pacific Fishery Management Council has been very effective in providing scientific communication and advice as to the acceptable catch limit. In other parts of the country, there is disagreement and controversy between the state, Federal, and independent scientists. This is not a problem here.

Treadwell said that he believes the areas are too large and that there are biologically distinct populations that over-winter in specific areas. The quotas in the Aleutians or the Bering Sea are set to giant areas merging all stocks. Quinn said that he thinks that the future management will consider the local population stocks in an area. Regulations have been put into effect to avoid sea bird by-catch and measures to protect Steller sea lions. Also, there are other marine protected areas with time-area restrictions to protect herring, crab, sea lions, and other species. There will be further restrictions on fishing in the future because the past policies were not been conservative enough. A new science will develop to study ecosystems, habitat, and genetics. There will also be continued controversy and continued problems as new groups come in and try to get rid of the older institutions and regulations to try something new. It is important to build on the population models, fisheries science facts, and develop with consensus and agreement. **Newton** said that the Arctic Research Commission recently met in Dutch Harbor and heard many of positive things about the Bering Sea fishery. Quinn said good communications has helped communities to understand the policies.

Friday, June 4, 2004

Integrating Environment and Human Demands

John Payne, the Bureau of Land Management in Alaska, outlined the North Slope Science Initiative (NSSI) and development of an inventory, monitoring, and research strategy for resource managers. The vision of NSSI is for science to provide knowledge for resource management decision-making. The goal of NSSI is to sustain ecological integrity while allowing appropriate human use of North Slope resources. Payne said that most ecological studies on the North Slope have been local with few landscape-wide activities.

Climate change on the North Slope has been rapid over the past several decades. With continuing expansion of energy related activities on the North Slope, there is a need for coordinated science to assess environmental change from natural and anthropogenic causes. Additional inventory, monitoring, and research are required to support regulatory functions and resource management. Payne summarized the findings by the National Academy of Sciences and concluded that the NSSI is the organization needed to provide a system for resource management agencies to identify and prioritize inventory and monitor and provide research activities for long-term integrity of the North Slope.

The proposed structure of NSSI is as follows:

- North Slope Science Oversight group comprised of Federal, state, and local resource managers
- Science Technical Advisory Group to review the quality and effectiveness of all proposals submitted for funding
- Stakeholder Collaboration to review and discuss issues, concerns, and recommendations.

Treadwell made a motion for the USARC to join the NSSI that was seconded by **Roderick**. It passed by unanimous consent. **Brigham** will represent the USARC at the next NSSI meeting to be held in Anchorage, Alaska and at future meetings.

John Kelly from UAF updated the Commission about IPY. Kelly offered seven recommendations describing the program's US vision including that IPY should

- be used to initiate a sustained effort to assess large-scale environmental change and variability in the polar regions
- include studies of coupled human-natural systems critical to societal, economic, and strategic interests
- explore new scientific frontiers from the molecular to the planetary scale
- be used as an opportunity to design multidisciplinary polar observing networks that provide a long-term perspective
- bring investments in critical infrastructure (physical and human) and technology to ensure lasting benefits
- create new connections between science and the public
- include US scientific community and agencies participation.

The US National Committee for IPY will release a report in May. Kelly said that in order for IPY to succeed, the next phase must shift from vision to implementation. More information is available on www.us-ipy.org

Monitoring Alaska's Ecological Resources

Doug Dasher, Alaska Department of Environmental Conservation (ADEC), detailed the Environmental Monitoring Assessment Program (EMAP) in Alaska. The state has 45,000 miles of coastline and 40 percent of the water resources in the United States. EMAP provides resource managers with the tools necessary to monitor and assess spatial and temporal trends in national ecological resources. Information generated will also assist them in gauging and protecting the ecological condition of Alaska's natural resources

EMAP selects sites randomly to obtain statistically valid representative samples of ecological indicators of benthic invertebrates, fish periphyton, physical habitat structure, and water and sediment chemical and physical quality. The information contributes to sound environmental development by providing a baseline from which to assess current and future impairments, gives the ability to correctly evaluate the effectiveness of efforts taken to minimize or correct impairments, and establishes relevant Alaska water quality criteria rather than using standards from other states with different environment factors.

