United States Arctic Research Commission

Annual Report
Fiscal Year 2002

Annual Report of the United States Arctic Research Commission to the President and Congress of the United States

Fiscal Year 2002

United States Arctic Research Commission
4350 North Fairfax Drive, Suite 630
Arlington, VA 22203

MEMBERS OF THE ARCTIC RESEARCH COMMISSION

1 January 2003

Mr. George B. Newton, Jr., Chairman
Planning Systems Inc.
12030 Sunrise Valley Drive, Suite 400
Reston, VA 20191-3453

Mrs. Mary Jane Fate
750 Farmers Loop Road
Fairbanks, AK 99712

Dr. Jacqueline M. Grebmeier
Dept. of Ecology and Evolutionary Biology
University of Tennessee
10515 Research Drive
Knoxville, TN 37932

Dr. John E. Hobbie
The Ecosystem Center
Marine Biological Laboratory
7 MBL Street
Woods Hole, MA 0254315

Mr. Jim O. Llewellyn, Esq.
Bellsouth Corporation
675 Peachtree Street, N.E. Ste. 4300
Atlanta, GA 30375

Mr. John R. Roderick
1620 Hidden Lane
Anchorage, Alaska 99501

Mr. Mead Treadwell
Institute of the North
Alaska Pacific University
P.O. Box 101700
Anchorage, Alaska 99501

Dr. Rita R. Colwell (Ex-Officio)
Director, National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Staff

Executive Director
Dr. Garrett W. Brass
Arlington, VA

Deputy Executive Director
Dr. Lawson W. Brigham
Arlington, VA

Administrative Officer
Mrs. Kay Brown
4350 N. Fairfax Drive, Suite 630
Arlington, VA 22203

Staff Officer
Mr. Lyle D. Perrigo
707 A Street
Anchorage, AK 99501

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 2002 (1 October 2001 through 30 September 2002). For a description of the activities of the Commission in previous years, see its Annual Reports (Table 1 on inside back cover).

Contents

Highlights of Commission Activities

• Conducted three meetings, one in Cordova, Alaska and one at the Lamont-Doherty Earth Observatory (Columbia University) in Palisades, New York.

• Constructed a link between the National Imagery and Mapping Agency (NIMA), the Maritime Safety Division, and the Arctic Ocean research community. NIMA publishes Notice to Mariners which provides information on hazards to navigation; until this initiative there had been no Notices to Mariners published for the Arctic Ocean.

• Participated in the work of the Arctic Council with Commissioners and staff serving on several working groups: Emergency, Prevention, Preparedness and Response (EPPR); Protection of the Arctic Marine Environment (PAME); the Sustainable Development (SDWG); and, the Circumpolar Infrastructure Task Force (CITF).

• Continued joint discussions and collaboration with the Canadian Polar Commission.

• Provided advice and council to the North Pacific Research Board (NPRB). Convinced NPRB to have the National Research Council (the Polar Research Board and Ocean Studies Board) develop a research plan to support its process of funding research proposals.

• Met with the President and Vice President for Research of the University of Alaska to discuss research needs for the University and State of Alaska.

• Conducted a study on 'Climate Change, Permafrost, and Infrastructure' for use by the Commission to recommend appropriate permafrost research in the United States.

• Addressed (Chairman) and chaired a session (Executive Director) at an international conference on the 'Prospects of Future Research in the Arctic Ocean' held in Sweden at the Royal Academy Science.

• Continued strong support for the Study of Environmental Arctic Change (SEARCH) by sponsoring sessions in Alaska and meeting with Congressional staffs. The Commission continued participation in the SEARCH Interagency Working Group.

• Worked with the State Department on the provisions of Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS) which established limits on claims for resource exploitation on submerged extensions of the continental shelf. At the invitation of State, the Executive Director reviewed the draft of the Russian claim for extension of their Exclusive Economic Zone (EEZ) into the Arctic Ocean and attended a meeting at the United Nations regarding this claim.

• Continued to work with the U.S. Navy for the declassification and release of environmental data taken by nuclear submarines in the Arctic Ocean and Bering Sea.

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 naturals 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; and 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 and a deputy executive director in Arlington, Virginia; a senior staff officer 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 2002 was $1,076,010.

Response to Mandate, Fiscal Year 2002

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 2002:

January 23 - 24, 2002, 63rd Meeting, Arlington, Virginia

April 15, 2002, 64th Meeting, Cordova, Alaska

July 15, 2002, 65th Meeting, Washington, D.C., and July 16 – 17, 2002, Palisades, New York

The minutes of Fiscal Year 2002 Commission meetings are given in Appendix A. A list of other meetings in which the Commission's members and staff have participated is given in Appendix B.

Appendix A: Minutes of Commission Meetings, Fiscal Year 2002

U.S. Arctic Research Commission
Minutes of 63rd Meeting, January 23 - 24, 2002
NSF Conference Room
Arlington, VA

Chairman Newton called the 63rd meeting of the U.S. Arctic Research Commission to order at 8:35 a.m. Those in attendance were:

a) Commission and staff: George Newton, Chairman; Rita Colwell, Ex-Officio; Mary Jane Fate, Commissioner; Jacquelyn Grebmeier, Commissioner; John Hobbie, Commissioner; James Llewellyn, Commissioner; John Roderick, Commissioner; Mead Treadwell, Commissioner; and Garrett W. Brass, Executive Director; Lawson Brigham, Deputy Executive Director; Kay Brown, Administrative Officer; Lyle D. Perrigo, Director of the Anchorage officer; Amanda Saxton, Alaska office intern; and

b) Visitors: Thomas C. Beck, Department of State (DOS); Jamie Bessee, Department of the Interior (DOI); John Calder, National Oceanographic and Atmospheric Administration (NOAA); Richard Cline, U.S. Department of Agriculture, Forest Service; Lou Codupoti, University of Maryland, Center for Environmental Sciences; James Devine, U.S. Geological Services; Craig Dorman, Office of Naval Research and University of Alaska; Karl Erb, National Science Foundation (NSF); Bill Fitzhugh, Smithsonian; John Haugh, DOI, Bureau of Land Management (BLM); G. L. Johnson, University of Alaska; Bernard G. Koether, Glacier Society; Sydney Levitus, NODC/NOAA; William Littlewood, DOS, retired; Peter Michael, University of Tulsa; Charles Myers, (NSF); Robin Muench, Office of Naval Research (ONR); Tom Murray, NOAA; Jim Overland, NOAA/PMEL; Thomas Pyle, Arctic Science Section, NSF; Mark C. Serreze, University of Colorado, Boulder; Lowell Smith, Environment Protection Agency (EPA); Neil Swanberg, NSF; Hale Vankoughnett, DOS; Robert Wharton, NSF; Bill Woolf, Senator Murkowski's office; and Bernard Zak, Sandia National Laboratories.

Agenda and Minutes

The Commission accepted the agenda with minor modifications. The Chairman deferred action on the previous meeting minutes until tomorrow.

Announcements

Chairman Newton welcomed two new commissioners, Mary Jane Fate and Mead Treadwell, both from Alaska. Executive Director Brass said that there were three power point presentations in the notebook. One is the talk on the SCICEX program the Chairman gave in Stockholm at a symposium on Arctic oceanography. Two others are ones the Executive

Director presented on the SCICEX program to the Ocean Studies Board, and on US Arctic research infrastructure presented in Brussels at an EU Arctic workshop.

Report of the Chairman's Activities

Chairman Newton reported that he attended a meeting in Stockholm with the Executive Director on the future of Arctic Ocean research and presented on the past and future contributions of submarines to this field. Newton attended the Science Advisory Committee, with the Executive Director (as Committee chair), for the collection of scientific data from submarine voyages. One of the issues was to ensure better communication between the operational Navy and the scientific community, particularly on what data was to be collected during the accommodation cruises. In January Chairman Newton also attended a 'Risk Assessment and Alaska Infrastructure' workshop in Anchorage, a venue that USARC has assisted with modest funding (several thousand dollars). Of concern is the lack of participation in these important annual meetings by senior Alaska State and federal agency representatives.

The Chairman and Executive Director were invited to the Canadian Embassy to hear a presentation by the government leader of Nunavut; science and research perspectives were also discussed during a very interesting and informative gathering. Newton visited with the two individuals who replaced Dave Garman on Senator Murkowski's staff – Bill Woolf (here today) and Dr. Brian Hannigan, who is on the Energy Committee staff as one of the Senator's members. Chairman Newton recognized Dr. Craig Dorman, soon to be the new Vice President for Research at the University of Alaska. The Chairman reported that at the recent change of command for the National Ice Center the Commission was recognized for its significant support of the Center's work.

Both the Chairman and Executive Director spent considerable time recently working on US responses to the tenets of the UN Convention on Law of the Sea (UNCLOS), particularly Article 76 concerning seabed resources that can potentially be claimed by the US. A discussion ensued as to when the US might ratify UNCLOS and if the US should join Canada and Denmark in a united front regarding Article 76 issues and survey together, using a submarine, the entire Western Arctic. The Chairman did note that it would take a very senior official, such as the Secretary of State, to say such a survey would be in the national interest. Brass stated that the State Department is urging acceding to UNCLOS before the end of 2002 so that a US member can stand for membership on the Commission. Brass also stated that the Article 76 claims are beyond the 200- nautical mile Exclusive Economic Zone (EEZ), but are only for energy and resources on or under the seabed. Chairman Newton also noted that once a nation accedes to the LOS Treaty it has ten years to make a claim on the extension of its continental margin.

Two other initiatives involved the Chairman and the operational Navy. He had proposed to the Navy to use a Coast Guard icebreaker as a logistics support base for a FY 2003 Arctic exercise; the Navy has declined but will consider this option in the future. He also reported that he had written the CNO's staff with a request to declassify all data taken in the Bering Sea by submarine during the past 40 years.

As a summary the Chairman outlined six items he will pursue during the new year: a history of the Commission including oral histories of the chairs; a Commission website of its own (not linked to UAA); a new Commission brochure; pursuing the amendments to the Arctic Research and Policy Act as proposed last year; key linkages with the Oceans Commission led by Admiral Jim Watkins; and, better and more frequent communications between the staff and commissioners.

A list of the Chairman's activities is attached at the end of the minutes.

Reports and Discussions by the Commissioners

Commissioner Roderick reported that Senator Murkowski was holding hearings on a gas pipeline for Alaska, specifically to talk with producers and pipeline companies. He suggested that companies would be looking out 10 years to see if a pipeline would be economic. He stated that the gas companies would not have an open season in 2002, so in his judgment it would be approximately 8-9 years before completion of a pipeline. There is a future need for LNG on the West Coast of the US and in Asia, and Cook Inlet may become a future source. Canada also has a stake in a proposed gas pipeline since several route options have two-thirds of the pipeline crossing Canada.

Executive Director Brass mentioned that Alaska should be producing petrochemicals and refined products, rather than just shipping crude oil south. Commissioner Roderick said some plants are producing small amounts of refined products, and there are plans for several firms to increase production.

Commissioner Fate introduced herself and said she was honored to be a member of the Commission. She is from Rampart, Alaska on the Yukon River and is Athapaskan. During regulated times in the airline industry she worked for Wein and today is a board member of the Alaska Air Group, Alaska Airlines and is a retired CEO/Chairman of the Board of a small village corporation (Vana Yukon) formed pursuant to the Alaska Native Claims Settlement Act in 1971. Her husband is a member of the Alaska State Legislature and is vice chair of a committee on oil and gas resources. She stated her concerns were that energy policies were not in place for the State of Alaska and that ongoing long range planning is necessary to formulate those policies. Another concern is ANWR and many natives have land within the ANWR and want to see development take place.

Commissioner Fate indicated one of her major concerns is that Alaska does not have a good inventory of its natural resources. Research could assist here. Her village has 100,000 acres of surface land but does not have a resource inventory or any mapping, roads or access. She also indicated that the 13 regional corporations in Alaska (and some 200-village corporations) are for profit and frequently negotiate with foreign countries. She said that she just completed nine years as a member of the University of Alaska Board of Regents and is very interested in research statewide.

Commissioner Hobbie stated that he had been conducting research in Alaska since 1958. He did his doctoral thesis work in the middle of what is now ANWR and he works on terrestrial

problems. Over the past decades a research site, Toolik Lake on the North Slope about 100 miles south of Prudhoe Bay, has become a important site for working on Arctic lakes and streams; also, a number of long term experiments have been going since 1982. For example, researchers have been fertilizing the stream and studying grayling populations for 20 years. 12,000 graylings have been tagged and tracked. He stated that the long-term data shows a change in the carbonate cycle – a completely unexpected result which would not be observed if scientists did not go back every summer to Toolik Lake. We are also seeing changes in individual plants and are measuring other changes even our 25 years time. Toolik research has been supported throughout by NSF and he has been involved with over 50% of the activities at the station. The station has recently has 100 scientists in July and this has taxed the system; a limit has been set at 75 and plans are being made to improve the logistics provided to the station.

Commissioner Hobbie reported that he had been busy writing several key scientific papers and edited a series of articles on the US Long Term Ecological Research program, something he has been very active with for more than 20 years. He also attended the October meetings in Salt Lake City of the NSF Arctic Systems Science program.

