Considering a Roadmap Forward: The Arctic Marine Shipping Assessment

WORKSHOP REPORT

University of Alaska Fairbanks
October 22-24, 2009

University of the Arctic ~ Institute for Applied Circumpolar Policy

Editors: Lawson W. Brigham and Michael P. Sfraga

University of Alaska Geography Program
School of Natural Resources & Agricultural Sciences

Greetings from the University of Alaska Fairbanks - America's Arctic University. I am pleased that UAF is a founding member, along with our partner Dartmouth College, of the University of the Arctic Institute for Applied Circumpolar Policy. The Institute was established to explore, inform, and shape policy issues that impact residents of the North. It is with this background that I share with you the findings of the Institute's 2nd workshop held at the University of Alaska Fairbanks entitled "Considering a Roadmap Forward: The Arctic Marine Shipping Assessment."

As Chancellor of the University of Alaska Fairbanks and member of the University of the Arctic's Board of Governors, I believe universities throughout the North have a responsibility to study and consider issues that impact the people of the North. The Arctic Council's Arctic Marine Shipping Assessment (AMSA), published in April of 2009, is a path-breaking report that will have far-reaching impacts on Northern communities well into the future. This report's long-term importance is the reason the Fairbanks workshop considered the implications and challenges of the AMSA and its related recommendations.

It takes many partners to conduct a successful program. In addition to the participants, I want to highlight Victor Santos-Pedro, David Jackson, Margaret Williams, and Bob Pawlowski, who tirelessly led the program's three working groups. I would like to thank Holland America Lines and the United States Arctic Research Commission for their generous support of the workshop.

I am confident that "Considering a Roadmap Forward: The Arctic Marine Shipping Assessment" will further inform stakeholders, policy makers, industry, and the people of the North as they consider the challenges in our unique, dynamic, fragile, and powerful Arctic of the future.

Brian Rogers, Chancellor
University of Alaska Fairbanks
Member, University of the Arctic
Board of Governors

Cover photo: The icebreaking carrier MV *Arctic* in the Canadian Arctic where the ship has operated safely and effectively since 1979. *© Fednav, Ltd.*

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Introduction and Workshop Objectives

This is a report of an Arctic policy workshop hosted by the University of Alaska Fairbanks on 22-24 October 2009. It forms an important contribution to the University of the Arctic's Institute for Applied Circumpolar Policy (IACP), a collaboration between Dartmouth College, the University of Alaska Fairbanks (UAF), and the University of the Arctic (UArctic). ICAP is co-directed by Dr. Michael Sfraga, University of Alaska Fairbanks and Former U.S. Ambassador Kenneth Yalowitz, Dartmouth College. IACP is the first formal institute sanctioned by UArctic member institutions and its mission is to promote discussion and analysis of critical issues facing the circumpolar region and its people. IACP has also been established to provide educational opportunities and policy-oriented advice as northern peoples face the challenges resulting from rapid climate change and other drivers of change in the Arctic such as natural resource development and globalization.

IACP has initially focused its efforts on a series of conferences and workshops that will hopefully improve public and private understanding of the policy implications resulting from circumpolar change, especially climate change and the human dimension. These gatherings bring together representatives of governments, non-governmental organizations, Arctic indigenous peoples, industry, and research organizations to discuss, identify, and prioritize issues and policy-related research. The outcomes of these meetings will help develop the agendas for governments to address pressing policy issues in the Arctic. The first IACP venue was held at Dartmouth College 1-3 December 2008 with a focus on climate change and Arctic security issues; a report, *The Arctic Climate Change and Security Policy Conference - Final Report and Findings*, was released in June 2009 at the Carnegie Endowment for International Peace in Washington, DC. The second IACP venue is the subject of this workshop report regarding the Arctic Council's Arctic Marine Shipping Assessment (AMSA). A third venue will be organized at the Arctic Centre in Rovaniemi, Finland in September 2010 focusing on climate change and human security in the Arctic.

The topic for this workshop report, the Arctic Council's Arctic Marine Shipping Assessment (AMSA), came about because of the April 2009 release of the *AMSA 2009 Report*. AMSA has clear policy implications for the Arctic and the global maritime industry, and UArctic and UAF recognized the relevance of these issues to the mission of IACP. Nearly seventy experts from Canada, China, Denmark, Japan, Norway, the United Kingdom and the United States participated; participants included representatives from the Arctic states, non-governmental organizations, indigenous groups, marine companies, maritime organizations, and academic institutions.

The objectives of the Fairbanks workshop were to explore the implications of the AMSA recommendations using three working groups of experts, and discuss the challenges ahead for implementation of the outcomes of AMSA. The working groups identified a roadmap and actions, and a set of key issues for each of AMSA's recommendations. Further discussions focused on funding and financial issues, and the key policy issues that are of the highest priority in addressing Arctic marine safety and marine environmental protection. The workshop agenda, included as Appendix 2, also indicates nine workshop presentations that highlighted significant policy issues being faced today by the Arctic states and indigenous communities throughout the North. It is anticipated that the results of this workshop will be used by the Arctic Council and its working groups, the Permanent Participants on the Council, the maritime industry, and many other stakeholders to assist in shaping future use of the Arctic Ocean.

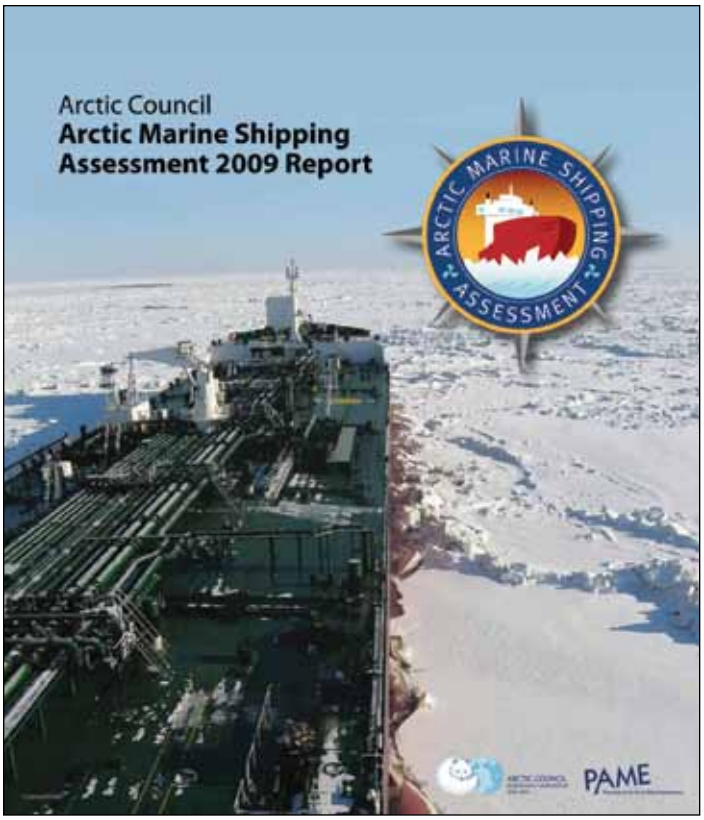
Background ~ The Arctic Marine Shipping Assessment

On 29 April 2009 at the Arctic Council Ministerial meeting in Tromso, Norway, the Arctic Ministers approved a key study for the future of the region, the Arctic Marine Shipping Assessment (AMSA). AMSA is the culmination of work by nearly 200 experts under the Council's working group Protection of the Arctic Marine Environment (PAME). AMSA was led by Canada, Finland and the United States during 2005-2009 and is a follow-on effort to the Council's Arctic Climate Impact Assessment and the Arctic Marine Strategic Plan, both released in 2004 and each indicating increases in Arctic marine operations. AMSA is an assessment of current and future Arctic marine activity with a focus on Arctic marine safety and marine environmental protection. These themes are consistent with the Arctic Council's key mandates of environmental protection and sustainable development. Overall, the *AMSA 2009 Report* is a message by the Arctic states to the world with a framework to address the many, complex challenges of protecting Arctic people and the environment in an era of expanding use of the Arctic Ocean.