So far, 55 sites have been analyzed for nutrients, chlorophyll-a, sediment toxicity, sediment metals, and other factors. ADEC is working with community volunteers, National Marine Fisheries Service (NMFS), EPA, UA, Bering Sea Ecotech, International Pacific Halibut Commission, University of Washington, and others. At this point, \$2.5 million is needed to support an Aleutian coastal assessment and to start a Yukon Watershed Assessment. The data is vital to understand the state's overall estuarine condition since offers a base for sound environmental development.

Russia's Current and Future Arctic Impact

Two Russian delegates, Victor Prokopenko and Vladimir Pavlenko, delivered the meeting's final presentation. Professor Pavlenko said that it is exciting to see government works in partnership with educators and that they are very interested in hearing how projects are funded in the United States. As Russia is developing new systems of managing resources, developing education, and creating research initiatives, it is important to note the progress made in Arctic research in the United States.

Brass said a joint meeting with the Canadian Polar Commission could also be arranged. Pavlenko said he could see benefits in attending a meeting with the Canadians Polar Commission.

According to s a rule Pavlenko, the Russian government has made all Arctic-related decisions, but now that has changed. There are several goals that the Russian Federation has in the Arctic

- develop funding
- understand sustainable development of Arctic regions
- involve indigenous groups

- develop environmental protection of the seas.

Over the past couple of years scientists at the Academy of Sciences have been asking for support for activities in science. Pavlenko was in Iceland and had several discussions with representatives from circumpolar countries. They are now trying to establish a national committee. They will prepare a list of projects and form working groups to adopt certain projects. Pavlenko was named Russia's representative to the European Polar Board.

As for Arctic Council Activities, Russia will be the chair. He said it will be important to meet on a regular basis and that new conditions in Russia encourage this routine. Part of the problem had been that the former commission was not comprised of scientists and the Arctic was not considered a prime mission. Pavlenko and Prokopenko believe it is important for future understanding to develop an agency similar to the USARC. The US, Canada, and Russia are the biggest users of the Arctic. Sweden, Germany, and Japan are interested in the Arctic as well. **Newton** added that the Chinese are interested in the Arctic as well. Pavlenko said it Russian managers would benefit from visiting Alaska in order to use Alaska as a model to show interaction of government, states, university, and indigenous peoples. It is important to know how science is established in a market economy. **Brass** said there is a group called the Northern Forum that would be able to help with visits. **Newton** said it would be beneficial for new generations of managers to communicate with all the stakeholders.

Treadwell said that there is a special program to fund Russian projects from the Library of Congress. The Russian National Academy of Sciences needs to submit a proposal. A US host is necessary to establish the relationship as well. It is important for circumpolar countries to know Russia's new position. **Brass** said that a visitor program could include a visit to the pipeline to learn how it is managed. **Fate** said that the University of Alaska is recruiting students and perhaps there are Russian students who would be able to attend. She said that the Alaska Natives learned how to partner with industry and educators. It may be worthwhile to attend an annual meeting with Doyon Limited, a native corporation. Pavlenko said that these are all good ideas. It is a good idea to develop a Ministry of Education and Science. He said that the National Academy of Science is in position to create courses for education. **Fate** said that it would be good to work more closely together with the Russians.

Newton commented that he knows US and foreign scientific vessels need access to Russian waters. He asked if there was a new way to request access. Also, the US and Russia could exchange ideas about how best to protect the environment and coastlines in the Arctic. It is also important to understand navigation is opening in the Arctic Ocean and potentials. **Newton** stated that there is also an effort underway to re-commission the USCGC Glacier and make it a healthy platform for indigenous peoples and communities in the north. It would be important for the Glacier Society to make

contact with someone in Russia about this project. **Brass** said that there might be a possibility to have a joint meeting with Canada, Russia, and the US and perhaps Canada.

An unidentified speaker said that his group has been collaborating with Russian scientists for the last 10 years. Offshore research has been going very well. A problem that he sees is that the US and Russia view collaboration differently. The US views collaboration from the ground-up and Russia views collaboration from the top-down. Collaborative efforts have been made in Chukota. He would like to pursue another approach where individual researchers to talk to individual Russian scientists. The US needs to have support at a higher level in order for principal investigators in the US to improve collaborating in the Arctic.

