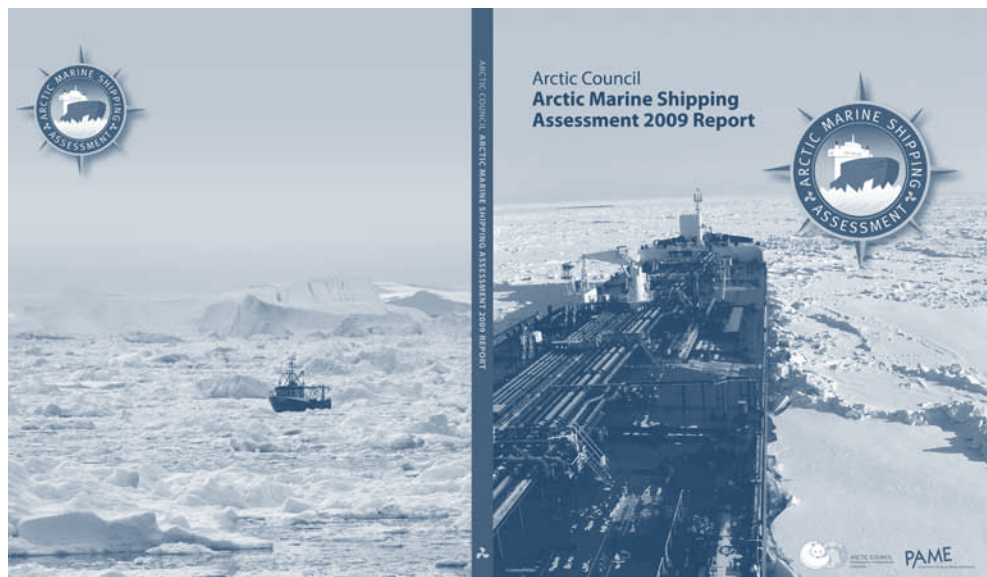


**ARCTIC MARINE SHIPPING ASSESSMENT
OF THE ARCTIC COUNCIL**

By: Lawson W. Brigham, PhD
University of Alaska Fairbanks



Introduction

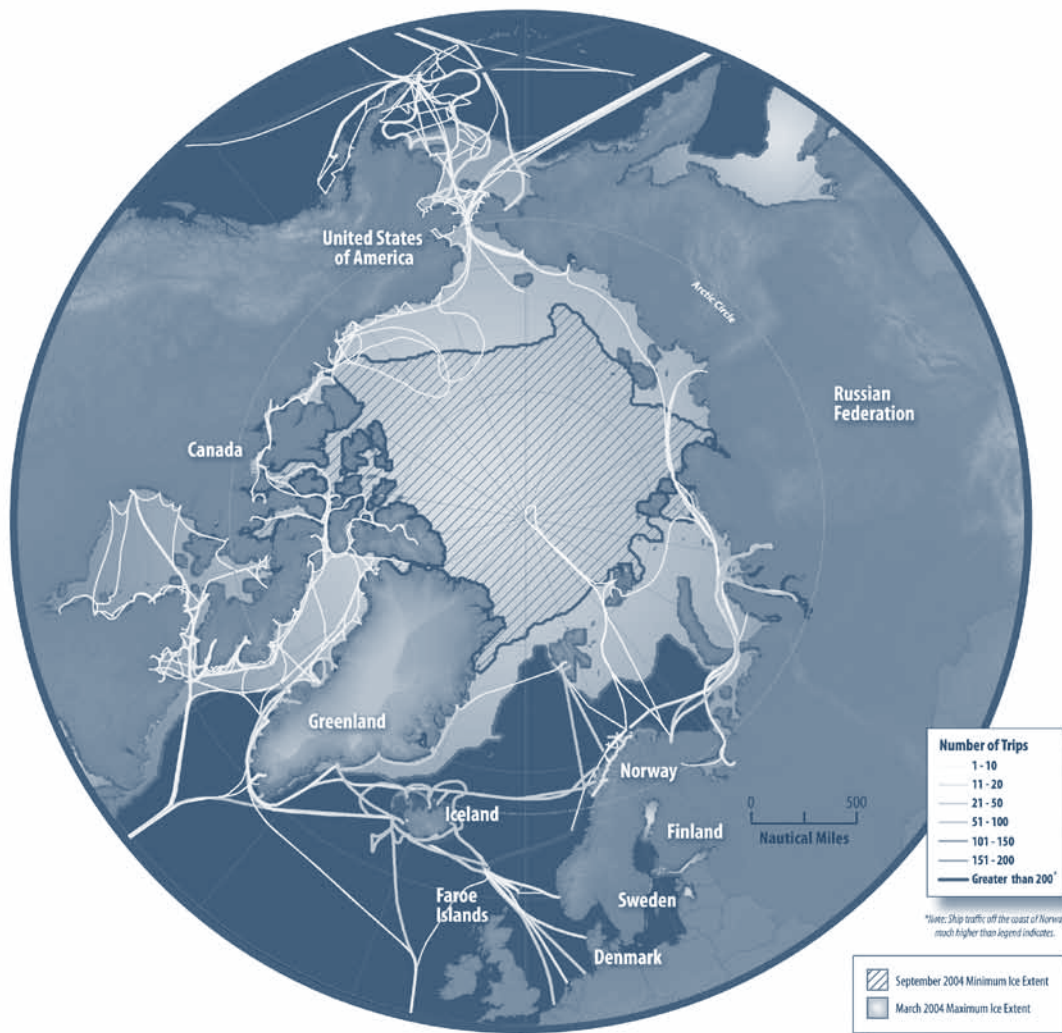
On 29 April 2009 at the Arctic Council Ministerial Meeting in Tromsø, the Arctic Ministers approved a key study for the future of the region, the Arctic Marine Shipping Assessment (AMSA). AMSA is the culmination of work by nearly 200 experts under the Council's working group Protection of the Arctic Marine Environment (PAME). It was led by Canada, Finland and the United States during the period 2005 to 2009, and is a follow-on effort to the Council's Arctic Climate Impact Assessment and Arctic Marine Strategic Plan, each released in 2004 and both indicating future increases in Arctic marine operations. AMSA is an assessment of current and future Arctic marine activity with a focus on Arctic marine safety and environmental protection; these key themes are consistent with the Arctic Council's mandates of environmental protection and sustainable development. **Overall, AMSA 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 as three things:

- a **baseline assessment of Arctic marine activity** early in the 21st century using the 2004 AMSA database as an historic snapshot of Arctic 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 report and policy document, not a scientific assessment, although some elements of the report are based



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

on the most recent scientific research especially those related to environmental impacts. AMSA is appropriately 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 viewpoints, natural resource development, and other practical issues of Arctic marine navigation; 96 findings were outlined in the assessment. The *AMSA 2009 Report* and AMSA Background Research Documents (research papers that were not approved or negotiated by the Arctic Council) can be found on the PAME web site (www.pame.is).

Defining Arctic Shipping

The AMSA Team defined 'Arctic Shipping' very broadly to include many types of ships and vessels including: icebreakers, container ships, tankers, bulk carriers, cruise ships, fishing vessels, offshore supply vessels, ferries, tug-barge combinations, government survey

vessels, salvage ships, and coast guard ships. The reason for this broad definition was that the AMSA Team took a holistic approach to Arctic marine use and wished to include nearly all Arctic surface vessels that might have an impact on the marine environment. Also it was recognized that comprehensive levels of discharges and stack emissions could be estimated from the AMSA database. Most naval ships that are combatants, such as submarines and surface warships, were not included in AMSA although they are well-known operators in the Arctic Ocean. This exclusion is consistent with the Arctic Council's non-involvement in naval, military and security affairs.