AMSA can be viewed in three ways:

- A **baseline assessment** of Arctic marine activity early in the 21st century using the 2004 AMSA database as an historic snapshot of marine use;
- A **strategic guide** for a host of Arctic and non-Arctic actors and stakeholders;
- A **policy document of the Arctic Council**, since the *AMSA 2009 Report* was negotiated and consensus for its approval was reached by the eight Arctic states within the Council.

The *AMSA 2009 Report* is a key Arctic Council policy document that contains some elements of scientific research, especially those topics related to environmental impacts. However, AMSA is much broader than science and includes such topics as geography, law of the sea, scenarios of the future, marine infrastructure, globalization of the Arctic, indigenous community viewpoints, natural resource development, and other practical issues of Arctic marine navigation; 96 findings are presented in the assessment. The *AMSA 2009 Report* and *AMSA Background Research Documents* (research papers not approved or negotiated by the Arctic Council) can be found on the PAME web site (www.pame.is).



The key outcomes of AMSA are 17 recommendations agreed to by the Arctic states in the *AMSA 2009 Report* under three, inter-related themes: Enhancing Arctic Marine Safety, Protecting Arctic People and the Environment, and Building the Arctic Marine Infrastructure. The full AMSA recommendations are included in Appendix I of this report. These 17 recommendations were the focus of the Fairbanks workshop expert discussions and resulted in a roadmap ahead and key issues for each, and identification of funding challenges and policy issues that require attention. As with AMSA itself, the workshop experts recognized that implementation of the AMSA recommendations would require extensive international cooperation and public-private partnerships.

Guidance to the Workshop Working Groups

AMSA Workshop Working Groups:

I. Enhancing Arctic Marine Safety
II. Protecting Arctic People and the Environment
III. Building the Arctic Marine Infrastructure

- ✓ Please read recommendations specific to your AMSA theme.
- ✓ Please address the five tasks listed below.
- ✓ Provide bulleted answers – followed by a brief narrative that summarizes the overall "roadmap" response to each recommendation.

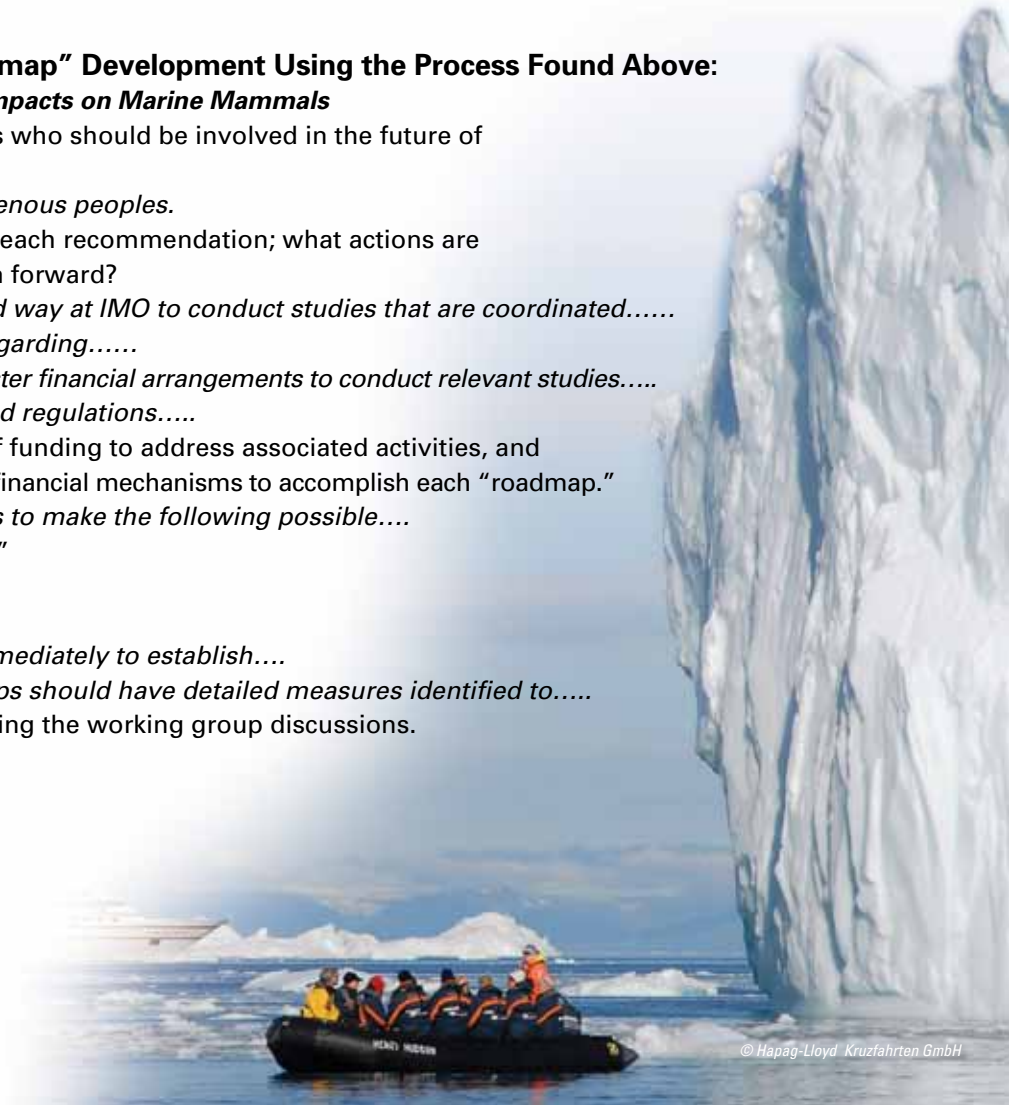
Tasks:

1) Identify primary stakeholders and actors who should be involved in the future of this recommendation.
2) Develop "roadmap" or "roadmaps" for each recommendation; what actions are required to move each recommendation forward?
3) For each "roadmap" identify sources of funding to address associated activities, and recommend any possible new or special financial mechanisms to accomplish each "roadmap."
4) Establish a timeline for each "roadmap."
   a. Less than 2 years
   b. Beyond 2 years
5) Identify other key issues discovered during the working group discussions.

Example Recommendation and "Roadmap" Development Using the Process Found Above:

AMSA Recommendation II G: Addressing Impacts on Marine Mammals

1) Identify primary stakeholders and actors who should be involved in the future of this recommendation.
   - *IWC, IMO, Maritime agencies, Indigenous peoples.*
2) Develop "roadmap" or "roadmaps" for each recommendation; what actions are required to move each recommendation forward?
   - *Arctic nations should act in a unified way at IMO to conduct studies that are coordinated……*
   - *Consult with Arctic Communities regarding……*
   - *Arctic Council, SDWG, etc. should foster financial arrangements to conduct relevant studies…..*
   - *Establish international standards and regulations…..*
3) For each "roadmap," identify sources of funding to address associated activities, and recommend any possible new or special financial mechanisms to accomplish each "roadmap."
   - *Establish new financial mechanisms to make the following possible….*
4) Establish a timeline for each "roadmap."
   a) Less than 2 years
   b) Beyond 2 years
      - *Technical groups must begin immediately to establish….*
      - *In two year's time, working groups should have detailed measures identified to…..*
5) Identify other key issues discovered during the working group discussions.