Also, he would like to see the establishment of a laboratory to allow Russian scientists to work with Russian students in laboratories. It is difficult for students to get involved in the sciences. John Calder, director of the Arctic Research Office at NOAA, recently pulled a new agreement together that involves the polar regions. Palvenko said that they need to schedule a time for a meeting and have more discussions. Perhaps a meeting can be arranged in 2005 in Canada and then another meeting can be arranged in Russia in 2006. He said that his country faces several challenges including radioactive waste disposal and development of oil exploration equipment. **Brass** said that the US had recently imposed new restrictions on travel of scientists into the US. He said there is a lot of work to do in order to prepare for upcoming visits and sharing of information.

Before adjourning, the Commission agreed to send a citation of congratulations to Bill Seitz who is retiring from the USGS in Alaska.

Appendix B: Meetings and Additional Activities During FY 2004

In addition to those meetings and other activities reported in the minutes, the Commission is represented, when possible, at the monthly meetings of the

- State Department's Arctic Policy Group
- Interagency Arctic Research Policy Committee's staff meetings
- *ad hoc* Alaska Arctic Council Working Group.

The Commission's staff attends meetings of the National Research Council's Polar Research Board and Ocean Studies Board. The Commission continues to attend the annual (spring) Arctic Summit Week, an international gathering of Arctic scientists coordinated by the International Arctic Science Committee.

The Executive Director and Deputy Executive Director have participated, as the Commission's representative(s), at all meetings of the North Pacific Research Board. They have also participated in workshops for the development of a National Climate Change Program.

Several Commissioners and staff have attended meetings of the Arctic Council and meetings of the various working bodies under the Council:

- Emergency Prevention, Preparedness and Response working group (EPPR)
- Arctic Climate Impact Assessment (ACIA)
- Arctic Monitoring and Assessment Program (AMAP)
- Protection of the Arctic Marine Environment (PAME)
- Circumpolar Infrastructure Task Force (CITF) under the Sustainable Development Working Group.

In addition, they continue to attend meetings of the American Geophysical Union, and other science gatherings such as the

- Arctic Institute of North America
- The Oceanography Society
- US Permafrost Association
- Alaska Marine Science Conference
- International Bering Sea Conference.

Appendix C: The Arctic Research and Policy Act, As Amended

PUBLIC LAW 98-373 – July 31, 1984
Amended as
PUBLIC LAW 101-609 – November 16,
1990

An Act

To provide for a comprehensive national Policy dealing with national research needs and objectives in the Arctic. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

TITLE 1-ARCTIC RESEARCH AND POLICY

SHORT TITLE

SEC. 101. This title may be cited as the “Arctic Research and Policy Act of 1984, as amended.”

FINDING AND PURPOSES

SEC. 102(a) The Congress finds and declares that:

- 1) the Arctic, onshore and offshore, contains vital energy resources that can reduce the Nation’s dependence on foreign oil and improve the national balance of payment;
- 2) as the Nation’s only common border with the Soviet Union, the Arctic is critical to national defense;
- 3) the renewable resources of the Arctic, specifically fish and other seafood, represent one of the Nation’s greatest commercial assets;

- 4) Arctic conditions directly affect global weather patterns and must be understood in order to promote better agricultural management throughout the United States;
- 5) industrial pollution not originating in the Arctic region collects in the polar air mass, has the potential to disrupt global weather patterns, and must be controlled through international cooperation;
- 6) the Arctic is a natural laboratory for research into human health and adaptation, physical and psychological, to climates of extreme cold and isolation and may provide information crucial for future defense needs;
- 7) atmospheric conditions peculiar to the Arctic make the arctic a unique testing ground for research into high latitude communications, which is likely to be crucial for future defense needs;
- 8) Arctic marine technology is critical to cost-effective recovery, and transportation of energy resources and to the national defense;
- 9) the United States has important security, economic, and environmental interests in developing and maintaining a fleet of icebreaking vessels capable of operating effectively in the heavy ice regions of the Arctic;
- 10) most Arctic-rim countries, particularly the Soviet Union, possess Arctic technologies far more advanced than those currently available in the United States;
- 11) Federal Arctic research is fragmented and uncoordinated at the present time, leading to the neglect of certain areas of research and to

unnecessary duplication of effort in other areas of research;