Executive Director Brass raised concern for who has responsibility for the safety of all the scientists working at Toolik Lake. What responsibility does the University of Alaska have with regard to safety? A lengthy discussion on this topic ensued between Commissioner Hobbie, Dr. Brass and Dr. Tom Pyle, Arctic section head with OPP/NSF. A general trend was noted away from the days of the lone, unsupported researcher who had to entirely look after his/her safety. NSF continues to work on all safety and heath issues for scientists doing fieldwork particularly for those whose work takes them to remote Arctic sites.

Commissioner Llewellyn stated that he has been busy with one of the largest legal cases he has ever been party to (115,000 pages) and had not been involved with Commission business since the September meeting.

Commissioner Treadwell reported that he was very happy to be a new member of the Commission. He had been the state's representative to Commission meetings in the past and has been involved with USARC and several projects as Managing Director of the Institute of the North. Much of the work in the past with the Commission has been in arctic affairs and US involvement with the Arctic Council. Although he grew up in Connecticut, he has been a resident of Alaska since 1977 and has worked in business, government and academe. He helped start the Yukon Pacific Corporation, the Siberian Alaska Trading Company, and Digimark, a public company in Portland, which commercialized watermark technology. He also served as Governor Hickel's Deputy Commissioner of Environmental Conservation, and has been active as a board member of the Prince William Sound Science Center and Oil Spill Research Institute. Commissioner Treadwell stated that when the White House asked him why he wanted to be on the Commission he told them he wanted to assist with infrastructure projects, help with understanding the value of commonly-owned resources in the north, and build more enduring international partnerships in the Arctic. He added that we need to improve our cooperation with Russia and better coordinate all of Alaska's marine science activities.

Treadwell also believes the Commission can influence two US strategic issues – energy and responding to climate change.

Treadwell reported that during the Senior Arctic Officials meeting in Finland last November he and Walter Parker issued a press release for the Institute of the North (with support of the SAO Chair) regarding Arctic aviation initiatives. Added to the CITF aviation issues is a mandate from the Arctic Council to include the improvement of Arctic telecommunications through international cooperation. Brass brought up the subject of commercial development in Alaska and the development of technologies with commercial applications. Treadwell responded that the state legislature would be interested in having a report done on research and infrastructure needs in Alaska. Brass supported such collaboration with the state and indicated the Commission's Task Force on Climate Change, Permafrost and Infrastructure can provide part of what is needed. Chairman Newton added that with regard to the state, the Commission needs greater direct contact with the Governor's office on a wide spectrum of research issues.

Treadwell also reported on a meeting he attended of the Alaska Native Science Board. He announced a 13-14 February whaling meeting organized by the Institute of the North, Barrow Arctic Science Commission, and Alaska Eskimo Whaling Commission. Treadwell believes the US needs to get its position together before a summer 2002 meeting of the International Whaling Commission since that body will address the next five–year quotas of Arctic whales.

Brass raised the issue of the need for a replacement to Commissioner Parker who had a mandate to the Commission as an oversight person for Arctic Council affairs. Perhaps the Commission would like to pass this mandate to Commissioner Treadwell. Chairman Newton led the brief discussion and moved to have Commissioner Treadwell fill this critical role that was so admirably conducted by Walter Parker. Treadwell stated he would be pleased to carry out this mandate.

Commissioner Grebmeier reported that she is a member of a Stellar Sea Lion Committee of the National Academy of Science and had attended meetings in Seattle and Anchorage. Knowledge of the Bering Sea ecosystem is critical to understanding the Stellar Sea Lion and these issues are a research priority within the Commission. She also attended the November symposium in Stockholm and presented on aspects of pan-Arctic shelf basin interactions. Grebmeier stated that the SBI program is a 10-year global change effort currently in phase II. Fieldwork in the Chukchi and Beaufort seas will take place this year with cruises in May, June, July and August. There is some concern with the cruises and their interaction with the bowhead whale migration, but consultations are ongoing. Much information has been exchanged with the local communities.

Commissioner Grebmeier reported that she had been working closely with the Coast Guard preparing for SBI expeditions aboard the icebreaker Healy. There has been a number of technical problems including the lack of ambient temperature seawater since the engineers have heated the ship's water to melt ice in clogged piping. A jury rig will be arranged for her productivity work, but this is a long-term problem that continues to be addressed by the ACII, NSF and the Coast Guard. Another issue is the lack of specific training of the Coast Guard's

Marine Science Technicians (MSTs). Perhaps they can go to sea aboard several UNOLS ships. Grebmeier then led a lengthy discussion on the use of US and Russian icebreaking ships in Arctic research, particularly when the voyage is in Russian waters. She stated that she had good success with clearances in 1995. Brass indicated that the way to go is use Russian ships and avoid any political problems such trying to use the Healy in Russian waters. Grebmeier mentioned that another approach is to have Russian scientists aboard the US ship, as was done in 1995 with Russians aboard Alpha Helix. A discussion enthused regarding the use of Canadian, Swedish, German and US icebreakers on joint, international expeditions.

Commissioner Fate indicated she wanted to add to her portfolio of experiences living and working in Alaska. She said that former President George Bush and former Governor Hickel had placed her on a presidential commission (as chair) to look into all programs and policies affecting Native Alaskans. The 18-month study became a 4-year effort covering all aspects of health, education, economics (including subsistence) and social issues. Fate said she was a past president of the North American Women's Association and a founding member of the Fairbanks Native Association, formed to pursue quality education close to home. This came about because of the past experiences of many that were uprooted from their families to go to school for 4-6 years at locations far from home. She herself was sent to a school in Sitka at Mt. Edgecomb. Others were sent to schools in Kansas, Oregon and Oklahoma, but unfortunately most of these schools were not accredited. Fate then discussed aspects of the Alaska Native Claims Settlement Act signed 18 September 1971 and the resulting challenges of establishing enterprises, both non-profit and for profit.

Reports and Discussions by the Staff

The Executive Director reported on his presentation in Brussels at the EU-sponsored meeting on Arctic infrastructure. Most of the focus was on how to get Russian oil and gas to European markets. Brass said that he had organized a session on Arctic Ocean studies for the 1-2 November meeting of the Ocean Studies Board that proved to be a highly productive opportunity to link with an effective NRC board. This knowledge of the Arctic Ocean can assist the Board when they are planning future world ocean research. Brass also attended the Stockholm symposium on future Arctic oceanography and chaired one of the sessions. He met with Drue Pearce on 21 November (with John Calder from NOAA), Alaska Advisor to the Secretary of the Interior, and explained the Commission's desire to see the Fish & Wildlife Service and National Parks Service part of SEARCH. At the end of November Brass spent two days in New York at the US UN Mission meeting with the Russians, Danes and Canadians on issues related to Article 76 of UNCLOS. Art Grantz and Brass felt some of the Russian claim was not justified by the science and this was conveyed to the State Department.

Brass also reported on meetings at AGU – the SCICEX Science Advisory Committee clarifying lines of communication, and with Ted Delaka and Martha Stewart from the University of Alaska. He also reported that the US Permafrost Association had asked him to be a member of the board, but he is reluctant to accept as he is concerned about recommending activities through the Commission where those on the board might benefit from those activities. A discussion ensued and Chairman Newton stated there was consensus that the offer should be declined.

Deputy Executive Director Brigham reported on establishment of the Permafrost Task Force approved by the Commission in September. A task force of eight members has been formed including Fritz Nelson from the U. of Delaware, Ken Hinkel from the U. of Cincinnati, Vladimir Romanovski from UAF, Orson Smith from UAA, Walter Parker, Terry Tucker from CRREL (who is located at UAA for the year), Ted Vinson from Oregon State University, and Lawson Brigham as facilitator. Meetings with individual members have been held in Salt Lake City, Anchorage and at AGU in San Francisco. A meeting of the full task force is scheduled for 15-19 February in Seattle, just prior to the NSF ARCSS All-Hands workshop that a majority of the task force will attend as well. Brigham stated that the focus is on permafrost response to climate change and the implications for infrastructure. The task force is focusing on the key issues and a research agenda. The final report will not be a large 100-page tome, but more of a 'white paper' review of 15-25 pages. Professor Fritz Nelson, one of the leading US permafrost researchers, is here today to give us a presentation about climate change and permafrost

Brigham also reported on the Senior Arctic Officials meeting in Espoo, Finland and an earlier meeting in September on transportation issues held in northern Finland and Sweden. Former Commissioner Parker and Brigham attended and both presented aspects of marine and aviation Arctic transportation. Brigham reported that Iceland would replace Finland as Chair of the Arctic Council at the end of 2002.

Mr. Perrigo from the Commission's Alaska staff reported on meetings with those responsible for specification codes and standards. The bottom line remains that Alaska appears to be the only northern region without cold climate codes & specifications. Perrigo also met with Ed Rasmusson of Anchorage regarding these issues and he suggested linking with the Arctic Slope Regional Corporation. He also attended an October oil and ice cleanup meeting where he and others discussed trying to conduct an experiment since 1993 to burn oil on the ice. A permit from EPA has never been approved. Perrigo also stood in for the Executive Director at the Alaska Native Science Commission meetings. There was much discussion on the need for scientists to communicate with the local communities and the ANSC is making some headway in capturing traditional knowledge (30-40 oral histories have been conducted).

Chairman Newton adjourned the morning session at 12:17 and stated the meeting would reconvene at 13:15.

Presentations to the Commission

Chairman Newton reconvened the meeting and introduced Mr. Bill Woolf of Senator Murkowski's staff.

Mr. Woolf stated that he had been working for the Senator since 1987 and focuses on fisheries, wildlife, and transportation issues (except for aviation), NASA, and a few trade issues. His work is on living resources while Brian Hannigan focuses on non-living resources. He reported the Senator's interest in having a gas facility built near Fairbanks that would pull off gas and create a petrochemical product. The Senator also has been proposing the creation of

bi-lateral US-Canada commission to study the feasibility of combining our rail systems. The Alaska Rail Road ends just south of Fairbanks at Eielson Air Force Base and the Canadian system ends at Fort Nelson, 1200 miles away. There may be advantages in linking the two systems. The recent shake up of the Canadian cabinet may move this initiative along.

Woolf indicated interest in cooperative efforts with the Russia, but recognizes the difficulty of getting US ships to operate in Russian Arctic waters. He has supported sending a NOAA ship for fisheries work in Russia, but it has never happened. Woolf stated that he was pleased the icebreaker Healy performed well. A very key issue from the morning discussions is the creation of a coherent plan for Bering Sea research. He believes the Commission has a critical role to play in coordinating or integrating research in the Bering Sea. Commissioner Newton suggested that this would be great challenge and a discussion ensued as to all the issues at stake if the Commission took on a role. Brass stated that the Commission could use the bully pulpit and even conduct accountability exercises on how others use the Commission's advice. However, the current budget would limit activities of the Commission unless the revisions of the Arctic Research and Policy Act could be passed. Brass stated that the Commission's Goals and Objectives Report does contain elements of this proposed synthesis effort for the Bering Sea. Commissioner Treadwell added that he supported Woolf's concept and suggested that the White House or Senator Murkowski could ask the Chairman to lead such an integrating inquiry.

Brass reported that there is a proposal to the North Pacific Research Board involving the Ocean Studies Board and Polar Research Board to study what would be the elements of a predictive system for the Bering Sea. Commissioner Roderick asked Mr. Woolf if he was saying that one agency or entity should take charge of the full plate of arctic research. Woolf responded that he is sensitive to the independence of the various institutions, but that he would like to see one step forward and pull all of the information together. Roderick stated that he is concerned that with no money attached to the Commission the purely advisory role does not work effectively. A discussion took place regarding a suitable amount of funding for the Commission ($10 million) that could be used as matching grants to agencies or other organizations. Chairman Newton thanked Bill Woolf for the informative exchange.

The Chairman introduced Mr. Ben Koether who is CEO/President of the Glacier Society. Koether presented the effort of a large group to reactivate the old Navy/Coast Guard icebreaker Glacier. The vision is to have the ship based in Bridgeport, Connecticut as a science platform, research platform and visitors center. The ship would be operational and available for polar research expeditions. Glacier was completed in 1955 and was at that time the largest and most powerful icebreaker in the world. The ship made 39 polar voyages and was decommissioned by the Coast Guard in the mid-1980's. The Society has gained custody of the ship and is preparing to sail Glacier from San Francisco to Connecticut perhaps through the Northwest Passage.

Koether reported that some of the ship's machinery is new and interviews with the Coast Guard crew on her last Antarctic voyage revealed that the ship performed flawlessly. He said the hull does not have significant corrosion. Funding/support for the project comes from three sources: individual contributions, corporate donations, and the federal government. The capital

budget for the program is $26 million with roughly $15 million to get the ship running. He stated that the intention is not to bring back Glacier as a full icebreaker. They want to get the ship operating in open water so as to bring it back safely to Connecticut. Chairman Newton thanked Mr. Koether for the informative and interesting presentation, and wished the Society much success with the ship.