Identifying the Stakeholders and Actors

Experts in the three Workshop Working Groups (Enhancing Arctic Marine Safety, Protecting Arctic People and the Environment, and, Building the Arctic Marine Infrastructure) identified a host of stakeholders and actors who are believed to have some involvement and influence in AMSA and in the future of Arctic marine activity. As might be expected, there were significant overlap among the working group listings, and discussions on who might be relevant stakeholders and actors. The primary decision-makers and 'players' in this review are considered to be the eight Arctic sovereign states, the flag states, and the indigenous groups who make up the six Permanent Participants of the Arctic Council. The below should be considered examples of the key stakeholders & actors, however, not an exhaustive list.

~ **Sovereign States** (Regulatory and response agencies; regional authorities; national hydrographic services; national ice services; national pollution funds); Flag States; ~ **Indigenous Groups** (including domestic tribal groups and Arctic Council Permanent Participants)

~ **International Governmental Organizations:** International Maritime Organization; International Hydrographic Organization; International Maritime Satellite Organization; World Meteorological Organization; International Whaling Commission; International Association of Marine Aids to Navigation and Lighthouse Authorities; International Oil Pollution Compensation Funds; International Telecommunication Union; International Oceanographic Commission; International Ice Charting Working Group; The World Bank

~ **Maritime Industry:** Shipping companies; Offshore drilling companies; Ship classification companies; International Association of Classification Societies (IACS); Intertanko, Bimco; Cruise Lines International Association; Oil Companies International Marine Forum; Offshore Marine Services Association; International Oil and Gas Products; SIGTTO; International Association of Drilling Contractors; International Association of Arctic Expedition Cruise Operators; Passenger Vessel Association; International Association of Antarctic Tour Operators; Fishing industry; marine pilots; Oil spill response organizations; International Tanker Owners Pollution Federation; Local marine suppliers and engineering/technical support firms

~ **Marine Insurers:** Marine insurance companies; International Union of Marine Insurance; American Institute of Marine Underwriters

~ **Private/Independent**: NGOs; Non-profit foundations; academic & training institutions; research organizations (public and private)

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Results of the Working Group Discussions on the AMSA Recommendations:

Roadmap and Actions & Key Issues for

I ~ Enhancing Arctic Marine Safety

II~ Protecting Arctic People and the Environment

III ~ Building the Arctic Marine Infrastructure

I. Enhancing Arctic Marine Safety

I.A. Linking with International Organizations

ROADMAP AND ACTIONS	KEY ISSUES

• PAME to bring together experts on shipping from the Arctic states to identify common interests and develop unified positions and approaches.
• Identify an Arctic state lead country to facilitate an IMO meeting of experts on Arctic safety issues.
• For a consistent approach on Arctic shipping issues, the Arctic states should coordinate:
  ○ Input from all actors and stakeholders in each state including regional interests.
  ○ Input from different government agencies who attend various international organizations (for example IMO, ILO and WMO).
  ○ Input from stakeholders and government departments who attend a particular organization (such as IMO).
	• Taking into consideration the opinions and ideas of other interested stakeholders before approaching international organizations (such as IMO), the Arctic states may have a potential agreed position.
	• Knowing who is and is not represented at the international organizations.
	• Early, proactive actions will improve communications on all Arctic shipping issues

I.B. IMO Measures for Arctic Shipping

ROADMAP AND ACTIONS	KEY ISSUES
• Guidelines have been updated to become the IMO 'Guidelines for ships operating in polar waters.' • Arctic Council to send a letter to Arctic marine interests as a whole to promote the December 2009 IMO Assembly resolution applying guidelines to polar waters. • Arctic states to promote the application of the polar guidelines with industry and others as appropriate, to national and international interests. • IMO Maritime Safety Committee (MSC) has tasked the Design and Equipment Subcommittee to develop a mandatory polar code in 3 sessions (Feb 2010, Autumn 2010, and Spring 2011). • Adoption will be by tacit or implied amendment to SOLAS and MARPOL Conventions. • Having agreed the polar code is to become mandatory, the Arctic states encourage other interested states/ parties to participate, engage and support adoption and implementation of the polar code. • Influential for communication and consensus building for the mandatory polar code are the Consultative Parties of the Antarctic Treaty.	• These Guidelines now apply to Arctic and Antarctic waters whether ice-covered or not. • Polar code will have a mandatory Part A and recommendations in Part B. • Construction requirements (hull and machinery) will be in both the polar code and International Association of Classification Societies (IACS) rules. • Ice navigator competence requirements must be clearly defined in STCW Convention; requirements to have an ice navigator aboard will be in the polar code. • Need for a model ice navigation course and to establish acceptance criteria for simulations as partial training fulfillment. • Need for theoretical training, including the incorporation of contemporary local knowledge, together with practical experience in ice. • Lack of Arctic marine infrastructure needs to be considered for independent operations. • Endorsement of certificates to include bridge and engineering personnel; desirable for operators to be familiar with ship conditions when operating in remote and ice-covered waters.

I.C. Uniformity of Arctic Shipping Governance

ROADMAP AND ACTIONS	KEY ISSUES
• PAME to conduct a survey/inventory of national or regional regulations, standards and guidelines with the aim of harmonizing safety and pollution prevention measures in keeping with UNCLOS. • Required surveys and inventories from the AMSA research agenda include: 1. Comparative study of how Arctic states address liability and compensation, especially for bunker fuel spills and hazardous/noxious substance incidents. 2. Survey of existing and potential fee systems for icebreaking and other Arctic services, such as navigational aids, charting, SAR, and ice information services, provided by the Arctic states. 3. Survey of ballast water practices and invasive species threats from Arctic shipping and a comparison of Arctic state approaches to ballast water exchanges and treatments. 4. Review of how bilateral and regional cooperation in addressing Arctic marine operations might be enhanced using other international approaches and experiences. • Draft language for a potential international agreement or designation (PSSA) in keeping with UNCLOS on safety and pollution prevention measures in regions of the central Arctic Ocean beyond coastal state jurisdiction for consideration by IMO.	• Key examples of Arctic state regulations for possible integration in the harmonization of measures: ○ *Canada:* Reporting scheme; guidelines for cruise ship operation; ballast guidelines for tankers and barges; equivalent standards for construction of Arctic class ships; Arctic shipping/waters pollution prevention regulations; oil transfer guidelines. ○ *Russia:* Guidelines for operation on the Northern Sea Route; Arctic port regulations. ○ *United States:* Marine Mammal Protection Act; cruise ship discharge regulations in Alaska. ○ *Greenland:* mandatory reporting scheme; regulations for the safety of navigation. ○ *Norway and Russia:* Results of Barents 2020. ○ WWF-Gap Analysis study. ○ Industry and NGO surveys and standards.

I.D. Strengthening Passenger Ship Safety in Arctic Waters

ROADMAP AND ACTIONS	KEY ISSUES
• Include in an Arctic Council letter (for distribution of polar guidelines to operators), the IMO enhanced contingency guidance for cruise ships in polar waters. • Request cruise ship associations (CLIA and AECO) to develop harmonized best practices for operating in remote and ice-covered conditions (for example, mother ship and tenders). • Invite cruise ship associations to make presentations to PAME and Arctic expert meetings at IMO. • Organize an international workshop/conference on cruise ship safety in Arctic waters with cruise operators and regulators.	• Need to encourage the formation of cruise ship organizations that cover all Arctic waters, such as IAATO in Antarctic waters. • Urge passenger ship operations in polar waters to be carried out in tandem with sufficient capacity for mutual rescue. • Passenger ship operators to document and mitigate risks and hazards associated with potential grounding in poorly charted waters.