12) improved logistical coordination and support for Arctic research and better dissemination of research data and information is necessary to increase the efficiency and utility of national Arctic research efforts;

13) a comprehensive national policy and program plan to organize and fund currently neglected scientific research with respect to the Arctic is necessary to fulfill national objectives in Arctic research;

14) the Federal Government, in cooperation with State and local governments, should focus its efforts on collection and characterization of basic data related to biological, materials, geophysical, social, and behavioral phenomena in the Arctic;

15) research into the long-range health, environmental, and social effects of development in the Arctic is necessary to mitigate the adverse consequences of that development to the land and its residents;

16) Arctic research expands knowledge of the arctic, which can enhance the lives of Arctic residents, increase opportunities for international cooperation among Arctic-rim countries, and facilitate the formulation of national policy for the arctic; and

17) the Alaskan Arctic provides an essential habitat for marine mammals migratory waterfowl, and other forms of wildlife which are important to the Nation and which are essential to Arctic residents.

b) The purposes of this title are

1) to establish national policy, priorities, and goals and to provide 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 establish and Arctic Research Commission to promote Arctic research and to recommend Arctic research policy;

3) to designate the National Science Foundation as the lead agency responsible for implementing Arctic research policy; and

4) to establish an Interagency Arctic Research Policy Committee to develop a national Arctic research policy and a five-year plan to implement that policy.

ARCTIC RESEARCH COMMISISON

SEC. 103(a) The President shall establish an Arctic Research Commission (hereinafter referred to as the "Commission").

b)(1) The Commission shall be composed of seven members appointed by the President, with the Director of the National Science Foundation serving as a nonvoting, ex-officio member. The members appointed shall include:

(A) four members appointed from among individuals from academic or other research institutions with expertise in areas of research relating to the Arctic, including the physical, biological, health, environmental, social and behavioral sciences;

(B) one member appointed from among indigenous residents of the Arctic who are representative of the needs and

interests of Arctic residents and who live in areas directly affected by Arctic resource development; and

(C) two members appointed from among individuals familiar with the Arctic and representative of the needs and interests of private industry undertaking resource development in the Arctic.

(2) The President shall designate one of the appointed members of the Commission to be chairperson of the Commission.

(C)(1) Except as provided in paragraph (2) of this subsection, the term of office of each member of the Commission appointed under subsection

(b)(1) shall be four years.

(2) of the members of the Commission originally appointed under subsection (b)(1)

(A) one shall be appointed for a term of two years;

(B) two shall be appointed for a term of three years; and

(C) two shall be appointed for a term of four years.

(3) Any vacancy occurring in the membership of the Commission shall be filled, after notice of the vacancy is published in the Federal Register, in the manner provided by the preceding provisions of this section, for the remainder of the unexpired term.

(4) A member may serve after the expiration of the member's term of office until the President appoints a successor.

(5) A member may serve consecutive terms beyond the member's original appointment.

(d)(1) Members of the Commission may be allowed travel expenses, including

per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code. A member of the Commission not presently employed for compensation shall be compensated at a rate equal to the daily equivalent of the rate for GS-18 of the General Schedule under section 5332 of title 5, United States Code, for each day the member is engaged in the actual performance of his duties as a member of the Commission, not to exceed 90 days of service each year. Except for the purposes of chapter 81 of title 5

(relating to compensation for work injuries) and chapter 171 of title 28 (relating to tort claims), a member of the Commission shall not be considered an employee of the United States for any purpose.

2) The Commission shall meet at the call of its Chairman or a majority of its members.

3) Each Federal agency referred to in section 107(b) may designate a representative to participate as an observer with the Commission. These representatives shall report to and advise the Commission on the activities relating to Arctic research of their agencies.

4) The Commission shall conduct at least one public meeting in the State of Alaska annually.