AMSA Baseline Database and Current Operations

The AMSA Team sent an electronic survey form to the Council's Senior Arctic Officials requesting ship data in their nation's Arctic waters during calendar year 2004. Since AMSA's research phase commenced in summer 2005, it was logical to ask the Arctic states

for their most recent Arctic ship data for calendar year 2004. Also requested was how each of six Arctic states defined the boundaries of their Arctic waters (only Sweden and Finland have no Arctic waters). In this way, the AMSA team would be able to report on the numbers of ships in each Arctic Large Marine Ecosystem (LME); total emissions and discharges could be derived from such a comprehensive database. The AMSA database should be considered a first-order estimate since this was an initial attempt at a complete survey of all Arctic ships (less naval) for a given year. Using AMSA as a baseline, future surveys should be more robust.

Notable Arctic marine activity data from the AMSA include:

- an estimated 6,000 individual ships operated in or near the Arctic during calendar year 2004 (including ships along the North Pacific Great Circle Route through the Aleutian Islands).
- slightly less than 50% of the total were fishing vessels and 20% were bulk carriers.
- high ship concentrations were found off coastal Norway and northwest Russia (Barents, Kara and Pechora seas); along the North Pacific Great Circle Route (off southwest Alaska); off Greenland's west coast (cruise ships and support traffic); and around Iceland.
- evidence of surface ships operating in the central Arctic Ocean (from 1977-2008 there have been 77 icebreaker voyages to the North Pole for science and tourism).
- year-round operation of commercial Arctic ships between Dudinka on the Yenisey river and Murmansk supporting the industrial complex at Norilsk.
- seasonal operation of large, non-icegoing bulk carriers to the Red Dog zinc mine in northwest Alaska, and extensive summer supply operations in the Canadian Arctic.

The Human Dimension and Arctic Communities

One of the most important issues facing commercial use of the Arctic Ocean is how these many new uses and users will impact the economic, environmental, social and cultural well-being of Arctic communities. In particular, the impact on Arctic indigenous people of future Arctic shipping was one of the key areas studied in AMSA. The AMSA Team held 14 town hall meetings in Arctic communities in Canada, Iceland, Norway and the United States. A key chapter in the

AMSA 2009 Report is devoted to the human dimension and these issues are addressed throughout the report and in the final AMSA recommendations. AMSA notes that future Arctic marine activity will include many non-Arctic stakeholders, multiple users in Arctic waterways, and the potential overlap of new marine operations with traditional, indigenous uses. Studies have shown that many local Arctic communities depend heavily on marine resources for subsistence and hunters use the ice for travel and the local waters for transport by boat in summer. From the AMSA town hall meetings, Arctic residents expressed their concern about the disruption of hunting practices and marine species, and their concern for oil spills. The Arctic communities recognized the potential economic benefits of increased marine activity, but also expressed concern for the social, cultural and environmental effects of such expansion. The early engagement of local residents in planned Arctic marine development projects has been shown to be successful in reducing the negative impacts and enhancing the positive benefits of such marine projects.

The Legal Framework

AMSA found that the United Nations Convention on the Law of the Sea (UNCLOS) provides the fundamental framework for governance of Arctic marine navigation and overall marine use. UNCLOS sets out the legal framework for the regulation of shipping according to maritime zones of jurisdiction. Significantly for the Arctic Ocean, UNCLOS allows coastal states the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution in ice-covered waters (Article 234). AMSA indicates that the International Maritime Organization (IMO) is the competent and appropriate UN agency for issues related to international shipping including maritime safety, security and environmental protection. The IMO acts as a secretariat for most international conventions and facilitates their global implementation through adoption of codes and regulations that become international rules and standards. All 8 Arctic states are active and influential members of the IMO and working together with the global maritime community at IMO they can attain acceptance of Arctic-specific rules and regulations for improved safety and environmental protection in polar waters.