I.E. Arctic Search and Rescue (SAR) Instrument

ROADMAP AND ACTIONS	KEY ISSUES
• U.S. currently chairing an Arctic Council task force to draft a multinational Arctic SAR agreement; to be completed by 2011 for signature by the Arctic Ministers; first meeting December 2009. • Coordinate the use of existing resources and deploy them in the most effective manner that will cover any response gaps. • Arctic Council to urge all Arctic states, and EPPR, to participate in the process for a SAR agreement.	• Requirement for a comprehensive review of current, national SAR (maritime and aviation) capabilities for the Arctic. • Evaluation of the adequacy of cooperative SAR agreements and arrangements for addressing increasing commercial use of the Arctic Ocean and Arctic airspace.

II. Protecting Arctic People and the Environment

II.A. Survey of Arctic Indigenous Marine Use

ROADMAP AND ACTIONS	KEY ISSUES
• Feasibility and design of a survey should be regional and national, not one unified circumpolar effort. • Development of a survey must have early communications and develop trust with indigenous communities. • Surveys to be based on scientific methods with verifiable data; data needs to be accessible in a synthesized format for review. • Survey characteristics: relate risk to communities, resource and traditional ways; build on existing information/past surveys; structured for acceptability; administered with trust and believability; sustainable for future use and comparison; cover general areas and patterns rather than specific tracks. • Surveys must recognize changes: increased access for shipping; boundary changes with climate change; marine values associated with resource access; differences in stakeholder perspectives of the circumpolar region; importance of today's decisions and the future.	• Must identify who to communicate with including organizations, community leaders, and spokespersons. • Must determine what information is important for operations, development, and regulatory regimes. • Survey must insure: scientific methodology; verifiability; accuracy; and usability for the intended purpose. • Survey data must be formatted and mapped for accessibility by many. • More synthesized information will have greater value in decision-making; level of resolution of data also key for users.

II.B. Engagement with Arctic Communities

ROADMAP AND ACTIONS	KEY ISSUES
• Community engagement long before regional/local development or ship arrivals. • Communication of near-term Arctic marine operations, such as cruise ships, allows preparedness for community opportunities to show cultural pride and traditional lifestyle, to provide arts and crafts, and for local job development. • Early communication of marine operations can enhance coordination of traditional uses of ice-covered waterways with ship uses/tracks. • Future planning for Arctic ports and ship support requires community involvement with socio-economic aspects and an understanding of traditional uses of the waterways and local coastal areas. • Recognition that future Arctic port site selection (and limited funds for infrastructure) will create competition between communities; evaluation of gains and losses within communities and needs for investment. • Future development will require mandated environmental assessment processes involving: community engagement, national standards, international coordination, and transparency of findings. • New Arctic marine developments will require risk assessments involving community engagement and reporting of results.	• Need to keep Arctic communities engaged; Permanent participants at the Arctic Council can monitor progress and mechanisms for engagement. • Determination of the level of public process mandated for each region. • Stressing the importance of ongoing dialogue and government consultation with a goal of enhanced community engagement. • Fostering conflict avoidance and communicating the importance of building trust among the actors.  *© Ross MacDonald*

II.C. Areas of Heightened Ecological and Cultural Significance, and II.D. Specially Designated Arctic Marine Areas

ROADMAP AND ACTIONS	KEY ISSUES

• **For Archaeological and Cultural Sites:**
  ○ Develop site management plans with: location identification; community engagement; identification of stresses on the site (tourism, offshore operations, and climate change); rules for numbers of visitors, type of access, and type of facilities allowed; guidelines for waste management offshore.
  ○ Develop site response plans to: offshore anchoring, discharges from ships, cargo loss, oil spills and hazmat spills.
  ○ Site response plans would be nested in larger, regional response plans.
• **For Migratory Route Protection and Preservation:**
  ○ Measures include: regulating ship speeds; establishing areas to be avoided; ship routing; establishing financial responsibility for liability and compensation.
  ○ Monitoring and designating reporting areas are key elements to evaluating mitigation effectiveness.
	• Local site management should not conflict with MARPOL or UNCLOS navigation rights.
	• Consideration of climate change impacts and the resulting movement of cultural and ecological sites.
	• Should management regimes be mobile as well as protected sites with changing climate?
	• How to pay for response activities; the need for an international regime (civil liability).
	• Movement of marine species with changing Arctic climate.
	• Sorting out the relationship between changing access for shipping and the impacts of climate change on migratory routes.
	• Range of objectives, from allowing no shipping to creating a balance between shipping and environmental protection measures.
	• Multiple strategies available to minimize marine use impacts; options available to communities to be pro-active rather than reactive to future Arctic marine uses.

II.E. Protection from Invasive Species

ROADMAP AND ACTIONS	KEY ISSUES
• Ratification of IMO Ballast Water Convention (for the global oceans) not enough and there is a need for tighter, Arctic-specific measures/requirements. • Beyond ballast water there are hull fouling and cargo riders as potential sources of invasive species. • Requirement for an Arctic prevention plan, perhaps a Hazard Analysis and Critical Control Points (HACCP) evaluation program (Australia has developed invasive species transfer avoidance measures for a range of marine activities). • Require further Arctic shipping scenarios and projections to frame the risks of invasive species. • Need more baseline surveys, especially in the areas of concentrated marine activity. • Require expanded monitoring, protocols for comparability, and the involvement of local residents with traditional knowledge who will be first to see changes. • As part of a response capacity there is a need for agreed upon emergency treatment options. • Shipwreck response and rapid response (eradication) capacities in shallow waters and on land (rats).	• Rapid ratification of the IMO Ballast Water Convention required, especially by the 8 Arctic states. • IMO movement on creating measures for the Arctic under the Ballast Water Convention and the other agreements. • Potential incentives for shipbuilders and ship operators to improve prevention effectiveness. • Application of same regulations for international shipping to Arctic coastwise trade. • Require research/testing and personnel expertise ~ capacity building in the Arctic. 

II.F. Oil Spill Prevention

ROADMAP AND ACTIONS	KEY ISSUES
• Most significant strategy remains keeping oil contained ashore and within ships - the prevention of Arctic oil spills. • Initiate a comparative evaluation of Arctic state schemes including: strength of prevention regime; liability standard; damage compensation; preparedness laws; fuel transfer standards; compliance; enforcement of regulations. • Enhanced cooperation and dialogue on unified standards of prevention and levels of tolerance/enforcement. • Initiate an effectiveness evaluation of training, systems, technology and environmental knowledge. • Conduct response gap analysis with a view to required research and capacity-building. • Explore the possibility of marine areas or zones where there is restricted traffic for tankers & LNG ships. • Development of a potential liability incentive fund for prevention.	• Development of trust among the many stakeholders on prevention issues. • Establishing strategic communication among the states and conducting oil spill tests and experiments with international consensus. • Required funding of basic research for systems improvements.

II.G. Addressing Impacts on Marine Mammals

ROADMAP AND ACTIONS	KEY ISSUES
• Research on improving baseline information on migratory routes required: added challenge are route changes and distinguishing between climate change impacts and increased marine activities. • Industry representatives must be involved in discussions for mitigation measures from the earliest development. • Preferred strategy is to separate ship traffic and marine mammals in space and time; where separation is not feasible, restrictions on ship speeds can help reduce mammal strikes. • Completion of an AIS receiver network in the Arctic is high priority; linkages between AIS and marine mammal awareness need to be developed. • Spatial distance is key for other disturbances: mating, migration, resting, calving, feeding and haul out areas; seasonal deflection from normal migratory routes can impact food security, subsistence lifestyles and the social structure of communities. • Develop lighting measures to reduce light disturbance to birds. • Research on noise from marine operations: deflection causes; masking (mammal communications); potential physiological damage. • Develop 'sound budgets' to review the cumulative effects of various marine operations.	• Cultural-subsistence awareness training should be developed for regional operators. • Restrictions and measures impacting navigation should be linked to the evolution of special marine areas and mapping efforts to plot changing marine ecosystems. • Vessel routing and speed restrictions are effective measures to mitigate impacts on marine mammals. • Many Arctic regions are not currently regulated; potential mechanisms and use of possible technologies are pathways forward.