DUTIES OF THE COMMISSION

SEC. 104(a) The Commission shall

1) develop and recommend an integrated national Arctic research policy;

2) in cooperation with the Interagency Arctic Research Policy Committee established under section 107, assist in establishing a national Arctic research program plan to implement the Arctic research policy;

3) facilitate cooperation between the Federal Government and State and local governments with respect to Arctic research;

4) review Federal research programs in the Arctic and recommend improvements in coordination among programs;

5) recommend methods to improve logistical planning and support for Arctic research as may be appropriate and in accordance with the findings and purposes of this title;

6) recommend methods for improving efficient sharing and dissemination of data and information on the Arctic among interested public and private institutions;

7) offer other recommendations and advice to the Inter-agency Committee established under section 107 as it may find appropriate;

8) cooperate with the Governor of the State of Alaska and with agencies and organizations of that State which the Governor may designate with respect to the formulation of Arctic research policy;

9) recommend to the Interagency Committee the means for developing international scientific cooperation in the Arctic; and 10) not later than January 31, 1991, and every 2 years thereafter, publish a statement of goals and objectives with respect to Arctic research to guide the Interagency committee established under section 107

in the performance of its duties. b) Not later than January 31 of each year, the Commission shall submit to the President and to the Congress a report describing the activities and accomplishments of the Commission during the immediately preceding fiscal year.

COOPERATION WITH THE COMMISSION

Sec. 105(A) (1) The Commission may acquire from the head of any Federal agency unclassified data, reports, and other nonproprietary information with respect to Arctic research in the possession of the agency which the Commission considers useful in the discharge of its duties.

2) Each agency shall cooperate with the Commission and furnish all data, reports, and other information requested by the Commission to the extent permitted by law; except that no agency need furnish any information that it is permitted to withhold under section 522 of title 5, United States Code.

b) With the consent of the appropriate agency head, the Commission may utilize the facilities and services of any Federal agency to the extent that the facilities and services are needed for the establishment and development of an Arctic research policy, upon reimbursement to be agreed upon by the Commission and the agency head and taking every feasible step to avoid duplication of effort. c) All Federal agencies shall consult with the Commission before undertaking major Federal actions relating to Arctic research.

ADMINISTRATION OF THE COMMISSION

Sec. 106. The Commission may –

- 1) in accordance with the civil service laws and subchapter III of chapter 53 of title 5, United States Code, appoint and fix the compensation of an Executive Director and necessary additional staff personnel, but not to exceed a total of seven compensated personnel;
- 2) procure temporary and intermittent services as authorized by section 3109 of title 5, United States Code;
- 3) enter into contracts and procure supplies, services and personal property;
- 4) enter into agreements with the General Services Administration for the procurement of necessary financial and administrative services, for which payment shall be made by reimbursement from funds of the Commission in amounts to be agreed upon by the Commission and the Administrator of the General Services Administration; and
- 5) appoint, and accept without compensation the services of, scientists and engineering specialists to be advisors to the Commission. Each advisor may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code. Except for the purposes of chapter 81 of title 5 (relating to compensation for work injuries) and chapter 171 of title 28 (relating to tort claims) of the United States Code, and advisor appointed under this paragraph shall not be considered an employee of the United States for any purpose.

LEAD AGENCY AND INTERAGENCY ARCTIC RESEARCH POLICY COMMITTEE

SEC.107(a) The National Science Foundation is designated as the lead agency responsible for implementing Arctic research policy, and the Director of the National Science Foundation shall insure that the requirements of section 108 are fulfilled.

(b)(1) The President shall establish an Interagency Arctic Research Policy Committee (hereinafter referred to as the “Interagency Committee”).

(2) The Interagency Committee shall be composed of representatives of the following Federal agencies or offices:

- (A) the National Science Foundation;
- (B) the Department of Commerce;
- (C) the Department of Defense;
- (D) the Department of Energy;
- (E) the Department of the Interior;
- (F) the Department of State;
- (G) the Department of Transportation;
- (H) the Department of Health and Human Services;
- (I) the National Aeronautics and Space Administration;
- (J) the Environmental Protection Agency; and
- (K) any other agency or office deemed appropriate.

(3) the representative of the National Science Foundation shall serve as the Chairperson of the Interagency Committee.