Marideth Sandler of the Alaska Governor's Office in Washington reviewed the recent work of the Arctic Council in the context of Alaskan participation. She stated that recent support for Alaska's participation was obtained through the work of Senator Steven's staff. In particular, Native Alaskans have had an opportunity to be present at Council meetings and be part of the deliberations. Alaskans have worked on issues of ecotourism, reindeer herding, telemedicine, small business entrepreneurial skills, and gender equality. Sandler stated that Alaskans want to be a part of the Sustainable Development Working Group of the Council and be involved in the World Summit on Sustainable Development scheduled for 2002. The Governor's Office is working hard to secure scheduled flight services between Russian and Alaska. Sandler also said work is underway with the FCC to allow the Internet linkages provided to schools to be extended to the local communities as well.

Chairman Newton thanked Sandler and also introduced Robin Ross, the Commission's new secretary, who is the 'voice of the Arctic Research Commission.'

Jamie Bessee for the Department of the Interior spoke on behalf of Drue Pearce, the Senior Advisor to the Secretary of the Interior for Alaska Affairs. Bessee related that Pearce, who has been in the Alaska State Legislature for 17 years (and Senate President for two terms), has convened two different science boards/councils for the Secretary - one internal and a second external science council. The external board will have a stakeholder meeting and Brass indicated the Commission's interest in participating. Treadwell asked about recent legislation that devotes a portion of offshore leasing revenues to wildlife enhancement research. Bessee said it hasn't been fully developed. Treadwell noted that this should represent new funding for marine research in Alaska.

Hale Van Koughnett, a Foreign Service Officer with DOS at the Office of Ocean Affairs, reported on the recent work of the Arctic Council. He stated that the Arctic Policy Group meets monthly with Alaska State participation by teleconference and that Sally Brandel is the US Senior Arctic Official, leading the US delegation to Finland for the SAO meetings.

Dr. Craig Dorman was introduced as the new Vice President of Research at the University of Alaska. He will take over in the position in March. Dorman stated that he would not yet speak for the University, but would comment on oceanographic ship replacement issues, particularly those associated with Alpha Helix. He discussed the role of the Federal Oceanographic Fleet Coordinating Committee (FOFCC) and the development of world/global class oceanographic ships now operating. Four operate and FOFCC has been dealing with the replacement of regional class ships - 8 to 10 of these smaller ships. The first to be replaced is the Alpha Helix, now 35 years old. Dorman reported that he hoped the FY2004 budget would have funding for an Alpha Helix replacement. The ensuing discussion focused on a $600 million replacement scheme for 9 new ships, two of which would be high latitude ships - one for the West Coast

(replacing Alpha Helix) and another for the East Coast. Dorman stated that the University of Alaska and Woods Hole Oceanographic Institution have a memorandum of agreement between them regarding the design of the high latitude ships. Chairman Newton said a key would be to get a block or fleet request in the budget to gain greater congressional support. Commissioner Treadwell commented that perhaps more international collaboration with ship operations and funding new ships was in order.

Executive Director Brass said that before the last speaker he wanted to bring up a plan to schedule a Russian Academy of Science group at the AAAS meeting in Alaska in September 2002. Chairman Newton said to move ahead with a plan to do this at the Anchorage AAAS meeting and potential topic of discussion would be collaborative research.

Chairman Newton introduced the last speaker, Professor Fritz Nelson from the University of Delaware, who will speak on permafrost and climate change. Professor Nelson stated that permafrost is simply any subsurface material that remains at or below zero degrees Celsius for 2 or more years. The materials can be frozen sediment, ground ice, frozen rock, or other materials. The active layer is above the permafrost and annually freezes & thaws. Nelson reported that permafrost has three roles in the context of global warming: it is a temperature archive or record keeper; it is a facilitator of climate change (positive feedback effects such as the release of sequestered carbon); and, it is a translator of environmental change such as with subsidence and increased coastal erosion. Nelson showed several photos of the effects of permafrost change in Alaska and Siberia. He noted that significant damage to 300 buildings has occurred in Siberia.

Nelson discussed the 1997 circumpolar permafrost map developed in large measure by Jerry Brown's leadership and persistence - a milestone in permafrost studies. He then presented his work on changing permafrost (poleward) in the Northern Hemisphere and the development of hazard potential zones for permafrost change. He superimposed on the hazard zonation maps a database showing Arctic infrastructure. What can be shown is that substantial facilities fall within areas of significant hazard potential for changing permafrost. Nelson also mentioned the Circumpolar Active Layer Monitoring Network (CALM) which is a series of 100 sites developed with substantial NSF support. A dialogue ensued regarding pipelines and permafrost, and the use of remote sensing in studying permafrost change. Deputy Executive Director Brigham mentioned that much of what Professor Nelson presented would be included in the ongoing Permafrost Task Force.

The meeting was adjourned at 1710.

Chairman Newton reconvened the 63rd meeting at 8:37 a.m. on January 24, 2002. The focus of the morning presentations was on the scientific issues involved in the Study of Environmental Arctic Change (SEARCH) Program. At earlier meetings the Commission had received agency overviews. Newton called upon John Calder to start the process. Calder gave a brief summary of the program from its onset in 1997 to the present and then introduced Jamie Morison, Chair of the SEARCH Science Steering Committee.

Morison said that SEARCH is based on large changes in ecosystems and local societies in the

past few decades. In the 1990s changes were seen in all parts of the Arctic environment. This collection of changes they have termed Unami. There is a drop in atmospheric pressure over the Arctic, increasing surface air temperatures in northern Europe, Russia, Alaska, and parts of Canada, decreasing temperatures in the eastern Canadian Arctic, increases in permafrost temperatures across the Arctic except in eastern Canada where they have decreased, a more cyclonic ocean circulation, increases in the water temperatures of egressing Atlantic waters which has decreased ice cover and salinity in the Beaufort Sea, shifts in whale migration pathways northward, and increases in the fisheries in the Northern Bering Sea. It has many of the characteristics of the El Nino in the lower latitudes and some think of it as the El Nino of the North.

There are uncertainties as to what is occurring but their multi-disciplinary approach should be able to accommodate new data and information and lead to a better understanding of conditions. They recognize the need to involve scientists across the Arctic in this endeavor and efforts are being made to work with various international programs. They hope to get all needed observations made in way to avoid redundancy.

Morison said they had conducted workshops to further implementation. To date these have been with groups concerned with Arctic and Sub-arctic fluxes, biocomplexity, and the atmosphere and cryosphere. Also, they have established panels for projection of change, understanding change, responding to change, and international programs to help understand progress and future needs. The membership on these panels and the steering committee is interdisciplinary so as to have a better overall understanding of what is found and learned.

The SEARCH science steering committee is trying to develop outreach activities to help educate elected officials, agency personnel, and the public. Morison said they would be seeking advice and support from the Commission in this outreaching effort. Also, the public needs to become aware that Unami likely plays a similar role to El Nino with impacts on fishing, farming, forestry, and weather.

Overland said his presentation would be directed at the observation base needed to track changes in the Arctic, holes in their current coverage, re-analysis of old data, and specific recommendations for the future. Recently they met in Seattle where they focused on the atmosphere, terrestrial systems, sea ice coverage, and system re-analysis. They did not cover biological and ocean sciences; these are important and will be covered in the future.

One of the recommendations coming from the Seattle meeting was the need to develop a protocol for detection of Arctic change. Approaches must look 5 years into the future and be able to say clearly what has been found. Natural variability must be accommodated; these may be just as significant as CO_2 changes. They expect to use a multi-varied approach that will use commercial fishing records and other changes which may be just as important as some of the more classical ones such a temperature and circulation changes. They expect data to help them tell the difference between the two effects.

As for data collection, Overland said weather station coverage is very good but the buoy program is not producing as much data as it could because of logical shortages. The weather

balloon data collection on temperature and wind profiles in the atmosphere is not in good shape either. They have only 10% of the stations operating that they had 10 or more years ago. Brigham asked if data from transpolar and other Arctic flights could be used for that purpose and Overland said that could help. Some satellites transmit temperature profile data for lands and seas beneath their tracks. Their terrestrial data appears to be in good shape. They are also checking on changes in permafrost coverage and river discharge flow rates into the Arctic Ocean. They have not received any data on Russian River flows for a couple of years. Ice thickness changes are included in their analysis.

Data re-analysis is very important. The use of new approaches in such analyses can lead to new interpretations of older data. They are working with the European Weather Service, which does re-analysis for the entire world; their data for the Arctic and Sub-arctic are very useful. Overall, they are not in bad shape for monitoring physical and terrestrial variables in the Arctic. They do need a monitoring station placed at Alert on Ellsmere Island.

Calder commented that the Science Steering Committee is doing a good job and the agencies are recognizing this effort and trying to arrange to make things happen. The Interagency Arctic Research Policy Committee in its spring of 2001 meeting asked them to develop an implementation plan for 2003 and beyond. A draft has been prepared and submitted for consideration.

Fitzhugh noted that the Smithsonian was involved in the SEARCH Program not only in the cultural and biological areas but also in the presentation of results to other agencies and the public via their public education program. This effort for SEARCH fits well with the Forces of Change Program, which began a couple of years ago at the Natural History Museum. This is a large, integrated education program dealing with force changes in the world. Subsequent to it being on exhibit at the Smithsonian, it was a traveling exhibit around the country via the American Library Association.

The Smithsonian is experiencing some budgetary constraints so their initial effort will be limited to work on a web site and some education programs. A major exhibit will cost $2-3 million so they will work with other agencies to see if there is some way of helping defray such costs.

Brass commented that the Commission had contacted Bryan Hannigan who a member of Minority Staff on the Senate Energy Committee and runs the Climate Change Caucus. Hannigan was briefed about SEARCH and responded positively to the suggestion that the Science Committee make a presentation to them. Newton said that the Commission was continuing its efforts to get letters to OSTP and OMB from a couple of senators in support of the SEARCH Program; this would help with funding the interagency scope of the effort. Bessee said ARCUS is encouraging those who are working on or hope to work under SEARCH budgets to contact their Congress delegations in support of the program. Presentations before the Senate Climate Change Caucus are another thing they hope to do. Calder said they wanted also to make contacts with industry, people in Alaska and elsewhere, and state agencies to tell them how the SEARCH Program could benefit them in the future.

Brass noted that the University of Alaska had staged an infrastructure workshop with a focus on risk assessment in early in January in Anchorage but there were none from the insurance and banking sectors in attendance. These are the sectors which will hammered from storms, changes in sea level, and the melting of permafrost. Perhaps, Ed Rasmuson at Wells Fargo Bank in Alaska and a member of the Ocean Policy Commission will be a means to help make such contacts.

Treadwell said that he had four suggestions on how to create greater visibility. First, when Calder is in Alaska in February, he and others could set up a briefing of the press and others that should be interested in SEARCH. Second, efforts should be made to brief new administration appointees on how SEARCH is connect with other broad studies in the Arctic. The third was to make contacts with other caucuses beside the one focused on climate change. The fourth suggestion was to work with the Arctic Council; the interests of this organization include the work that SEARCH is doing.

Fate commented that it was important to work with the Alaska legislature, state agency officials, and regional and village corporations for activities of interest to the state. The turn over of people in the first two is expected to approach 80% by early 2003. Special efforts will be required to open and maintain contact with these new people.

Chairman Newton asked Muench to talk about what the Office of Naval Research (ONR) is currently doing in the Arctic. Muench started by saying that ONR had large programs in the Arctic in the 1970s and 1980s. The demise of the Soviet Union resulted in much lower budgets and less activity. However, the ONR continues to be interested in basic research on the Arctic environment and various types of technology related to marine operations in that area.

After reviewing the characteristics of the Arctic Ocean, he commented about current operational issues which included no clearly defined enemy, a region where undersea warfare is difficult, operational efficiency is deteriorating, and existing views of operational or strategic paradigms may no longer be valid. Their broad objectives now are on understanding processes, basic ocean physics, development of predictive models for ice coverage, development of improved instrumental techniques for use in the Arctic, and creating an awareness of the effects of environmental change in the region. They are developing an improved polar ice predictive system, which will have greater resolution, produce information on smaller areas, and improved ice coverage estimates. Their goal is to have this system in operation in 2003.

ONR in collaboration with the NSF has been involved in the SHEBA program, the Shelf Basins Interactions (SBI) program, and the development of long-term observations programs. With the demise of the SCICEX program they are pursuing the use of submarines-of-opportunity to continue to acquire information. They also are working on the development of autonomous underwater vehicles (AUV), the use of submarines from other nations, and trans-Arctic acoustic tomography. One of the AUVs under consideration would have a range of 1500 kilometers and a system to communicate while underway. He ended by saying ONR is seeking collaborative programs with other agencies beside NSF and foreign organizations.

Levitus presented information about NOAA data rescue efforts in the Former Soviet Union (FSU). There are four NOAA National Data Centers, one in Silver Springs, MD that is concerned with oceanographic data, the climatic data center in Asheville, NC, and the geophysical and snow and ice data centers in Boulder, CO. All four centers are involved in rescue efforts in FSU in their areas of interest. These rescue efforts are done under the auspices of intergovernmental organizations because of the representativeness and uniqueness of the geographic area.