II.H. Reducing Air Emissions

ROADMAP AND ACTIONS	KEY ISSUES
• Development at IMO of uniform standards. • Recognition that the global marine industry and IMO are developing regulations and uncertainty surrounds future standards. • Air quality agencies of the Arctic states should address this issue at a meeting with marine operators; potential for future negotiated acceptable levels of emissions for the Arctic. • Assessment of black carbon impacts in the Arctic important. • Arctic-specific standards may be requested in the the future at IMO.	• New control technologies may be available to mitigate ship emissions in the Arctic. • Different, more stringent emissions standards may be required for the Arctic Ocean and entire Arctic region. • Monitoring and tracking of future emissions will be essential for enforcement.

III. Building the Arctic Marine Infrastructure

III.A. Addressing the Infrastructure Deficit

ROADMAP AND ACTIONS	KEY ISSUES
• Institute an 'infrastructure deficit awareness program.' • Industry notification of communities at all stages. • Port and shore side development plans in all Arctic states. • Coordinate and identify public and private/industry funding. • Survey existing ports and port needs. • Develop national Arctic port strategies. • Explore 'tiered-port' (primary & secondary) approach. • Match government and industry priorities enhancing cooperation. • International conference of Arctic, Northern and Gateway ports and infrastructure. • Review linkages between large ports, small ports, and river infrastructure. • Launch an Arctic aids-to-navigation requirements review. • Prioritization of areas for hydrographic resurvey. • Review and assess Arctic long-range electronic navigation requirements. • Continue harmonization of national ice services and products. • Continued research on Arctic sea ice thickness and improved remote sensing tools for thickness. • Explore concept of 'virtual' ice center for the Arctic Ocean. • Improved sea ice type and iceberg detection (satellite and radar).	• Prioritizing hydrographic surveys. • Industry funding identification for public-private partnerships. • Development of new schemes for cost recovery of all marine infrastructure. • Icebreaker fleet renewal (public and private/ industry fleets). • Survey and enumeration of Arctic places of refuge. • Holistic Arctic port planning – closer Arctic state cooperation and coordination.  © Neste Shipping Oy

III.B. Arctic Marine Traffic Systems

ROADMAP AND ACTIONS	KEY ISSUES
• Mandatory Automatic Identification System (AIS) carriage. • Mandatory commercial traffic reporting. • Assessment of potential vessel traffic separation schemes in selected Arctic waterways. • Assessment of Arctic state ability to enforce mandatory reporting. • Potential harmonization of mandatory reporting systems (for example, between the Northern Sea Route, Canadian Arctic and Bering Strait regions). • Comprehensive examination of crossing maritime borders: examining the practical issues (ease of crossing, logistical support, SAR, emergency response, communications). • Develop consolidated coast pilot & sailing directions for the Arctic Ocean (one-stop shopping and available electronically in multiple languages).	• Identification of potential marine protected areas; timing key for infrastructure and navigation systems development. • Status of endangered species legislation that could impact traffic schemes. • Sharing traffic information with regional governments and local communities.  © Fednav, Ltd.

III.C. Circumpolar Environmental Response Capacity

ROADMAP AND ACTIONS	KEY ISSUES
• Primary goal of all Arctic rules and regulations: spill prevention. • Enhanced R&D for: recovery of oil in ice; trajectory modeling; remote sensing detection. • Harmonization of minimum standards for oil spill legislation. • Extend best practices and R&D to all Arctic states. • Comprehensive analyses of projected marine areas of high risk. • Enhanced analyses and reviews of appropriate response strategies based on geography. • Continued close cooperation among the Arctic states in: R&D, spill response exercises, and exchange of information and best practices. • Encourage regional, bilateral response agreements (for example, Canada/Denmark, US/Russia). • Assessment and augmentation of emergency and rapid transportation capability for oil spill response equipment. • Initiate Arctic discussions regarding hazardous material and chemical spills in the Arctic.	• Responses to incidents involving naval vessels in the Arctic Ocean. • Need for an Arctic oil spill liability trust fund; potential joint Arctic state-industry collaboration. • Role of Arctic communities in emergency response capability. • Increased frequency of Arctic emergency response joint exercises. • Potential for an Arctic state agreement on circumpolar, environmental response capabilities and capacities; could be an Arctic Council initiative following Arctic SAR agreement.

III.D. Investing in Hydrographic, Meteorological and Oceanographic Data

ROADMAP AND ACTIONS	KEY ISSUES
• Improved quality of regional and circumpolar weather forecasting. • Improved and refined met-ocean-ice forecasts and modeling techniques. • Improved training for Arctic forecasters (link met training to sea ice training; increased field training). • Improved access throughout the Arctic Ocean (including EEZs) for real-time met-ocean-ice data. • PAME/Arctic Council to approach the World Meteorological Organization (WMO) to expand Arctic states' participation in WMO activities. • WMO conference for met-ocean-ice cooperation in the Arctic. • Arctic Council and Arctic states to coordinate increased cooperation for observations. • Increased reporting of local weather observations by all ships in the Arctic Ocean (a function of the ice navigator). • Enhanced iceberg monitoring in the Arctic Ocean. • New observing systems with free and open access to environmental satellite information.	• Requirements for adequate polar communication to handle new, large information flow. • Cost recovery of data and information (user fees possible). • Status and future of observing networks resulting from IPY cooperation. • Cost and access to SAR data for ice information. • Improving transfer of met-ocean-ice information to indigenous populations and communities for hunting and fishing.  *© Canadian Coast Guard*

Funding Issues

Key issues not addressed in AMSA are the broad financial and funding concerns linked to each of the AMSA recommendations. The Fairbanks workshop experts identified several significant areas that require near-term funding and also reviewed issues related to the need for liability and compensation mechanisms in the Arctic.

Indigenous Marine Use Surveys ~ A key requirement in most regions of the Arctic, and one of the AMSA recommendations, is the need for surveys of indigenous marine use. Up-to-date baseline data on regional and local patterns of indigenous use of Arctic waters is necessary to assess the impacts from increasing Arctic marine operations. Significant discussions were held on this topic in Fairbanks due to the complexities and sensitivities of conducting such human use surveys. There was general agreement that the surveys could not be conducted in one unified circumpolar effort (although the baseline data could be merged later to construct a unified 'picture'). Public appropriations from national and regional governments are key since these surveys relate to subsistence living, marine safety, environmental protection and multiple use management of Arctic marine waterways. Broad scale surveys are nominally the responsibility of governments, national and regional. However, private sources of funding, such as from NGOs and nonprofit foundations, could also be important at the local, community level for detailed studies and surveys. Grants or surveys from industry sources (for example, natural resource developments related to mining) could be used to support surveys in preparation of new marine transportation systems and navigation in local waterways.

Marine Infrastructure Elements ~ The lack of adequate marine infrastructure in most of the Arctic (except for the Norwegian coast and northwest Russia) to support current and future levels of Arctic marine activity is a key finding of AMSA. Large public and private investments will be necessary to provide an adequate safety net for marine operations and environmental protection. Public and private funding for satellite communications and environmental monitoring are urgently required to fill existing Arctic gaps in coverage. Enhancing environmental response capacity may require public-industry funding of equipment to be cached in remote Arctic locations. A mandatory ship tracking and monitoring system will require public appropriations and the potential for pooling funding among the Arctic states. Public funding of enhanced Arctic weather and sea ice information may also mandate cost recovery schemes. Hyrographic surveys and charting are urgent requirements and these activities need significant national investments; cost recovery through industry user fees may be necessary, for example, in remote Arctic regions of seasonal marine traffic. The World Bank and other international financial institutions should be considered for Arctic port facilities and overall marine infrastructure. Coordinated investments for such elements as ports and aids to navigation should be discussed by the Arctic states.