DUTIES OF THE INTERAGENCY COMMITTEE

SEC. 108 (a) The Interagency Committee shall

- (1) survey Arctic research conducted by Federal State, and local agencies, universities, and other public and private institutions to help determine priorities for future Arctic research, including natural resources and materials, physical and biological sciences, and social and behavioral sciences;
- (2) work with the Commission to develop and establish an integrated national Arctic research policy that will guide Federal agencies in developing and implementing their research programs in the Arctic;
- (3) consult with the Commission on-
 - (A) the development of the national Arctic research policy and the 5-year plan implementing the policy;
 - (B) Arctic research programs of Federal agencies;
 - (C) recommendations of the Commission on future Arctic research grants;
- (4) develop a 5-year plan to implement the national policy, as provided in section 109;
- (5) provide the necessary coordination, data and assistance for the preparation of a single integrated, coherent and multi agency budget request for Arctic research as provided for in section 110;
- (6) facilitate cooperation between the Federal Government and State and local governments in Arctic research, and recommend the undertaking of neglected areas of research in

- accordance with the findings and purposes of this title;
- (7) coordinate and promote cooperative Arctic scientific research programs with other nations, subject to the foreign policy guidance of the Secretary of State;
 - (8) cooperate with the Governor of the State of Alaska in fulfilling its responsibilities under this title;
 - (9) promote Federal interagency coordination of all Arctic research activities, including-
 - (A) logistical planning and coordination; and
 - (B) the sharing of data and information associated with Arctic research, subject to section 552 of title 5, United States Code; and
 - (10) provide public notice of its meetings and an opportunity for the public to participate in the development and implementation of national Arctic research policy.
 - (b) Not later than January 31, 1986, and biennially thereafter, the Interagency Committee shall submit to the Congress through the President, a brief, concise report containing
 - (1) a statement of the activities and accomplishments of the Interagency Committee since its last report; and
 - (2) a statement detailing with particularity the recommendations of the Commission with respect to Federal interagency activities in Arctic research and the disposition and responses to those recommendations.

5-YEAR ARCTIC RESEARCH PLAN

SEC.109(a) The Interagency Committee, in consultation with the Commission,

the Governor of the State of Alaska, the residents of the Arctic, the private sector, and public interest groups, shall prepare a comprehensive 5-year program plan (hereinafter referred to as the "Plan") for the overall Federal effort in Arctic research. The Plan shall be prepared and submitted to the President for transmittal to the Congress within one year after the enactment of this Act and shall be revised biennially thereafter.

(b) The Plan shall contain by need not be limited to the following elements:

- (1) an assessment of national needs and problems regarding the arctic and the research necessary to address those needs or problems;
- (2) a statement of the goals and objectives of the Interagency Committee for national Arctic research;
- (3) a detailed listing of all existing Federal programs relating to Arctic research, including the existing goals, funding levels for each of the 5 following fiscal years, and the funds currently being expended to conduct the programs;
- (4) recommendations for necessary program changes and other proposals to meet the requirement of the policy and goals as set forth by the Commission and in the Plan as currently in effect; and
- (5) a description of the actions taken by the Interagency Committee to coordinate the budget review process in order to ensure interagency coordination and cooperation in (A) carrying out Federal Arctic research programs, and (B) eliminating unnecessary duplication of effort among these programs.

COORDINATION AND REVIEW OF BUDGET REQUESTS.

SEC. 110(A) The Office of Science and Technology Policy shall

(1) review all agency and department budget requests related to the Arctic transmitted pursuant to section 108(a)(5), in accordance with the national Arctic research policy and the 5-year program under section 108(a)(2) and section 109, respectively; and

(2) consult closely with the Interagency Committee and the Commission to guide the Office of Technology Policy's efforts.

(b)(1) The Office of Management and Budget shall consider all Federal agency request for research related to the Arctic as one integrated, coherent, and multi agency request, which shall be reviewed by the Office of Management and Budget prior to submission of the President's annual budget request for its adherence to the Plan. The Commission shall, after submission of the President's annual budget request, review the request and report to Congress on adherence to the Plan.