The exchange process is quite complicated and labor intensive for the provider and receiver. Most of the older data is in manuscript form or on electronic media that is degrading. A great deal of the environmental data requires entry into electronic forms to be useful today. Acquiring the Meta data can be a labor-intensive task often requiring the expertise of the scientists whom gathered it originally.

Accomplishments to date include the preparation of joint data sets and scientific publications. The use of visiting scientist and data manager programs is crucial to the success of the process as well as adequate financial support.

Myers, the next one to make a presentation, provided background information about the Interagency Arctic Research Policy Committee (IARPC) for the newly appointed commissioners. IARPC, chaired by the NSF director, is comprised of 15 agencies. They prepare and publish the U.S. Arctic Research Plan on a biannual basis, prepare other publications, and provide a means for agencies with Arctic Research interests to interact with each other. He said that formative legislation put the generation of the Commission's goals report out of step with the process that must be followed by IARPC in preparing its biennial research plan. Brass commented that a Commission retreat in April will be used to start the preparation of its recommendations and that there should be a draft by mid July.

Myers then said there was a 6-year time frame in getting Commission recommendations into funded programs. Even when all agree that programs should be undertaken, starting them requires sufficient funds to support them. Another issue that they have is that some agencies believe the only agency with Arctic programs is NSF. Brass noted that ONR called its program to generate models of what is occurring in the Arctic Ocean as something else. Roderick inquired if agencies can asked OMB for support in funding a special program. Brass said Commission efforts to get letters from a Congressional delegation to OMB and OSTP is to make them aware a cross-agency approach is needed to advance the program.

Myers commented that the Commission has become involved with a number of agency officials to encourage support for Arctic programs. That is very important to their long-term success. There ensued a number of discussions about particular agencies, their current approaches, and possible ways to encourage changes. Newton asked Myers to delay additional comments until Colwell had made her presentation.

Colwell said she was pleased with the 8.4% budget increase her agency received in FY2001. As for SEARCH she indicated she could not say anything currently but some information

should be available by early February. She noted that one of results of the September 11 destruction of the World Trade Center focused the need for more engineering research and the development of a better anthrax defense and ways to combat other types of bio-terrorism. Within days of the attack on the World Trade Center, NSF funded social and behavioral science programs looking at economic impacts, building profiles of terrorism and terrorists, and the sequencing involved in the anthrax used last fall.

Newton inquired about what the Commission might do to help the NSF budget. She responded that she wanted support for the entire NSF budget. Recent experience has shown that the broad approach leads to significant funding increases while focusing on specific projects did not. She added engineering research must be increased. Engineering has become increasing significant but the number of engineers is decreasing and as well as the number of Americans taking engineering degrees. Brass encouraged more support for engineering research on Arctic issues; she responded that such support would be forthcoming soon.

Hobbie said that funds for research on microbes should become a high priority. Colwell said she agreed and one of the things that NSF is doing is trying to create a broader understanding of such needs in the minds of the public and Congress via a greater emphasis on conveying information about interesting findings, developments, and needs. Also, Brass noted that the Commission was continuing its efforts to gain more public attention via crosscut budget requests and research programs. More people would benefit and be inclined to support scientific research. Treadwell commented that he and Commissioner Roderick would be arranging briefings about the SEARCH Program in the near future for the Alaska community.

The chairman thanked Colwell and then asked Myers to continue his report. Myers said he wanted to conclude with an example to show that the Commission does have a positive impact. The Commission told NASA that it had not paid enough attention on the Arctic recently. That agency acknowledged that was correct and recent NASA research announcements have shown a significant increase in programs related to the Arctic.

Erb commented about lessons learning in working with other agencies in creating the multi-agency SEARCH program. Each agency has a different planning process and a different planning cycle in a different bureaucracy. Starting that process is perhaps half of the effort and it may take 1-3 years. To be certain it occurs White House, Office of Management and Budget (OMB) and Office of Science and Technology Programs (OSTP) support should be involved. He also noted the increase in the NSF Arctic Science budget in the past 3+ years. Newton said that the Commission hopes to stimulate a greater awareness within the Navy of the Arctic. He was concerned that not many seem to understand the strategic value and that the nation's national security is closely connected with capabilities in this area. The ONR budget has declined while the NSF budget has increased. Newton wants increases in the ONR budget as well as those going to NSF.

The chairman asked Pyle for his comments. Pyle said his briefing would cover 6 general topics. The first was their support of the Arctic Transition of the Land-Atmosphere System (ATLAS) Project, which is to be completed in 2002. The focus of this project was an inter-disciplinary study of the role of climate change on the ability of soil, hydrology, and tundra

plants to store or release greenhouse gases. Second among the topics were comments on the Surface Heat Budget of the Arctic (SHEBA) which has been underway for 9 years. It is a study of the role of climate on clouds and sea ice conditions affecting the storage of heat in the Arctic. Data are being used in models to simulate climate impacts. The third subject concerned the Arctic Mid Ocean Ridge Expedition (AMORE) project which occurred in FY 2001 and discovered evidence of hydrothermal activity on the Gakkel Ridge; more detailed information would be given later in the meeting by the chief scientist on the Healy. The fourth topic concerned NSF's work with ONR to develop AUVs to extend their knowledge of the Arctic seas at times and places where ships and people cannot be present. Sea-trials of an vehicle were conducted on the Healy in 2001. The fifth subject summarized was the forthcoming Shelf-Basin Interactions (SBI) program that will continue its fieldwork in the summer of 2002. The sixth concerned NSF being a strong supporter of the SEARCH Program, which was described to the Commission earlier in the day. Also, Congress requested that infrastructure requirements for Barrow be examined and a Barrow Arctic Research Center is under consideration. NSF is continuing its support of Arctic Research Logistics. ARCUS has been requested to update its earlier survey on logistic needs and provide a report.

Roderick asked for examples of why an autonomous vehicle was needed and what it would do. Pyle responded by saying that AUVs would be pre-programmed to go to certain places, do certain things, and transmit the data to the scientists doing the project. For example, it would be a convenient way to study seasonal variations in Arctic Ocean temperatures.

Newton asked Peter Michael to make his presentation. Michael started by saying that he had been the chief scientist on the U.S. Icebreaker Healy for the Arctic Mid Ocean Ridge Expedition (AMORE). This icebreaker joined by the Polarstern from the Alfred Wegner Institute completed a 65-day cruise in early October 2001. They conducted geological and biological work along the Gakkel Ridge in the Arctic Ocean. This is the slowest spreading of the mid-ocean ridges. They were testing models for what happens as the spreading rate goes to zero, exploring the sub-Arctic mantle, and determining the relative importance of transform faults and spreading rates on volcanism and segmentation. They were also assessing the capabilities of the Healy to perform in Arctic Ocean ice.

The cruise was a success. The two ships acquired 100 dredge samples; only 60 had been expected. They had not expected hydrothermal activity but they found 10 vent sites, strong evidence of microbiological activity, fresh sulfides, and perhaps hydrothermal vent fauna.

The research team found that working on the Healy was a positive experience. The ship's culture was one of "Can Do" rather than "Maybe or Cannot Do." The ship's officers were intelligent and motivated; everyone was a student or teacher. They found that it was considerably different than working on UNOLS vessels; more planning is needed and the marine science technicians (MSTs) are less experienced but cross-trained. The icebreaker had sufficient power and maneuverability, its laboratories were spacious and efficient, and the winches worked well but the conductivity, temperature, and depth (CTD) measurements need improvement. Also, needing improvement were the deck layout, communications, and helicopter support.

Brass commented that helicopters take off and land frequently on the Polarstern. It was a procedural process that led to delays on the Healy.

The chairman thanked Michael for his presentation and asked for a motion to adjourn the 63rd meeting. The meeting was adjourned at 16:45 p.m. on a motion by Hobbie, which was seconded by Treadwell, and passed unanimously.

George Newton, Chairman
Activities Report for the Period: September 2001 to January 2002

Meetings/Conferences Attended:

● Perspectives/Future of Arctic Ocean Research
- Stockholm/November at Swedish Royal Academy of Sciences; presentation on submarines contributions to Arctic Ocean research

● Science Advisory Committee at Arctic Geophysical Union in San Francisco/December
- Executive Director chairs committee and Chairman is a member.
- Rejuvenating the committee to ensure there is better communication between communities
- New/revised priority list for data collecting being prepared

● Risk assessment of Alaska's Infrastructure 2002, 5th annual workshop
- Event held at University of Alaska Anchorage in Anchorage; USARC supported/good attendance; Orson Smith led (USARC inspired)
- Tenure decision in process for Dr. Smith. Letter of support sent to UAA
- Concerns expressed for the warming trend in Alaska and its effect on infrastructure.
- Expressed essence of meeting to Alaska Governor's Office and Senator Murkowski's staff.

● Visited the Canadian embassy to hear speech and spoke with the government leader of Nunavut, Paul Okalik, regarding Nunavut Science and Research perspectives.

Individual Meetings held
- Mr. Bill Woolf of Senator Murkowski's staff and Dr. Bryan Hannigan
- Dr. Craig Dorman, Science Advisor to Chief of Naval Research and prospective Vice President for research at University of Alaska (March)
- Mr. Peter Spotts, a Science reporter for the *Christian Science Monitor* to discuss recent events and research in the Arctic.
- Met with Commander Zdanka Willis, Director of the National Ice Center in Suitland, Maryland and her relief, Navy Commander Steve Warren, to discuss USARC/NIC and research.
- Later was invited and attended their change of command. Commission was mentioned as a "friend."

U.S. Arctic Research Commission
Minutes of the 64th Meeting
April 15th, 2002
Reluctant Fisherman Inn
Cordova, Alaska

Chairman Newton called the 64th meeting to order at 8:20 a.m., April 15, 2002. In attendance during the meeting were:

a) Commissioners and staff: Mr. George Newton, Chairman; Mrs. Mary Jane Fate; Dr. Jacqueline Grebmeier; Dr. John Hobbie; Mr. James Llewellyn; Mr. John Roderick; Mr. Mead Treadwell; Dr. G. W. Brass, Executive Director; Dr. Lawson Brigham, Deputy Executive Director; Mr. Lyle D. Perrigo, Alaska Office Director; Ms. Amanda Saxton, Intern; and

b) Others: James Aguiab, public; Rhonda Arvidson, Prince William Sound Regional Citizens' Advisory Council (RCAC); Tom Church, Vice-Mayor, City of Cordova; Walter Cox, Oil Spill Research Institute (OSRI); Abigail Dunning-Newberry, public; Tom Newberry, Mineral Management Services (MMS); Tylan Schrock, Vice Chairman, North Pacific Research Board and Director, Alaska Sealife Center; Cinthia Stinson, Cordova Times; and Dr. Gary Thomas, Director, Prince William Sound Science Center.

Agenda and Minutes

Chairman Newton asked for a motion to accept the agenda as proposed by the Executive Director. Commissioner Fate moved acceptance and Commission Llewellyn seconded the motion. It was accepted by unanimous consent of the Commissioners. Action on the minutes of the 63rd meeting were deferred to a later time. Brass commented that future plans for the minutes called for decisions to be placed in bold letters and action items identified by italics.

Welcoming Comments

The chairman called upon Cordova Vice-Mayor Tom Church to make his comments. Church welcomed the Commission to Cordova and then said he had noted from the Commission's web page its interest in having the results of research disseminated and shared with the public. He said the latter is of special interest to the local citizens. Some years ago NASA officials asked a teacher to arrange for a group of students to use a GPS system to monitor seismic activity locally, calibrate the equipment daily, and to transmit acquired data. These data were used to measure the movement of the tectonic plate on which Cordova is located and how much it is rising. The students were keenly interested and acquired the data. After two weeks the scientists took the data and the students have never heard anything about the results of the study.

Church then contrasted this event with some state and local efforts to communicate with the public. A scientist from the Auke Bay Laboratories in Juneau spoke recently to the community about research on the longer term effects of the Exxon Oil Spill in Prince William Sound. Church said that Gary Thomas, from the Prince William Science Center, did an excellent job of

sharing information with local fishermen and the community. This center also has an outreach program in the schools and during the summer a science camp for students. The Cordova Vice-Mayor suggested that similar programs by other agencies and scientists were needed.

Presentations to the Commission

The Chairman asked Dr. Thomas to make his presentation. Thomas said he would describe their ecosystem research and management program, their findings in its use, and make suggestions about its broader application. The focus by most predicative models is on large systems such as the Gulf of Alaska and the Aleutian Islands. Year-old data are used in predicating the status of various fishing stocks. That approach is flawed and contributes to over-fishing in certain areas. Crashes of herring and pink salmon in Prince William Sound after the 1989 Exxon Valdez oil spill led to a blockade by local fishermen of the Valdez Narrows. One of their demands was for ecosystem research; that led OSRI to use a Globec-like program in the period 1994-1998 and it produced very promising results. They used multiple high and low frequency sound assessments of adult and juvenile fish schools. These are used to identify schools where there are adequate numbers for fishing and avoiding harvests of those that are marginal or in decline.