Liability and Compensation Challenges ~ Robust, effective oil spill liability trust funds are required in the Arctic; funds can come from public-private partnerships and they could be based on regional or bi-lateral agreements. Two national models are Canada's Ship-source Oil Pollution Fund and the U.S. Oil Pollution Act of 1990. A conference on liability-compensation issues for Arctic marine incidents should be organized by the Arctic states and industry interests.

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Summary ~ Key Policy Issues Ahead

During the course of the workshop discussions revealed a number of high priority issues as critical outcomes of AMSA. The Co-editors of this report have developed a list of key policy issues from the discussions in Fairbanks that require attention in the near-term to enhance Arctic marine safety and marine environmental protection. Throughout the workshop the highest priority issue consistently noted was the urgent need for a mandatory Polar Code developed by the International Maritime Organization. Implementation of mandatory rules for polar ship construction, design, equipment, operations and ice navigator competency was considered by the workshop participants as the crucial first step for protecting Arctic people and the environment in an era of increased marine operations in the Arctic Ocean.

The following lists are provided as summaries of Arctic policy issues derived from the expert discussions of the AMSA Workshop:

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I. <u>Highest Priority</u> Arctic Policy Issues Related to AMSA:

- A mandatory Polar Code developed by the IMO.
- Full tracking and monitoring of Arctic commercial ships (mandatory AIS).
- An Arctic SAR agreement ~ an ongoing Arctic Council SAR Task Force is to produce a binding agreement by spring 2011.
- Surveys of indigenous marine use so that multiple use strategies in Arctic waterways can be developed.
- A circumpolar response capacity agreement ~ an agreement among the Arctic states (and possibly non-Arctic states) for pooling resources and enhancing regional capacity.
- Implementation of an Arctic Observing Network among the 8 Arctic states and non-Arctic states ~ a network to support scientific research and marine operations.

II. <u>High Priority</u> Arctic Policy issues Related to AMSA:

- A critical Arctic marine infrastructure requirement ~ increased hydrography and surveying of Arctic waters for enhanced navigation charts.
- Oil spill research on prevention best practices and responses to oil released in Arctic ice-covered waters.
- Enhanced research, including mitigation measures, on the impacts on marine mammals, and other migratory fauna, of increased Arctic marine operations.
- Identification of specific ballast water/invasive species issues and prevention strategies related to Arctic marine operations.
- A comprehensive study to identify potential Arctic marine areas, including the central Arctic Ocean, for possible designation as IMO Particularly Sensitive Sea Areas (PSSAs).
- Marine industry development of harmonized best practices for all cruise ships operating in Arctic waters, including operational strategies for mutual rescue.
- Studies on the application of ecosystems-based management to Arctic coastal regions.
- A comparative study of Arctic state liability and compensation strategies for marine incidents with a view to developing future uniform measures.
- Fully developed IMO ice navigator competency requirements included in the STCW; mandatory requirement for onboard ice navigator as part of the Polar Code.
- Enhanced marine communications systems in the Arctic, including full coverage satellite communications in the central Arctic Ocean.

APPENDIX 1:
The Arctic Marine Shipping Assessment Recommendations

The focus of the AMSA is marine safety and marine environmental protection, which is consistent with the Arctic Council's mandates of environmental protection and sustainable development. Based on the findings of the AMSA, recommendations were developed to provide a guide for future action by the Arctic Council, Arctic states and many others. The AMSA recommendations are presented under three broad, inter-related themes that are fundamental to understanding the AMSA: Enhancing Arctic Marine Safety, Protecting Arctic People and the Environment, and Building Arctic Marine Infrastructure. It is recognized that implementation of these recommendations could come from the Arctic states, industry and/or public-private partnerships.

I. ENHANCING ARCTIC MARINE SAFETY

A. Linking with International Organizations: That the Arctic states decide to, on a case by case basis, identify areas of common interest and develop unified positions and approaches with respect to international organizations such as: the International Maritime Organization (IMO), the International Hydrographic Organization (IHO), the World Meteorological Organization (WMO) and the International Maritime Satellite Organization (IMSO) to advance the safety of Arctic marine shipping; and encourage meetings, as appropriate, of member state national maritime safety organizations to coordinate, harmonize and enhance the implementation of the Arctic maritime regulatory framework.

B. IMO Measures for Arctic Shipping: That the Arctic states, in recognition of the unique environmental and navigational conditions in the Arctic, decide to cooperatively support efforts at the International Maritime Organization to strengthen, harmonize and regularly update international standards for vessels operating in the Arctic. These efforts include:

---Support the updating and the mandatory application of relevant parts of the *Guidelines for Ships Operating in Arctic Ice-covered Waters* (Arctic Guidelines); and,

---Drawing from IMO instruments, in particular the Arctic Guidelines, augment global IMO ship safety and pollution prevention conventions with specific mandatory requirements or other provisions for ship construction, design, equipment, crewing, training and operations, aimed at safety and protection of the Arctic environment.

C. Uniformity of Arctic Shipping Governance: That the Arctic states should explore the possible harmonization of Arctic marine shipping regulatory regimes within their own jurisdiction and uniform Arctic safety and environmental protection regulatory regimes, consistent with UNCLOS, that could provide a basis for protection measures in regions of the central Arctic Ocean beyond coastal state jurisdiction for consideration by the IMO.

D. Strengthening Passenger Ship Safety in Arctic Waters: That the Arctic states should support the application of the IMO's *Enhanced Contingency Planning Guidance for Passenger Ships Operating in Areas Remote from SAR Facilities*, given the extreme challenges associated with rescue operations in the remote and cold Arctic region; and strongly encourage cruise ship operators to develop, implement and share their own best practices for operating in such conditions, including consideration of measures such as timing voyages so that other ships are within rescue distance in case of emergency.

E. Arctic Search and Rescue (SAR) Instrument: That the Arctic states decide to support developing and implementing a comprehensive, multi-national Arctic Search and Rescue (SAR) instrument, including aeronautical and maritime SAR, among the eight Arctic nations and, if appropriate, with other interested parties in recognition of the remoteness and limited resources in the region.

II. PROTECTING ARCTIC PEOPLE AND THE ENVIRONMENT

A. Survey of Arctic Indigenous Marine Use: That the Arctic states should consider conducting surveys on Arctic marine use by indigenous communities where gaps are identified to collect information for establishing up-to-date baseline data to assess the impacts from Arctic shipping activities.

B. Engagement with Arctic Communities: That the Arctic states decide to determine if effective communication mechanisms exist to ensure engagement of their Arctic coastal communities and, where there are none, to develop their own mechanisms to engage and coordinate with the shipping industry, relevant economic activities and Arctic communities (in particular during the planning phase of a new marine activity) to increase benefits and help reduce the impacts from shipping.

C. Areas of Heightened Ecological and Cultural Significance: That the Arctic states should identify areas of heightened ecological and cultural significance in light of changing climate conditions and increasing multiple marine use and, where appropriate, should encourage implementation of measures to protect these areas from the impacts of Arctic marine shipping, in coordination with all stakeholders and consistent with international law.

D. Specially Designated Arctic Marine Areas: That the Arctic states should, taking into account the special characteristics of the Arctic marine environment, explore the need for internationally designated areas for the purpose of environmental protection in regions of the Arctic Ocean. This could be done through the use of appropriate tools, such as "Special Areas" or Particularly Sensitive Sea Areas (PSSA) designation through the IMO and consistent with the existing international legal framework in the Arctic.

E. Protection from Invasive Species: That the Arctic states should consider ratification of the IMO International Convention for the Control and Management of Ships Ballast Water and Sediments, as soon as practical. Arctic states should also assess the risk of introducing invasive species through ballast water and other means so that adequate prevention measures can be implemented in waters under their jurisdiction.