(2) The Office of Management and Budget shall seek to facilitate planning for the design, procurement, maintenance, deployment and operations of icebreakers needed to provide a platform for Arctic research by allocating all funds necessary to support icebreaking operations, except for recurring incremental costs associated with specific projects, to the Coast Guard.

AUTHORIZATION OF
APPROPRIATIONS; NEW
SPENDING AUTHORITY

SEC.111(a) There are authorized to be appropriated such sums as may be necessary for carrying out his title.

(b) Any new spending authority (within the meaning of section 401 of the Congressional Budget Act of 197 4) which is provided under this title shall be effective for any fiscal year only to such extent or in such amounts as may be provided in appropriation Acts.

DEFINITION

SEC 112. As used in this title, the term "Arctic" means all United States and foreign territory north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi seas, and the Aleutian chain.

Table 1

PUBLICATIONS OF THE US ARCTIC RESEARCH COMMISSION

Annual Reports to the President and the Congress

- *US on the Arctic Rim*. 1986
- *The United States: An Arctic Nation*. 1987
- *Entering the Age of the Arctic*. 1988.
- *Arctic Research for an Arctic Nation*. 1989
- *Arctic Research: A Focus for International Cooperation*. 1990
- *Arctic Research in a Changing World*. 1991
- *An Arctic Obligation*. 1992
- *Arctic Research Priorities*. 1993
- *Annual Reports, Fiscal Years 1994 and 1995*. 1996
- *Annual Reports, Fiscal Year 1996*. 1997
- *Annual Reports, Fiscal Year 1997*. 1998
- *Annual Reports, Fiscal Year 1998*. 1999
- *Annual Reports, Fiscal Year 1999*. 2000
- *Annual Reports, Fiscal Year 2000*. 2001
- *Annual Reports, Fiscal Year 2001*. 2002
- *Annual Reports, Fiscal Year 2002*. 2003
- *Annual Reports, Fiscal Year 2003*. 2004
- *Annual Reports, Fiscal Year 2004*. 2005

Special Reports

- *National Needs and Arctic Research, a Framework for Action*. May, 1986
- *Logistics Recommendations for an Improved US Arctic Research Capability*. June 1997
- *The Arctic Ocean and Climate Change: A Scenario for the US Navy*. January, 2002
- *Climate Change, Permafrost, and Impacts on Civil Infrastructure*, 2003
- *Advancing Oil Spill Response in Ice Covered Waters* 2004

Findings and Recommendations

- *Logistic Support of Arctic Research*. July, 1988.
- *Statement of Goals and Objectives to Guide United States Arctic Research*. December, 1989.
- *Arctic Data and Information: Issues and Goals*. June, 1989.
- *Improvements to the Scientific Content of the Environmental Impact Statement Process*. December, 1989.
- *Arctic Engineering Research: Initial Findings and Recommendations*. April, 1990.
- *Logistic Support of United States Research in Greenland: Current Situation and Prospects*. December, 1990.
- *Goals, Objectives, and Priorities to Guide United States Arctic Research*. January, 1991.
- *Research Needs to Respond to Oil Spills in Ice-Infested Waters*. May, 1992.
- *Goals and Priorities to Guide United States Arctic Research*. January, 1993.
- *Goals and Priorities to Guide United States Arctic Research*. January, 1995.
- *Goals and Priorities to Guide United States Arctic Research*. January, 1997.
- *Goals and Priorities to Guide United States Arctic Research*. January, 1999.
- *Report on Goals and Objectives for Arctic Research*. January, 2000.
- *Goals and Priorities to Guide United States Arctic Research*. January, 2001.
- *Report on Goals and Objectives for Arctic Research*. January, 2003.
- *Report on Goals and Objectives for Arctic Research*. January, 2005.

Background Reports

- *International Agreements for Research, Logistics, and Access concerning the Arctic*. J.A. Lopocaro. April, 1990.
- *Corrosion of the Trans Alaska Pipeline Systems & Research Needs*. L.D. Perrigo. May, 1990.
- *Effects of Glasnost and perestroika on the Soviet Establishment: Relevance to Arctic Research*. J.G. Roederer. March, 1991.
- *The Increasing Importance of Arctic Research to the United States*. J.G. Roederer. May, 1991.