Thomas told next of OSRI research on the application of forecasting models in assessing the effects of oil spills and responses. OSRI provides data on physical measurements to the University of Miami where they are integrated into a Princeton Ocean Model and the forecasts are then returned to OSRI where they can be used in realistic oil spill simulation projects. Data on atmospheric conditions are going into an archive to provide people information in the future. He then provided details on how they amass physical data which is done via Acoustic Doppler Curve Profilers and wind velocity and direction measurements. These data are used to develop current model and wind models which can be applied to evaluate oil spills and potential risks in a systematic fashion.

On the biological side OSRI uses a carbon budget model to look at the populations of fish and plankton that store most the carbon; they have found that herring, pollock and copepods are the primary basis of forage in the spring bloom each year. They have discovered that there are distinct stocks of fish and that finding is the basis for their biological scaling efforts. Acoustics are used to make repeated measurements in small areas. Such is not done in fisheries science; agencies are setting quotas based on pre-season forecasts coming from previous season observations. The OSRI approach using acoustics identifies weak as well as strong stock. The latter can be opened to harvesting while the former are not. It maximizes harvests where the stocks are strong which benefits local communities while protecting the weaker stocks.

They also found that herring are open gas-bladder fish as are salmon. This means that both species are susceptible to oil spills and this is related to their declines after the grounding of the Exxon Valdez. Much lower herring populations have had negative impacts on the species that feed upon them such as fish eating birds, Stellar sea lions, harbor seals, and killer whales. They are developing a virtual biological ecosystem built on herring and pink salmon. Thomas believes that similar approaches are needed to relate declines of Stellar sea lions in the Gulf of

Alaska and the Bering Sea. The National Marine Fisheries looks at too large of an area in trying to determine availability of pollock and other species.
OSRI wants to link its virtual physical and biological models to create an operational fisheries oceanography that can do the things that he described as having been accomplished by the two component parts.

Fate said that drastic changes had occurred in commercial fishing in the Yukon River and Thomas said that the same strategy can be applied in fresh water systems. Quotas set for the Copper River Delta, so far, have used the old approach. Measurements are needed to tell what the marine levels, micro-climatic effects, and animal distributions are so specific forecasts can be generated. Treadwell inquired if the systems he described could be used elsewhere, such as the Bering Sea, to deal with distinct stocks. Thomas responded saying that where there are herring they understand how they could apply what they have but for pollock they do not currently have all the needed background information. Treadwell said the reason for the question was to help the Commission in preparing priorities for its Goals and Objectives report this summer. Thomas responded that the National Academy of Science team, which reviewed fisheries management in the U.S., said the first need was to move away from pre-season deterministic estimate to the development and use of stochastic processes of measurement. That is what OSRI has done and what he described. He believes in merits of making repeated measurements and beginning at the level where the governing processes start. Hobbie commented that he would like for Thomas to comment again about the importance making measurements over time. The latter said that was very important. Hobbie asked how long it had taken to develop the model. Thomas indicated that it was first necessary to make measurements over time; they had more than 10 years of data to test models and these were fine tuned in the past 4-5 years. He then said that they have a sustained monitoring program that is very important. Often long-term monitoring has been criticized but it is what made their efforts successful. In conclusion, he remarked that the National Marine Fishery Service was not happy with their findings but one has to be ready for a little flak when you challenge management decisions.

Newton called upon Walter Cox to make his presentation. Cox said he would be addressing two topics, summarizing what David Dickens of D.F. Dickins Associations Ltd. found regarding research needs to develop effective responses to oil in ice-covered waters and, second, telling of OSRI's efforts on a study of mechanical oil recovery in ice infested waters (MORICE). What Dickens did was develop a matrix from the materials generated at the Oil in Ice Workshop in Anchorage in 2000. The objectives were to identify R&D deficiencies and associated problems and then identify priorities for recommended research projects. Dickens identified 77 Research & Development (R&D) ideas and prioritization based on likelihood of success reduced that number to 28. Mechanical recovery in broken ice and remote sensing to detect oil in or under ice were given secondary priorities because the little promise for further advances.

Dickens said of at least equal importance in developing a research agenda was conducting work to identify full responses to every possible response option without delaying oil spill work. Today artificial constraints cause inappropriate response planning procedures. Most

were originally designed for spills in open water. Ways of over-coming these constraints are needed. These may require new legislation and regulations.

R&D priorities were comprised of developing realistic scenarios to evaluate effectiveness, conducting experimental field spills with real oil, tank testing with oil and ice, developing and demonstrating real-time information systems, testing of in situ burning of oil in pack ice and brash, and evaluating the effectiveness of dispersants in pack ice and brash. Recommended follow-on work includes conducting a "Think Tank" workshop to build on priorities, publishing the results of the work and the output of the workshop and, thirdly, working with industry and agencies to pursue promising avenues of improvement.

Newton asked if development costs were considered in identifying the most effective R&D options and Cox said they had not been considered directly but they had been considered implicitly. Brigham asked if plans for a "Think Tank" review called for an electronic meeting or having a group of people come together? Cox said his preference was for a group of people to discuss the possibilities and having them together is more effective than the other approach. Treadwell asked if the results were to be presented to AMOP and whether there was enough time to organize a "Think Tank" session at that meeting. Cox said Dickens would be making the presentation and that he believed it would take more time to organize therefore they would not be getting together at the June AMOP meeting. Brass inquired about the use of ROVs for detection of oil under ice; advanced ones can now be operated autonomously. Treadwell asked if these devices were readily available and Brass said a center at UAF was providing these devices for research activities. Cox did not respond.

Cox then reported on the MORICE research program saying it had been a six-phase process to develop technology to enhance mechanical oil recovery in ice infested waters. The six phases involved a literature review, quantitative testing of concepts, quantitative testing of components, field testing of prototypes, testing of prototypes with oil in ice, and then testing of the most promising prototypes. The Minerals Management Service (MMS) and the Norwegian Institute of Technology (SINTEF) conducted Phase 1 and Alaska Clean Seas joined them in Phase 2 with OSRI coming aboard for Phase 4. Cox then described the seven concepts investigated which were a lifting grated belt, a submerged grated belt, brush and brush-drum, an air conveyor, rope mop, auger deflector, and an Archimedean screw vehicle. Brass asked if transportability of the cleanup equipment had been considered and commented that Coast Guard icebreakers may not be available in the winter. Cox said they would have to wait until spring or the summer because most of these devices would likely too big for air transport.

Cox commented that Phase 2 work was focused on small scale concept testing and Phase 3 was on quantitative tank testing but still directed at components, not prototypes. Phase 4 encompassed work on the most promising concepts which were the skimmer, the brush drum, and the lifting grated belt systems. The latter was subjected to sea trials at Prudhoe Bay. The Phase 5 work was conducted in HSVA tank testing facility in Hamburg. It was open to collaborative efforts by commercial interests and included the Foundation for Scientific and Industrial Research at the SINTEF and Commercial Institute of Gabe Lorian (Lori). Phase 6 involved tests of oil and ice work at Svalbard with SINTEF. After preparing channels in the ice for their tests and heavy snowstorm brought their efforts to a standstill. By the time they

recovered from the storm the ice was beginning to breakup so that part of the program was ended which led to Phase 6.1 at the MMS Oil and Hazardous Materials Simulated Environment Test Tank (OHMSETT) in New Jersey. After a series of tests the brush drum recovery technique was proven to be a promising process. It could be used under certain conditions to recover oil in broken ice.

Treadwell asked what their source of funding was and Cox said ACS was the largest funder but monies were also made available by OSRI and MMS.

Newton thanked Cox and asked Rhonda Arvidson to make her presentation. Arvidson said she worked for the Prince William Sound Regional Citizens' Advisory Council (RCAC) which is an independent, non-profit corporation whose mission is to promote environmentally safe operation of the Valdez Marine Terminal and the tankers which use that facility. Their work is guided by the Oil Pollution Act of 1990 and a contract with Alyeska Pipeline Service Company. They have 16 paid employees and over 40 volunteers. Her first topic focused on their ice detection radar project.

Arvidson said the source of ice impinging upon the shipping lanes into and out of the Valdez Terminal was the Columbia Glacier. These icebergs are only semi-buoyant because they contain large amounts of gravel and rock. A risk assessment on perils to shipping in Prince William Sound in the 1990s concluded that icebergs were a contributing factor in the grounding of the Exxon Valdez in 1989 and the cause of over $1 M in damage to an inbound tanker in the 1990s. Another RCAC project produced information suggesting that the Columbia Glacier will continue to calve for the next 20 - 40 years.

Mitigating those risks became one of the driving forces leading to the real-time ice floe/berg observation program. Such a program would be necessary to accommodate the locations and rapid changes in direction of ice movements into shipping lanes to and from Valdez. The project involves NOAA, OSRI, the Prince William Sound Community College, Alyeska Pipeline, the U.S. Coast Guard, the Alaska Department of Environmental Conservation, the Ship Escort Response Vessel System (SERV), and RCAC. They have installed a conventional radar system on Reef Island and they are now working on use of a UHF system to pickup ice that is semi-buoyant or floats just below the surface. The Reef Island facility will soon go through an extensive field testing program with SERVS and the Coast Guard having immediate access to its output. Because of liability issues, others will not have access until it is proven to be reliable and useful.

Brigham asked if the number of icebergs had increased in the past few years; Arvidson said the number had increased markedly. Brigham then inquired if they had considered using bottom-moored sonar systems. Arvidson commented that they had considered that option but chose to avoid bottom noise problems that might affect sea life.

Arvidson said RCAC was interested in studies on the use of dispersants. They are cooperating with OSRI on a modeling project. In a separate effort they are hoping to define the advantages and disadvantages of using dispersants in Prince William Sound. In the former category are: prevention of stranding oil in inner-tidal zones, reducing hazards of discharged oil on marine

bird, enhancing degradation of oil components, and reducing chronic impacts on habitats. Disadvantages included acute biological effects on some organisms and impacts on water columns. The RCAC role in the field of dispersants is to push for relevant research to clearly identify hazards involved in their use in the Sound. Dispersants may also have health and safety impacts. RCAC is interested in getting studies done on the use of in situ burning versus the use of dispersants.

State and federal laws require the use of best available technology in oil spill prevention and response. Approaches must be reviewed every five years and one is due in 2002. RCAC is asking for support to help fund such a conference later in the year. Arvidson believes that the U.S. Arctic Research Commission should push for more work on hydrocarbon laboratory and field measurement technologies in broken ice conditions in marine waters as well as oceanographic monitoring techniques applicable for the Sound. They want to see what the best technologies are and what can be done to improve them.

Chairman Newton introduced Tylan Schrock and asked him to provide an overview of the North Pacific Research Board (NPRB). Schrock said the NPRB was created by Congress to recommend needed marine research off Alaska to the U.S. Secretary of Commerce who will be making final funding decisions. Funds will come from the interest earned by the Environmental Improvement and Restoration Fund that Congress established in 1997. These funds come from part of those generated from the state-federal lawsuit over ownership of submerged lands known as the Dinkum Sands north of Prudhoe Bay. The 20 member Board also manages the North Pacific Marine Research Institute at the Alaska Sealife Center.

The mission of NPRB is to develop a comprehensive, high-caliber science program to enhance the understanding of the North Pacific, the Bering Sea, and the Chuckchi Sea ecosystems and fisheries. It will do its work through science planning, prioritization of pressing fisheries management and ecosytems informational needs, coordination and cooperation between research programs, competitive processes in the selection of projects, increased information access, and public involvement.

Schrock said that NPRB is in a startup mode. He remarked that the area to be encompassed in the "North Pacific" has not been resolved and currently is open to various interpretations. Because the money available to NPRB is from the Dinkum Sands settlement, funding research projects is not constrained by the normal appropriation process and constraints. The Secretary of Commerce, however, must approve the funding of research projects, but if he does not, the funds return to NPRB.

In response to a question by Commissioner Fate regarding coverage of freshwater as well as seawater, Schrock said the issue had not yet been resolved. NPRB is trying to develop a research program but currently it on a year-by-year basis. They want to create research priorities but right now they are just trying to get things running. They have just issued an RFP which is wide open to good proposals because they do not have the ability yet to narrow their focus. These initial projects will be of one year duration. He said he hopes they can move into long-term monitoring project that will provide basic researchers with useful background data

and information. Also, the National Research Council, of the National Academy of Science, is conducting a study of what the real needs are in the NPRB's area of interest.

Treadwell said an issue for the Commission is how it can work with NPRB in the creation of an integrated research effort. This effort should include the State of Alaska and federal-state agencies. The Chairman Newton asked for a motion to endorse the concept by the NPRB to have the National Research Council create a strategic master plan. Grebmeier moved approval and Treadwell seconded it. Schrock commented that he believed that having an outside group develop this plan was a good idea but does the National Research Council have the right to do it? Brass remarked that having the National Academy prepare such a document gives it an authoritative standing within federal agencies. That in turn gives the Commission a tool to induce the cooperation and coordination between agencies. Treadwell suggested that the Commission co-sponsor the planning effort so as to make it as much a Commission endeavor as that of NPRC. Brass said that the Commission does not have funds to support such an endeavor and Newton said the Commission cannot co-sponsor that effort; it promotes cooperation for such a plan but does not go beyond that point. The Chairman called for a vote on the motion; it carried unanimously.