F. Oil Spill Prevention: That the Arctic states decide to enhance the mutual cooperation in the field of oil spill prevention and, in collaboration with industry, support research and technology transfer to prevent release of oil into Arctic waters, since prevention of oil spills is the highest priority in the Arctic for environmental protection.

G. Addressing Impacts on Marine Mammals: That the Arctic states decide to engage with relevant international organizations to further assess the effects on marine mammals due to ship noise, disturbance and strikes in Arctic waters; and consider, where needed, to work with the IMO in developing and implementing mitigation strategies.

H. Reducing Air Emissions: That the Arctic states decide to support the development of improved practices and innovative technologies for ships in port and at sea to help reduce current and future emissions of greenhouse gases (GHGs), Nitrogen Oxides (NOx), Sulfur Oxides (SOx) and Particulate Matter (PM), taking into account the relevant IMO regulations.

III. BUILDING THE ARCTIC MARINE INFRASTRUCTURE

A. Addressing the Infrastructure Deficit: That the Arctic states should recognize that improvements in Arctic marine infrastructure are needed to enhance safety and environmental protection in support of sustainable development. Examples of infrastructure where critical improvements are needed include: ice navigation training; navigational charts; communications systems; port services, including reception facilities for ship-generated waste; accurate and timely ice information (ice centers); places of refuge; and icebreakers to assist in response.

B. Arctic Marine Traffic System: That the Arctic states should support continued development of a comprehensive Arctic marine traffic awareness system to improve monitoring and tracking of marine activity, to enhance data sharing in near real-time, and to augment vessel management service in order to reduce the risk of incidents, facilitate response and provide awareness of potential user conflict. The Arctic states should encourage shipping companies to cooperate in the improvement and development of national monitoring systems.

C. Circumpolar Environmental Response Capacity: That the Arctic states decide to continue to develop circumpolar environmental pollution response capabilities that are critical to protecting the unique Arctic ecosystem. This can be accomplished, for example, through circumpolar cooperation and agreement(s), as well as regional bilateral capacity agreements.

D. Investing in Hydrographic, Meteorological and Oceanographic Data: That the Arctic states should significantly improve, where appropriate, the level of and access to data and information in support of safe navigation and voyage planning in Arctic waters. This would entail increased efforts for: hydrographic surveys to bring Arctic navigation charts up to a level acceptable to support current and future safe navigation; and systems to support real-time acquisition, analysis and transfer of meteorological, oceanographic, sea ice and iceberg information.

APPENDIX 2: Workshop Agenda & Presentations

THURSDAY, OCTOBER 22, 2009

9:00 am **Welcome**
- Mike Sfraga, Director, UA Geography Program, Associate Dean, School of Natural Resources and Agricultural Sciences
- Brian Rogers, Chancellor, University of Alaska Fairbanks
- Mead Treadwell, Chairman, United States Arctic Research Commission
- Denise Michels, Inuit Circumpolar Council Representative, Mayor of Nome
- Lars Kullerud, President, University of the Arctic
- Ross Virginia, Director, Institute of Arctic Studies, Dartmouth College

9:45 am **Opening Presentations**
- *Economic Development, Community Sustainability, and Future Arctic Marine Use,* Denise Michels, Mayor of Nome, Vice President Kawerak Native Corporation, ICC Representative
- *Arctic Climate Modeling,* Scott Rupp and John Walsh, University of Alaska Fairbanks
- *Research Challenges in the Arctic Ocean – The Marine Mammal Protection Act and Geophysical Research,* Bernard Coakley, University of Alaska Fairbanks
- *Outcomes of the Arctic Marine Shipping Assessment,* Lawson Brigham, University of Alaska Fairbanks and Chair, AMSA

12:00 pm **Lunch**
- *The International Maritime Organization's Arctic Initiatives,* Victor Santos-Pedro, Transport Canada

1:30 pm **Charge to the Working Groups:** Mike Sfraga, Lawson Brigham, Ben Ellis
Outline Major Issues/Questions; Introduce Working Group Leads

2-5:00 pm **Working Groups and Leads in Session,** I. Enhancing Arctic Marine Safety , II. Protecting Arctic People and the Environment, and III. Building the Arctic Marine Infrastructure

6:30 pm **Welcome Dinner and Presentation**
- North by 2020: Hajo Eicken, Professor of Geophysics and Amy Lovecraft, Associate Professor of Political Science, University of Alaska Fairbanks

FRIDAY, OCTOBER 23, 2009

9:00 am **Working Group Leads Report to Participants and Discussion:** Lawson Brigham

10:00 am **Working Groups Reconvene**

12:00 pm **Lunch**
- *Governance Issues in the Arctic Ocean* – Betsy Baker, Vermont Law School and Dartmouth College
- *Regulating Arctic Ships and Operations* - Des Upcraft, Lloyd's Register, UK

1:30-5 pm **Working Groups Reconvene**

6:30 pm **Chancellor's Reception** – Sponsored by Holland America Lines
University of Alaska Museum of the North, Entertainment: Pavva Inupiaq Dancers
***Buses Depart Princess Lodge at 6:00 pm** ***Buses Depart Museum at 8:30 pm**

SATURDAY, OCTOBER 24, 2009

9:00 am **Working Groups Reconvene:** Mike Sfraga, Lawson Brigham

12:00 pm **Lunch**
- *Monitoring Ships in the Alaskan Arctic* – John Adams, Marine Exchange of Alaska

1:00 pm **Working Group Reports:** Group Leads, 30 minutes per group

3:00 pm **Synthesis Activity**

3:30 pm **Program Reflection, Next Steps**
- Draft document prepared
- Schedule for Report Writing, Participant Distribution, Editing, etc.
- Timing and plans for Report Distribution, etc.