Brass said that there is one challenge before the board and that is not to become so engrossed in what the board is doing as keeping an eye on what others are doing. Doing so means it can function efficiently in its role of coordination. Hobbie asked what the schedule was for the delivery of the NRC report? Newton said it would be 15 - 18 months after beginning the project.

The Chairman added an item to the agenda related to the SEARCH Program and asked Commissioner Hobbie to described his concerns about the lack of a strong biological component in that program. Hobbie said the question is how to get the SEARCH Program to have a stronger and more realistic biology component. Part of the problem is the original concept for SEARCH was devised by a physical oceanographer, but NSF insisted that the program be broad and include a number of disciplines. No biologists attended the initial meetings to organize the program. The other disciplines are almost two years into the process and what biology is involved now is weak and is not a broad as needed. Recently Dave McGuire, a full-time USGS employee who does work at the Institute of Arctic Biology, UAF, has become involved. He is has done extremely good work in relating terrestrial biology models to whole system modeling efforts concerned with global conditions including oceans and atmospheric systems. Hobbie said McGuire is relatively new in the field and Hobbie hopes that his input will be accepted and used in the program.

The next step is for Jamie Morrison, who is sensitive to biology needs, to convene a small committee of 10-15 people to work on this issue. Dave McGuire and George Hunt will be co-chairmen. The idea is to first identify the key issues. This will be difficult because these issues have not really been considered in detail previously. Complicating this matter is the desire of other SEARCH leaders to devise a plan that runs parallel to other SEARCH program components. Hobbie believes this will be difficult for people who have not worked together previously to develop such an approach but said if they can, it would be a good point of

departure for getting a strong biological component into the SEARCH program. A meeting of this planning group is currently scheduled for July.

Grebmeier commented that it was important for the agency and physical science community to recognize that the public is going to note changes to the biological world first if there is climate change. Biology must be accommodated within the SEARCH Program. Brass asked for a consensus on what the Commission was supposed to do. Hobbie suggested encouraging Pyle at NSF to keep this issue in the forefront of discussions. Brass responded by saying that every time he talks with Pyle and Calder about the SEARCH Program that he notes the weakness of the biological component. Chairman Newton suggested that it be a topic for further discussion at the October meeting in Hanover, NH. Treadwell encouraged working with the local press in Alaska to continue getting broad coverage of SEARCH program activities in Alaska this summer. Doing so would increase public awareness of the entire SEARCH effort. Newton said the Commission would encourage such coverage without question.

The chairman asked for a motion to adjourn and Treadwell so moved. Grebmeier seconded the motion which passed unanimously ending the meeting at 11:45 am

Chairman George Newton
Activities Report for the Period: January 2002 – April 2002

● Considerable time was spent working to develop U.S. action in responding to the tenets of the UNCLOS, particularly Article 76, concerning the survey of the Arctic continental margin north of Alaska to allow seabed resource claims by the U.S.

- Executive Director went to the United Nations meeting in November to review the Russian claim to the North Pole.

- Attended multi-agency meeting at DOS in December.

- Met with Chief of Naval Operations staff and the Naval Reactor's staff (Admiral Bowman) to address U.S. position and possible courses of action.

- Actively discussing with Canadian federal agencies conceiving possible cooperative action to do a multi-nation survey with an U.S. submarine. Navy is fully aware and in some areas has encouraged positive action.

- Worked with Coast Guard, Chief of Naval Operations' staff, and USCGC Healy's design agency to encourage Healy's participation as an offshore logistics base for a Navy Arctic exercise that will occur in FY-03. Not successful, but such action will be considered again for a later exercise.

● Drafted letter to Chief of Naval Operations' staff to request release and declassification of Bering Sea data collected over the past 40 years as submarines traversed the Bering Sea to and from the Arctic. No reply yet.

● New Year 2002: Administrative objectives for the Chair, USARC
- USARC History preparation and oral history of past chairmen
- USARC website - stand alone as arctic.gov
- New brochure
- Get change acted on ARFPA
- Ocean Commission agenda (Be a participant and influence outcome.)
- Better communication within the commission and between commissioners.

U.S. Arctic Research Commission 65th Meeting July 15th, 2002
State Plaza Hotel, Envoy Room, and Department of Interior, Room 5149
Washington, D.C.
and
July 16th & 17th, 2002, Lamont Hall, Lamont Doherty Earth Observatory
Palisades, N.Y.

Chairman George Newton called the 65th meeting to order at 9:09 a.m., July 15th, 2002. In attendance during the meeting were:

a) Commissioners and staff: Mr. George Newton, Chairman; Dr. John Hobbie; Mr. John Roderick; Mr. Mead Treadwell; Dr. G. W. Brass, Executive Director; Mr. Lawson Brigham, Deputy Executive Director, Mr. Lyle D. Perrigo, Alaska Office Director;

b) Others: Jaime Bessee OS/SIO; Paul A. Bienhoff, JHU APL; Pierre E. Biscaye, Research Scientist; Gerard C. Bond, Doherty Senior Scholar, LD; John Calder, National Oceans and Atmospheric Administration (NOAA), Arctic Research; Dale Chayes, Senior Staff Associate, LD; Jim Cimato, Minerals Management Service, (MMS); James R. Cochran, Doherty Senior Research Scientist, LD; Rosanna D'Arrigo, Senior Research Scientist, Lamont-Doherty (LD); Stephen Dery, Research Scientist, LD; Jim Devine, Department of the Interior, USGS; John Haugh, Bureau of Land Management; Kenneth L. Hunkins, Special Research Scientist, LD; Gerd Krahmann, Doherty Associate Research Scientist, LD; Charles Langmuir, Senior Research Scientist, LD; Thomas M. Marchitto, Jr., Research Scientis, LD; John C. Mutter, Associate Vice-Provost, The Earth Institute at Columbia University & Executive Deputy Director, LDEO; Charles E. Myers, National Science Foundation/IARPC; Drue Pearce, OS/SIO; Robert Newton, Research Scientist, LD; Dorothy M. Peteet, Senior Research Scientist, LD; Stephanie L. Pfirman, Adjunct Research Scientist, LD; Raymond N. Sambrotto, Doherty Research Scientist, LD; Peter Schlosser, Vinton Professor of Earth and Environmental Sciences, LD; Jeffrey Shaman, Department of Earth and Environmental Sciences, LD; William Massie Smethie, Jr., Doherty Research Scientist, LD; Charles E. Smith MMS/TA; Tom Stewart, FWS/NWRS; Taro Takahashi, Associate Director, Geochemistry, LD; Jim Tate, Department of the Interior, DOI; and Bruno Tremblay, Doherty Associate Research Scientist and Storke-Doherty Lecturer.

Agenda and Minutes

Chairman Newton noted that the meeting number should be the 65th and then he asked for a motion to accept the agenda as modified. Commissioner Treadwell moved acceptance and Commissioner Roderick seconded the motion. It was accepted by unanimous consent of the Commission. Commissioner Hobbie moved acceptance of the minutes of the 64th meeting and it was seconded by Commissioner Roderick. The motion was accepted by unanimous consent of the Commission.

Report of the Chairman's Activities

Chairman Newton provided the Commissioners and staff with a list of the meetings he had attended on behalf of the Commission since the last meeting.

In his elaboration of what occurred at these meetings, he reported that he and Executive Director Brass met with Senator Judd Gregg's staff to discuss the status of Article 76 of the Law of the Sea. Included in their presentation were concepts of U.S. commerce and the need for a mapping project of the Arctic Ocean. Senator Gregg has arranged for Larry Mayer, Director of Center for Coastal and Ocean Mapping of University of New Hampshire to examine all the U.S. continental shelves and determine what swath bathymetry data exists. Such data would be assembled to make a claim under Arctic 76. Mayer said there was nothing in the Arctic Ocean that would satisfy the need for a claim. Newton and Executive Director Brass commented that they did not believe Mayer had sufficient data to make such a statement.

Newton attended the Arctic Science Summit Week in Gronningen, Netherlands, in late April. It was a great opportunity to hear what is being done internationally in the Arctic and to meet many people involved in those scientific efforts. Another meeting that Newton highlighted was one by the Ocean Policy Commission. He was most unhappy with the comments made by the director of the Applied Physics Laboratory (APL), University of Washington. The latter did not know of the efforts of the Commission in focusing more attention on Arctic research needs, establishing the SCICEX Program, and arranging for SEARCH, one of the key programs at APL. Also, the director commented that he did not believe the Commission had been useful. Newton plans to address the Oceans Commission at its August 2002 meeting to provide a statement on what the Arctic Research Commission has done and its successes.

The chairman met with Paul Edgerton, Executive Director of the European Polar Board, on June 11. Their discussion was focused on collaborative association between the two organizations. At this stage the intent was to exchange information and then see where this may lead. The European Polar Board is interested in both poles and is comprised of representatives from all European nations including the Ukraine and Georgia.

A meeting that Newton attended on his regular job should be of interest to the Commission. Contact with the National Imagery and Mapping Agency (NIMA) revealed that there is no maritime navigational warning areas in the Arctic Ocean because no one went into that ocean. The decreased presence of ice in the Arctic Ocean changes these conditions radically. Something should be done to provide navigation warnings. Newton drafted a message for the science web site rather than make broadcasts to forward maritime warnings.

On June 25th Newton attended the second planning session for the FY 2003 SCICEX cruise. There are expectations that there will be scientific work for a time segment of up to 10 days of the voyage. It will involve the use of instruments to collect data. No scientists will be on board and no modifications to the submarine will be made.

An early June meeting with George Taft at the State Department concerned the Article 76 of the Law of the Sea. On the 30th Newton met with Dr. Norman Neureiter, science and

technology advisor to the Secretary of State. Neureiter and others will be looking at the issue to determine its importance from their perspective. Newton believes that it will generate wider interest in DOS and not be solely focused on the Law of the Sea.

On July 8th the Chairman and Executive Director met with Dr. Rita Colwell, NSF Director to discuss Article 76 issues. It was a disappointing meeting. She looked at the issue and said it was nothing but "pork." Newton tried to disabuse her of that idea and convince her it was a national priority item. Apparently, a past experience with a project of one of the Alaska senators came to her mind. Also, he believes that she continues to associate the Commission with the difficulty she has had with the International Arctic Science Center (IARC) which to her was "pork."

Hobbie inquired if some money for this effort had been included in the president's budget and if contact had been made with the National Security Council (NSC); Newton said that had not occurred in either case. Brass commented that there are two reasons for it not being in the budget. First the Navy has a limited number of submarines and second no agency is prepared to sponsor this effort because it will cost $12M. Adding emphasis to the need is a recent vote by the Russian Duma that they wanted to renegotiate the boundary between their country and the U.S. Newton said that enlisting the support of the Danes, Norwegians, and Canadians to do something similar in concert with the U.S. may be a viable approach. Newton concluded his comments by saying that he was continuing his efforts to get Navy historical data released on the Bering Sea.

Commissioner Reports

The Chairman asked Commissioner Roderick to make his report. Roderick said that the possibilities for the gas pipeline were still alive but the question now is when it will be built. Gas prices dropped in recent months and the anticipated costs are too high to move forward at this time. Chairman Newton inquired about the release of a study done in 2001 by the oil companies. Roderick responded that to the best of his knowledge that report had not been released to the public. He added that some of the oil companies are saying that the construction of such a pipeline would cost $18-20 billion. Newton asked if the oil companies were still talking about using a northern route across the Beaufort Sea to Canada and then southward. Roderick commented that BP and Phillips were currently talking about following the pipeline to the Fairbanks Area and then parallel to the Alaska Highway. Brass inquired about the cost of the Trans Alaska Pipeline (TAPS) and Roderick said it was about $9 billion +/- 20%. Treadwell remarked that he published an article in the *Alaska Business Monthly* two years ago that predicted a one-year swirl on the gas line followed by no action. That is understandable with current market conditions. It also provides opportunities for the state to create a broader awareness and build a consensus for such a development.

Chairman Newton called upon Commissioner Treadwell to make his report. The first topic Treadwell addressed was efforts within Alaska for state agencies to identify and coordinate research activities with federal agencies. The Alaska Legislature Joint Resolution 44 passed encouraging such cooperative endeavors. This was a step in the process of creating cross agency communications, the exchange of information, and work with federal agencies. These,

also, are important endeavors in avoiding duplication and overlooking research needs. It is a means of educating state leadership on the value of research and development to the economy of the State of Alaska. Dr. Craig Dorman, UAF, has taken the lead in organizing a response.

As a means of continuing the process, Treadwell suggested that a memorandum of understanding (MOU) be prepared and signed between the Alaska Science and Technology Foundation (ASTF), and the University of Alaska, and the Commission to further and expand the efforts that are currently underway. The Commission could look at such a step as a way of helping to implement one of its positions taken in the 2001 Goals and Objectives Report. Brass responded saying that such might be useful and that the efforts of the joint task force should be presented to the Interagency Arctic Research Policy Committee (IARPC). It would take a lot of groundwork to produce useful results with the federal agencies. Newton commented that after the formal signing of a MOU there should be a workshop to increase visibility and to give the public in Alaska the opportunity to contribute.