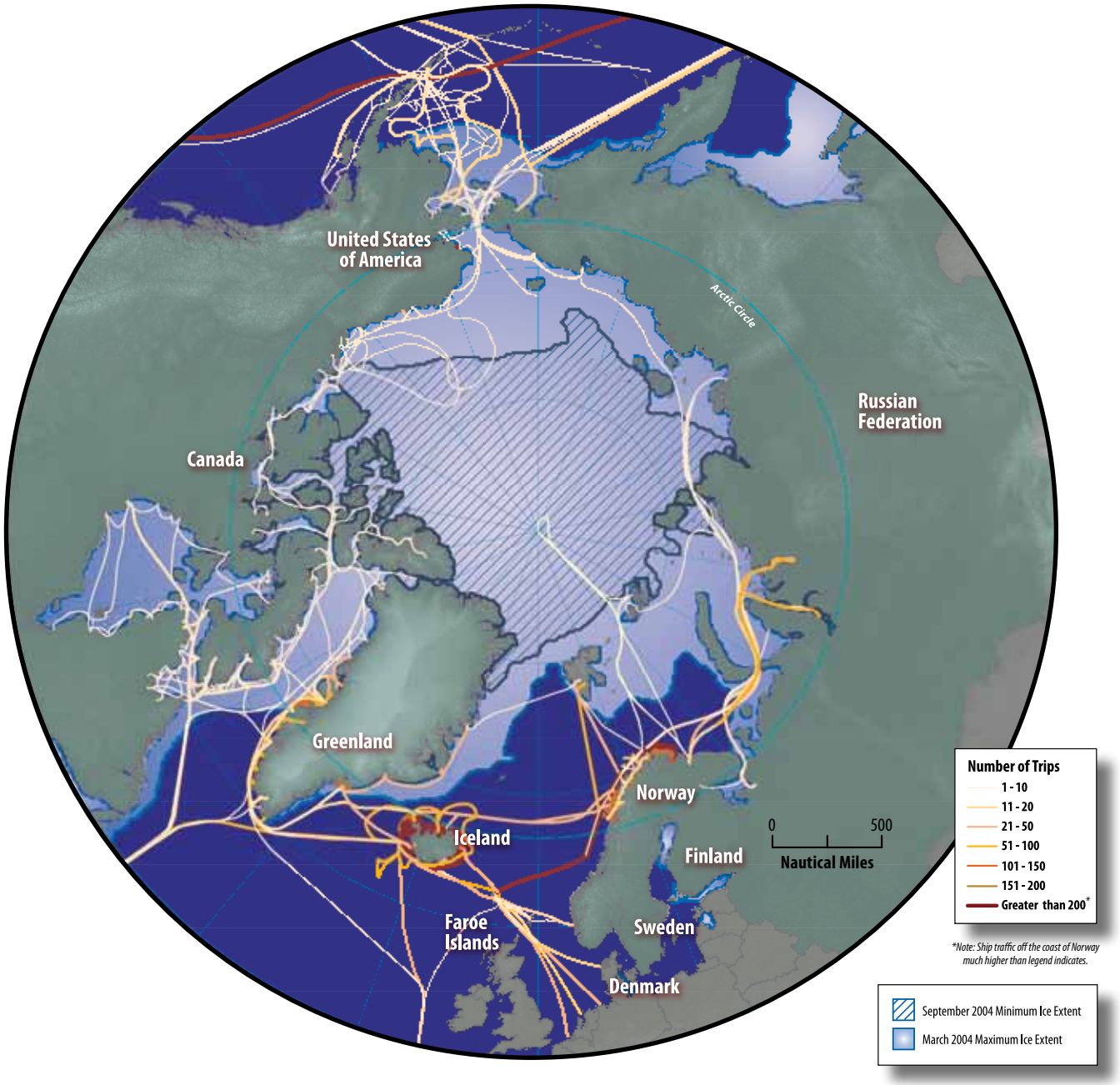
APPENDIX 3: Workshop Participants

Michael Baffrey	U.S. Department of Interior, Alaska
Betsy Baker	Vermont Law School and Dartmouth College
Lawson Brigham	University of Alaska Fairbanks and AMSA Chair / Workshop Co-Leader & Report Co-Editor
Pablo Clemente-Colon	U.S. National Ice Center
Bernard Coakley	University of Alaska Fairbanks
Craig Dorman	University of Alaska
Hajo Eicken	University of Alaska Fairbanks
Ben Ellis	Ben Ellis & Company / Workshop Co-Leader
Pierre-Andres Forest	University of the Arctic
Victoria Gofman	Aleut International Association
Larry Hartig	Commissioner, Alaska State Department of Environmental Conservation
William Hill	Crowley Marine Services, Anchorage
Rob Huebert	University of Calgary
Layla Hughes	WWF-Alaska
Henry Huntington	PEW Environment Group
Michael Inman	U.S. Coast Guard Seventeenth District, Juneau
David Jackson	Canadian Coast Guard / Leader, Workshop Working Group III
Jay Jerome	U.S. Coast Guard Sector, Anchorage
John Kaighin	Shell Exploration & Production Company, Anchorage
John Kelley	University of Alaska Fairbanks
Katie Kennedy	University of Alaska Fairbanks
Hiromitsu Kitagawa	Ocean Policy Research Foundation, Tokyo, Japan
Pia Kohler	University of Alaska Fairbanks
Lars Kullerud	President, University of the Arctic
Denny Lassuy	U.S. North Slope Science Initiative, Anchorage
Thomas Laughlin	International Union for Conservation of Nature, Washington, DC
Carol Lewis	University of Alaska Fairbanks
Patrick Lewis	WWF Arctic, Oslo, Norway
Amy Lovecraft	University of Alaska Fairbanks
Ken MacInnis	Marine and Environmental Law Institute, Dalhousie University, Halifax, Canada
Molly McCammon	Alaska Ocean Observing System, Anchorage
Earl McDowell	U.S. Navy
Elizabeth McLanahan	U.S. National Oceanic & Atmospheric Administration, Washington, DC
Denise Michels	Mayor of Nome, Alaska
Sharry Miller	Alaska State Department of Environmental Conservation
Sherry Modrow	University of Alaska Fairbanks
William Morani Jr.	Holland America Lines, Seattle
Tom Moyer	Office of U.S. Senator Mark Begich of Alaska
Patricia Opheen	U.S. Army Corps of Engineers, Alaska
Bob Pawlowski	Denali Commission, Anchorage / Co-Leader, Workshop Working Group II
Jackie Poston	Alaska State Department of Environmental Conservation
Brian Rogers	Chancellor, University of Alaska Fairbanks
Tracy Rogers	University of Alaska Fairbanks
Cheryl Rosa	U.S. Arctic Research Commission
Scott Rupp	University of Alaska Fairbanks
Warren Sanamo Jr.	Edison Chouest Offshore, Galliano, Louisiana
Victor Santos-Pedro	Transport Canada, Ottawa and AMSA Co-lead / Leader, Workshop Working Group I
Mike Sfraga	University of Alaska Fairbanks / Workshop Co-Leader & Report Co-Editor
Virgil "Buck" Sharpton	University of Alaska Fairbanks
Per Sønderstrup	Danish Maritime Authority, Copenhagen, Denmark
Wanda Tangermann	University of Alaska Fairbanks
Nancy Tarnai	University of Alaska Fairbanks
Michael Terminel	Edison Chouest Offshore, Anchorage
Dennis Thurston	U.S. Minerals Management Service, Alaska Region
Mead Treadwell	Chairman, U.S. Arctic Research Commission
Carl Uchytil	U.S. Coast Guard Seventeenth District, Juneau, Alaska
Des Upcraft	Lloyd's Register, London, United Kingdom
Ross Virginia	Dartmouth College
John Walsh	University of Alaska Fairbanks
Hanling Wang	Chinese Academy of Social Sciences, Beijing
John Whitney	U.S. National Oceanic & Atmospheric Administration, Anchorage
Denis Wiesenburg	University of Alaska Fairbanks
Margaret Williams	WWF-Alaska / Co-Leader, Workshop Working Group II
Shiji Xu	Chinese Arctic and Antarctic Administration, Beijing

Acronyms

AECO ~ Association of Arctic Expedition Cruise Operators
AIS ~ Automated Identification System
AMSA ~ Arctic Marine Shipping Assessment
CLIA ~ Cruise Lines International Association
EEZ ~ Exclusive Economic Zone
EPPR ~ Emergency Prevention, Preparedness and Response
HACCP ~ Hazard Analysis and Critical Control Points
IAATO ~ International Association of Antarctica Tour Operators
IACP ~ Institute for Applied Circumpolar Policy
IACS ~ International Association of Classification Societies
ILO ~ International labor Organization
IMO ~ International Maritime Organization
IPY ~ International Polar Year (2007-08)
IWC ~ International Whaling Commission
LNG ~ Liquefied Natural Gas
MARPOL ~ International Convention for the Prevention of Pollution from Ships
NGO ~ Non-governmental Organization
PAME ~ Protection of the Arctic Marine Environment
PSSA ~ Particularly Sensitive Sea Area
R&D ~ Research and Development
SAR ~ Search and Rescue
SDWG ~ Sustainable Development Working Group
SOLAS ~ International Convention for the Safety of Life at Sea
STCW ~ International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
UAF ~ University of Alaska Fairbanks
UArctic ~ University of the Arctic
UNCLOS ~ United Nations Convention on the Law of the Sea
WMO ~ World Meteorological Organization

Shipping traffic in the Arctic for the AMSA survey year 2004. *Source: AMSA*



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Word Emphasis Within the Outcomes (Roadmaps and Key Issues) of Workshop Discussions for the Arctic Marine Shipping Assessment Recommendations.

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