Treadwell noted that the Arctic Council ministerial meeting is to occur in early October and that Iceland will be assuming the Council Chair at that time. Iceland announced its priorities that include a social science survey of the status of people in the Arctic and furthering the use of telecommunications. The latter fits with the Circum-Arctic Infrastructure Task Force (CITF) objectives. A meeting with the deputy postmaster general was focused on identifying postal issues that required applied research and special consideration. One issue was the preparation of a feasibility study of using east-west air routes to enhance the movement of mail. There are 800,000 pounds of mail annually that go between the western states and Russia. Chukotka Governor Abramovich is keenly interested in more air traffic to the Russian Northeast and is promoting Anadyr as the hub. There is interest by U.S. airlines also. They are seeking more direct routes to Sakhalin Island where currently there are oil developments and production. Going through Korea and Japan is not always an easy way of getting to their destination.

Treadwell reported that sections 10.10 and 10.11 of Alaska National Interest Lands Conservation Act (ANILCA) called for the Department of the Interior (DOI) to conduct surveys of resources on public lands in the state and annually issue reports on its findings and efforts. The U.S. Geological Survey, however, has not prepared a report since 1997. Apparently DOI felt during the late 1990s that finding resources was not part of its job. Treadwell said that there may be different philosophies about finding versus mining such resources but he believed it was very important for the nation to understand what it owns. Also, he suggested that a comment be added to the Goals and Objectives report reiterating the importance of such work and the need to report results as demanded by (ANILCA).

Another topic Treadwell addressed was the economic impacts on Arctic natives by the Marine Mammal Commission forbidding the sale and trading of ivory products in the U.S. The Nunuvut Province Premier of Canada expressed hope recently that the U.S. position could be altered so that its products and those of other Native people could be marketed. Brass said he believed that the U.S. might make an exemption for Native peoples in Alaska like they have for whaling. He believed that Congress would not open that issue for the Canadians. If such action was taken the Greenlanders and Norwegians would campaign to hunt whales.

Treadwell said that recommendations for changing the Act governing the scope of the Arctic Research Commission had been included in the House's energy bill. It passed the House but not the Senate. It is now under discussion by a joint committee of the U.S. Senate and House. Maybe the wording calling for an expanded scope for the Commission will be stripped from the bill and then considered by these two legislative bodies as a separate item.

The Chairman asked Hobbie to make his report. Hobbie said that one of his efforts focused on what would be included in a report to be prepared by an inter-governmental panel on Arctic Climate Impact Assessment (ACIA). Plans call for it to be comprised of 17 chapters; a great deal is focused on the impact on humans in all areas. It will be broad, extensive, and currently there is no date for completion. Hobbie is involved in preparing the section concerned with fresh water and terrestrial issues. A problem for him is the emphasis placed on the entire Arctic but unfortunately not too much research has been done in the fresh water realm for most Arctic areas. Brass commented that he hoped the final product would contain three elements; 1) a good idea, 2) identification of one or more sources of funding, and 3) identification of someone who will prepare the proposal and work the system to encourage it funding.

Hobbie said he was concerned about the future of the International Arctic Research Center (IARC) at UAF. The three year cooperative agreement supported by NSF ends at the end of April 2003. NSF is not pleased with the methods that the current director uses to control research projects as well as management of the center. Hobbie said that John Walsh from the University of Illinois, a very well regarded terrestrial biologist, was interested in going to IARC but that would likely not occur if the current director remains. Walsh feels that he does not and would not have the freedom to pursue his Arctic research if the present director remains. Brass commented that the new cooperative agreement must pass a peer review. Myers remarked that the review would determine what actually happened as a result of the initial three year cooperative agreement and if a different management structure was needed. Hobbie said the current management structure was likely to preclude high quality people being able to lead and do good science. Treadwell commented that the current director had strong ties in Japan that have beneficially affected research support. He hoped there was some way to ensure institutional stability while addressing other issues. Brass remarked that he asked Dr. Craig Dorman, University of Alaska Vice President for Research, to address IARC problems; solving those issues was vital in saving IARC.

Also, Hobbie reported on the Toolik Lake field station. It is doing so well that they have had to place a cap on the number of people located there at any one time. The Dalton Highway is being widened and a chip seal process applied to its surface. In three years the State of Alaska may take over the lands along the highway from BLM. The latter is talking about increasing the research station permit cost dramatically from $100 to $5,000+/year; maybe a change of ownership would avoid or lessen the impact. The NSF sponsored Long Term Ecological Program allows every school site within a research area to apply for a $15,000 grant to public lectures on the program. These funds were placed with the Barrow Arctic Science Consortium, plus some obtained from BP, to support public lectures in Barrow. There was an 800 gallon diesel oil spill at Toolik. Cleanup will cost $1M +.

Reports

The Chairman asked Myers to make his report on the activities of the Interagency Arctic Research Policy Committee (IARPC). Myers started with a summary of the IARPC meeting held in early 2002. The first speaker was Sally Brandel, U.S. State Department. Hearing first from the State Department is important so that the agencies will understand what the overall federal government policy is with regard to the Arctic. Brandel noted that Iceland will chair the Arctic Council for the period 2002-2004 and then she said the U.S. Fish & Wildlife Service had made a major contribution to the Circum-Arctic Flora and Fauna (CAFF) group with a document on flora and The U.S. Environmental Protection Agency (EPA) has taken a leading role in preparing report for the Phase 2 effort by the Arctic Monitoring and Assessment Program (AMAP) on contaminants. Other federal agencies now taking a more active role in the Arctic are the National Institute of Health (NIH) and the Center for Disease Control (CDC). The national library of the former is developing a new library site concerned with health care in the Arctic. The latter is working on circumpolar network to connect public health centers and laboratories.

Myers noted that Newton had reported on the activities of the Commission at an early 2002 meeting and told of the importance of getting the Law of the Sea accepted by the U.S. The latter would help the U.S. establish greater boundaries in the Arctic Ocean. Another report at the IARPC meeting was by George Hunt, University of California Irvine, who outlined what should be included in a comprehensive study of the Bering Sea. Hunt recommended: 1) looking at the linkages between the physical drivers and the food chain, 2) how climate variability affects and modifications of ice and water flows in that sea, and 3) the fate of contaminates in that body of water. What he said is important because NSF is promoting research in the Bering Sea as a second interagency initiative. IARPC passed a resolution for the staff to review and analyze various Bering Sea plans and stage a workshop to achieve such a coordinated effort.

Another issue discussed at the meeting was the implications of an ice-free Arctic Ocean. Facets ranged from the current lack of search and rescue capabilities in the Arctic Ocean to work needed to better establish a U.S. territorial limit. Myers remarked that the North Pacific Research Board (NPRB) should be a source of information about research needs in the Bering Sea. Following was a great deal of discussion about the concern that NPRB was turning into a fisheries board rather than one focused on research. Also, concerns were voiced that the agencies, the National Marine Fisheries Service (NMFS) and the National Ocean Service (NOS), viewed the funds made available to NPRB as monies that should be divided between the their organizations. Brass said he had protested vigorously at the most recent NPRB meeting about such an approach. Treadwell remarked one of the reasons for the recently enacted Senate Joint Resolution (SJR) was to focus attention on such issues and that attention might help in situations like this.

The Chairman first asked Brigham to comment about some contacts he made recently in Finland. Brigham said the Executive Director had asked him to check on the possibilities of a Commission trip to Finland in 2003. He contacted various people in the Finnish government, research institutes, and universities; all were interested in meeting with the Commission. The

Finnish Maritime Administration would be happy to stage a meeting on one their vessels while breaking ice in the Baltic. Such a trip must be made no later than April or early May. Brass commented that the Commission should select one or two sites and invite the people from the other agencies, institutes, and universities to make presentations about their research and interests. He favored March rather than April for the trip on the icebreaker.

Newton asked Perrigo to make his report. Perrigo said he had presented a paper at the Polar Libraries Colloquy on data and information loss issues, led a panel discussion on that topic, and got the body to adopt a resolution to encourage libraries and information specialists to talk to various scientific and technical groups about various loss problems and possible ways of avoiding them. He reported that while on vacation he had made contact with the fisheries research group at the North Atlantic Fisheries Colleges in Scalloway, Shetland. They are interested in making contacts with various organizations in North America and applied research to develop new methods of handling fisheries waster and new products. Brass suggested that Perrigo put NAFC is contact with Scott Smiley at the Fisheries Industrial Technology Center. The latter is interested in applied research on fisheries waste and by-product development.

Calder inquired if he could make a few comments prior to his afternoon presentation. The Chairman encouraged him to do so. Calder said that one of the future activities of the Arctic Climate Impact Assessment (ACIA) effort was to generate a policy document. Such a report would follow one on its findings related to climate change and, if plans hold, initial efforts in the policy realm will be launched in March 2003. The Commission may wish to offer some comments in March and follow progress on the development of the policy document.

Treadwell inquired how this ACIA work related to the Arctic Council Action Plan (ACAP). Calder said the Arctic Monitoring and Assessment Program (AMAP) and the Circum-Arctic Flora and Fauna (CAFF), working groups of the Arctic, are directing their attention currently to PCB and other contaminants. Brass commented whether the document was focused globally or otherwise meant there will be plenty of local problems that must be addressed in the Arctic such as melting permafrost and accompanying infrastructure, transportation, impacts on economic development and sustainability of communities. Calder said this comprehensive examination and report may also call for a broad look at oil and gas production in the Arctic, not just Alaska. He had recommended to Lars Otto that they use the work of the AMAP as a model for their work. Many Council members disagreed. Brass also said that PAME, an Arctic Council group, had already issued guidelines for oil and gas development and had them translated into Russian. The lead within AMAP has been assigned to Norway.

The meeting was recessed at 12:48 p.m. to be reconvened in Room 5149, Interior Department Building at 14:00 p.m. The Chairman reconvened the meeting at the stated time. In attendance from the Commission were those who had been in the morning meeting. Attending from DOI were Bessee, Devine, Haugh, Pearce, Smith, Stewart, and Tate.

Newton introduced Tate, Science Advisor to the Secretary of the Interior, and asked him to make his presentation. Tate asked everyone to their introductions including affiliations. Following introductions, Tate gave a brief overview of his functions as Science Advisor to the

Secretary of the Department of the Interior. Recently the Secretary asked him to develop a science ethics policy. This resulted from questions about individuals attempting to influence policy related to national forests and preventing research from being done there as well as any development of resources. Also, involved was the need to avoid questions about whether past decisions were possibly manipulated to encourage or avoid these activities. They expect to complete this task in the near future.

Another factor affecting DOI's position on research and science was a Supreme Court decision. That body ruled that agencies and industrial organizations should have clear cut policies defining what is science and what is expert opinion. The Supreme Court prepared some general standards of what is good science. This means that DOI must conform to these standards. What Devine will provide in his summary is now guided by that decision.

Devine opened by saying that only five of the nine agencies within DOI have activities related the the Arctic. These agencies are MMS, BLM, the Park Service, Fish and Wildlife Services, and USGS which has the largest budget for research. Some of the other DOI agencies have activities in other parts of Alaska but they do no meet geographic criteria. Another factor influencing a DOI report is the question of what is research and what constitutes science services. This has been a difficult issue and they have tried to follow a consistent method to report their budgets to IARPC for inclusion in its reports.

Brigham asked if DOI was making any permafrost measurements in Alaska and Devine said he could not answer for MMS but most of the USGS effort in that area has disappeared. Earlier they had benefited from large appropriations made for the National Petroleum Reserve Alaska exploration program. When it ended, USGS essentially stopped its permafrost measurement. Newton commented that well over half of Alaska was underlain by permafrost and climate change is going to have a dramatic effect on civil infrastructure ranging from airfields to villages to pipelines. Brigham added that the decline in permafrost interest is not limited to the DOI. CRREL has essentially no such program and little if anything is being done in Finland. Devine said such a measurement program is something they have not been able to continue.

Treadwell asked why DOI reports on minerals have not been issued since 1996 for the Alaska Mineral Resource Assessment Program. Such reports are mandated by ANILCA. Devine said USGS spends about $3.5 million annually on minerals mapping above the Porcupine-Yukon-Kuskokwim (PKY) line. Closure of the Bureau of Mines led to many of its duties being transferred to USGS but resulted also in greatly reduced budgets for many of the transferred activities. Work on the ANILCA task was terminated. Treadwell commented that these reports as required by ANILCA were extremely important for the owner of these resources to know where and what they are. Only about a third of the state has been examined for such resources to date. Newton inquired what was the most important research programs not being done by DOI currently. Devine said permafrost measurements and detailed work to monitor changes in glaciers in Alaska is work that needs to be done.

Treadwell asked Devine to provide information about anticipated costs for again acquiring to data an distributing a minerals report annually and asked what would be involved in mapping Alaska to the same standards as the rest of the U.S. Pearce said she would be meeting with

officials in August to discuss the declassification of data that could be used for preparing more detailed maps of Alaska. Newton encouraged her to enter that meeting in a negotiating mood rather than accepting initial statements about classification forbidding the release of such data. Pearce said having a letter of support from the Commission would be most helpful in those discussions. Newton asked Treadwell to draft a letter of support.

Hobbie said he was concerned abut the lack of vegetation information being transferred between agencies and that no effort was being made to synthesize the information acquired over time. Why were agencies not communicating better and doing more outreach? Tate commented that a meeting of the editors of their journals, other people concerned with dissemination of agency data and information, and NSF occurred in February to discuss such problems. The meeting broke down in disarray; there is no consensus within the government. Hobbie said he was interested in getting beyond hypothesis testing to acquiring a general understanding of what has been done and some of the beliefs of what has occurred.

Newton asked Calder to provide information to DOI about the SEARCH program. Calder said he intended to provide a brief overview and then concluded with some thoughts on how DOI might play a bigger role in the program. He mentioned that he had briefed Pearce and Tate in 2001 on SEARCH. He then moved on to describing the rationale for the program. First, there have been some dramatic changes in ocean circulation, loss of sea ice, thawing permafrost, and many others. A major hypothesis for these changes are related to changes in the atmosphere and the Arctic oscillation and second, why the oscillation has changed. These changes in the Arctic can have impacts on the climate in lower latitudes and ocean currents in the Atlantic Ocean. Now, they were enlisting involvement of biological and social scientists because inputs are needed from those sectors to fully understand the implications of the changes.

Calder reported that the Anchorage offices of USGS and USPS had been active participants in the various meetings of their interagency working group. There are several other DOI agencies such as the MMS and FWS that could make significant contributions. Also, the Alaska agencies need to have a real mandate from their senior management to be completely involved in the SEARCH program. He pleaded with DOI to make that happen. Calder said he had estimated, without any DOI input, the research efforts that he had outlined briefly would take about $10 million annually. Perhaps the funds could be raised through the appropriation process. He concluded by providing SEARCH brochures and noted information is available on their websites.

Brass returned to the plea that Hobbie had made concerning communications. The most important thing that all can do for the program is to start talking to each other about what they are doing and how they are doing it. The Commission believes that terrestrial biology is somewhat neglected in this program. Fine work is underway at the Toolik Lake field stations and the Barrow Arctic Observatory. They need input from and interaction with DOI installations in that region.

The Chairman thanked Tate and DOI for their briefing and then recessed the meeting at 3:50 p.m. to be reconvened at Lamont Doherty on July 16.

Presentations on Tuesday, 16 July, 2002, Lamont Hall.

Newton reconvened the meeting at 9:02 a.m.

Peter Schlosser provided an overview of Arctic research at Lamont, commenting that the first such research began duing IGY in 1956-57. One major breakthrough during the 1980s was the capability of nuclear submarines to obtain very detailed bathymetric maps of the seafloor. He briefly described successful cruises of HEALY and POLARSTERN during the 2001 Arctic mid-ocean ridge operations and his own work on mapping present Arctic Ocean circulation patterns. Schlosser summarized by saying that there is a long tradition of Arctic research at Lamont, and strong participation among many disciplines.

Ken Hunkins came to Lamont from Stanford in 1957 and started a program of Arctic investigations. A great deal of Arctic research at that time was funded by the Air Force whose motivation was that manned bombers would be flying over the Arctic in the next war. The base for the early studies was Barrow; aircraft were flown out to the ice stations. One major area of research was hydrodynamics; small mesoscale eddies were discovered. Hunkins showed a series of slides of various ice stations and logistics during the late 1950's to the 1970's Arctic research which by the later years was being conducted in the "eastern Arctic."

Charles Langmuir presented the Arctic Mid-Ocean Ridge Experiment that was conducted aboard *Healy* and *Polarstern* in 2001 (he was a researcher aboard). He noted that the SCICEX Program provided the basic background geological information to readily define the program for the initial NSF proposal. The expedition was an outgrowth of 10 years of planning and preparation. The overall architecture of the Gakkel Ridge (a slow spreading ridge) is now known. He reported that the *Healy* operated well in ice and the multi-beam system worked "magnificently" (even in heavy ice conditions). The expedition (both ships) acquired more than 100 dredges of bottom samples. The Gakkel Ridge is 4 miles wide and there is considerable evidence of hydrothermal plumes. Langmuir concluded that the *Healy* was an excellent research platform for solid earth science in the Arctic Ocean.

Dale Chayes gave an overview of SCAMP, the modern mapping sonar placed on a nuclear submarine during SCICEX. The collaboration for this work involved Lamont, the Arctic Submarine Laboratory, and the University of Hawaii (Margo Edward's group). The system was first placed on the submarine *Hawkbill* for 1998 and 1999 SCICEX cruises. Chayes showed slides of the installed equipment and images of sea floor features including sites for active volcanism and ice contact features on the sea floor (from ice shelves and icebergs). Using SCAMP aboard a nuclear submarine was ultimately a great success.

James Cochran provided a review of several geophysical studies using the SCICEX data. He showed where volcanic ridges and other small volcanic features occur in the gravity data. Other data indicated where sediment filled a rift valley to the level of the surrounding basin. He also indicated regions where there is a discernable amount of (active) seafloor spreading, and illustrated the continuous nature of the Gakkel Ridge (with several bends). Cochran stated that another region that requires study is the Amerasian Basin and he summarized the importance and value of the SCICEX data.

Ray Sambrotto discussed biogeochemical fluxes in the Arctic Ocean (and Bering Sea) and explained mechanisms for bringing organic material from the coastal areas into the deep basin. He showed profiles of high silica Pacific water coming into the Arctic Ocean (acting as a good tracer), and discussed areas of the Arctic Ocean (in leads and polynyas) where organic production occurs at the surface. Sambrotto said there have been a number of geochemical changes in the Bering Sea, but no one is sure the changes are due to physical changes in the environment.

Peter Schlosser talked about his work on the circulation and freshwater balance of the Arctic Ocean. The motivation for his work is two-fold: climate and contaminants. The low salinity water coming out of the Arctic Ocean can have significant impacts on the global deepwater circulation. There was fairly limited knowledge of Arctic circulation patterns before the 1980's. We now have a good number of stations taken by icebreaker in the central Arctic Ocean (detailed hydrographic and tracer data). Using tracer data, surface waters probably transit from the shelves to the interior in 3 years; it may take 20-30 years to make a full loop around the Arctic Basin. Most dissolved pollutants would take roughly 3 years to get into the interior. His data (and others) confirm a salinity shift 1991-96 caused by a redirection of the Siberian river runoff into the Canadian Basin.

Bob Newton presented research on freshwater transport through the Arctic Ocean. River runoff appears tightly couples to sea ice formation. He showed computer output of a model which indicates how freshwater from the Siberian rivers spread around the Arctic Basin – a large, anti-cyclonic pattern in the late 1990's (with little Fram Strait outflow), but in the 1990's there was a shift of the pattern with more freshwater flowing out Fram Strait. His research focuses on determining the causes of these shifts, also using model test tanks that he illustrated. Newton summarized by saying that what is going on in the central Arctic Ocean is very tightly tied to what is happening on the shelves.

Bruno Trembley discussed sea ice export and modes of atmospheric variability (North Atlantic Oscillation/NAO). He showed how changes in the Icelandic low can advect more or less sea ice from Fram Strait. In 1978 there was a strong, high pressure system over the Arctic Ocean in summer; in 1992 it was just the opposite condition. Such changes significantly impact the surface ocean and freshwater budget. Gerd Krahmann also gave a review of the North Atlantic Oscillation (NAO) and how it is closely tied to the Arctic Oscillation (AO). He said that the longer the period of the NAO (decade or multi-decade) the more warm water can be advected into the Nordic Seas and melt the sea ice coming through Fram Strait. Krahmann said that he would like to use the new numerical technique to study spreading time sales and pathways of pollutants and freshwater in the Arctic Ocean.

Stephanie Pfirman's research focuses on using sediments in sea ice as an indicator of circulation patterns in the Arctic Ocean. Her team of investigators has taken sea ice samples, looked at their mineralogy, and back tracked where they came from using Arctic buoy drift data (1979 to 1997). They attempted to match the mineralogy with what is found in the sediments below. Much of the sediment originated from the Russian Arctic seas, so this technique has been used to track various pollutants that travel from the Russian shelves to the interior of the Arctic Ocean. The highest lead concentrations back track to the Kara Sea (snow

is contaminated by the Norilsk complex and gets into the rivers and coastal seas). She has found significant inter-annual variability in contaminants within sea ice.

Bill Smethie discussed his work in the Nordic Seas investigating the overturning circulation patterns of the North Atlantic waters. He uses CFCs as tracers of ocean circulation and indicated how they have high concentrations in surface waters and travel laterally along surfaces of constant density.

Taro Takahashi discussed research related to the East Greenland current and the importance of studying the gas exchange of carbon dioxide (CO2) between the atmosphere and the ocean. He and his colleagues have accumulated approximately one million ocean data points for the partial pressure of CO2. Using the technique he discerned that Arctic waters take up far more CO2 form the atmosphere than North Atlantic waters.

Pierre Biscayne presented data on mineral dust found in polar ice cores. The traces of clay mineralogy reflect the climate in the source area and intensity of weathering. He displayed data from the Antarctic (Dome C) and Arctic (Greenland) and indicated different seasons with some distinct levels of dust (spring-summer vs. winter-fall). Dust in Greenland ice probably has come from as far away as 10,000 miles (from China).

Jeffrey Shaman is conducting hydrologic research on an Arctic hill slope and investigating the surface transfer of nutrients. He showed model simulations of connectivity/hydrology in the Black Rock Forest (45 minutes north of Lamont) using a variable depth of bedrock (something new for hydrology models). In the Arctic, Toolik Lake is his research site; for a storm event in 1992 he showed how the 2.6 cm of rainwater saturated the surrounding hilltops. His future work will combine both observations and model simulations at Toolik Lake and will include water chemistry measurements from the surrounding streams.

Stephen Deny also discussed hydrology and the use of remote sensing data and a land surface model to detect the impact of snow on hydrology. The research region is the Kuparuk on the North Slope of Alaska. From 1971-2002 there has been a 5% increase in total runoff (a 6% increase over 15 years in amount of precipitation). Perhaps this is responding to the 2-degree C increase in air temperatures. Snowfall accounts for 50% of total precipitation in the basin. He uses the MODI satellite sensor (Moderate Resolution Imaging Spectroradiometer) data to get snow cover (500 m resolution). Overall, the hydroclimatology of the Kuparuk River Basin is undergoing significant changes.

The meeting was recessed at 5:15 p.m.

Presentations on Wednesday, 17 July 2002, Lamont Hall

Newton reconvened the meeting 9:07 a.m.

Rosanna d'Arrigo discussed the work of Lamont's Tree Ring Laboratory where they developed reconstructions/time series for past Arctic temperatures approximately 1000 years ago. She showed cross sections of various trees including the Siberian larch wood (very slow growing

and highly stressed); a reconstruction dating back to 1600 AD has been made for temperatures in the Wrangell-St. Elias Mountains in Alaska and this indicated above average growth of the trees for the 20th century. The tree ring data are used to model climatic forcings (such as volcanism) and to reconstruct large-scale Arctic temperatures. (Small trees in Alaska can be as old as 400-450 years.)

Dorothy Peteet discussed paleo-ecological research using fossil pollen as well as seeds, needles, and leaves to reconstruct past climates. She showed data for the early occupation of the North Slope (very early human occupation of North America). Analyses of permafrost corings provide a picture of the climate early people had to deal with. The pollen records she has researched show striking changes in temperature and moisture.

Gerard Bond researches the sub-polar North Atlantic using drift ice as a proxy. The ice sightings are closely tied to temperature anomalies in the region. This work, using a tracer for circulation of drift, is similar to Stephanie Pfirman's use of clay mineralogy to trace drift ice in the Arctic Ocean. He summarized his work by emphasizing the importance of understanding the connections between the Arctic and Sub-polar North Atlantic.

Thomas Marchitto discussed evidence of deepwater variability in the Labrador Sea. He is using a new tool, magnesium-calcium rations and oxygen isotope ratios, to reconstruct temperature salinity of the deepwater. His initial results show Labrador Sea water to be colder, fresher, and less dense during earlier periods.

The meeting adjourned at 11:30 AM.

Appendix B: Meetings attended FY 2002

In addition to those meetings reported in the minutes, the Commission is represented when possible at the monthly meetings of the State Department's Arctic Policy Group, the Interagency Arctic research Policy Committee's Staff meetings and the *ad hoc* Alaska Arctic Council Working Group. The Commission's Arlington staff attends all 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. The Executive Director has participated, as the Commission's representative, at the meetings of the North Pacific Research Board. Several Commissioners and staff have attended meetings of the Arctic Council in Finland, 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); and several Arctic Transportation working groups under the Sustainable Development working group chaired by the Senior Arctic Officials. Commissioners and staff continue to attend meetings of the American Geophysical Union and other scientific meeting

Appendix C: The Arctic Research and Policy Act

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 a 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 countires, 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 behaviorial 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 behaviorial 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 fo 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 which 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 Nations 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 of office deemed appropriate.

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

DUTIES FO 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;

(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 al 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 APPROPRIATATIONS; 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 1974) 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

Special Reports

National Needs and Arctic Research, a Framework for Action. May, 1986
Logistics Recommendations for an Improved U.S. Arctic Research Capability. June 1997
The Arctic Ocean and Climate Change: A Scenario for the U.S. Navy. January, 2002

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.

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.