Addressing the Future

One of the key challenges for the AMSA Team was to

identify the major uncertainties that will be central to shaping the future of Arctic marine use. Using scenario planning (creating scenarios or plausible futures of Arctic marine navigation in 2020 and 2050), AMSA identified nearly 120 factors and forces that could influence the future of Arctic marine activity. Included are such factors as: legal and governance regimes; oil and gas prices; hard minerals and other global commodities pricing (for example nickel, zinc, copper and high grade iron ore); climate change and sea ice variability; the safety of other global shipping routes; new resource discoveries; world trade patterns; actions of the marine insurance industry; and, the emergence of new Arctic maritime users such as China, Japan and Korea. The AMSA scenarios creation effort identified two primary drivers and uncertainties: (a) Resources and trade ~ the level of demand for Arctic natural resources and trade, and (B) Governance ~ the degree of relative stability of rules for marine use both within the Arctic and internationally. The scenarios framework or axis of uncertainty for the AMSA scenarios was bounded by these two uncertainties or primary drivers.

The roles of climate change and continued Arctic sea ice retreat are fully considered in the AMSA scenarios. Arctic sea ice is assumed to provide for improved marine access and potentially longer seasons of navigation. However, for AMSA it is the globalization of the Arctic and development of Arctic natural resources that are the primary drivers of increased marine use in the region. Greater access from retreating sea ice facilitates marine use, but global economic drivers are considered paramount.

Key Environmental Issues and Infrastructure Concerns

In an AMSA scientific review of the environmental impacts of Arctic marine activity, the most significant threat from ships was determined to be the release of oil through accidental or illegal discharge. Other potential impacts of Arctic ships include: ship strikes on marine mammals; the introduction of alien species from ballast water, cargo, and hull fouling, and transfer of organisms from one polar ecosystem to another; black carbon emissions accelerating regional ice melt; anthropogenic noise effects on migratory patterns of species; and, the unintended consequences of greenhouse gases, sulfur oxides and nitrogen oxides in the remote Arctic environment. Lengthening of the navigation season and the possibilities for year-round navigation may also have far reaching consequences for Arctic ecosystems.

For example, late autumn and early spring Arctic shipping may increase the potential for interaction between ships and migrating (and calving) marine mammals.

A major AMSA concern identified is the general lack of marine infrastructure in the Arctic except for areas along the Norwegian coast and coastal regions of northwest Russia. Missing or lacking infrastructure in most Arctic areas include: hydrographic data and marine charts; complete and adequate coverage of communications; environmental monitoring (for weather, sea ice, and icebergs); search and rescue (SAR) capability; environmental response capacity; ship monitoring and tracking; aids to navigation; salvage; and more. AMSA states that the vastness and harshness of the Arctic environment make conduct of marine emergency response more difficult throughout the region. The Arctic Ocean's hydrographic database for charting is not adequate in most areas to support current and future Arctic marine activity. And, the monitoring network of meteorological and oceanographic observations critical to safe navigation is extremely sparse and not adequate to support increases in Arctic marine transportation.

Recommendations

AMSA's 17 recommendations are presented in the *AMSA 2009 Report* under three, inter-related themes:

- Enhancing Arctic Marine Safety
- Protecting Arctic People and the Environment
- Building the Arctic Marine Infrastructure.

These themes are fundamental to understanding the complexity of responding to increased marine use and to the future investment required to achieve enhanced marine safety and environmental protection throughout the Arctic Ocean. Implementing the AMSA recommendations will require extensive international cooperation and public-private partnerships. The recommendations include:

- Supporting efforts at IMO to strengthen, harmonize, and regularly update international standards for Arctic vessels.
- Updating and the mandatory application of relevant parts of IMO's *Guidelines for Ships Operating in Arctic Ice-covered Waters*.
- Augmenting global IMO ship safety and pollution prevention conventions for the Arctic.

- Exploring the possible harmonization of Arctic marine shipping regulatory regimes (within coastal state jurisdictions and in the central Arctic Ocean).
- Development of a comprehensive, multi-national Arctic search and rescue (SAR) instrument (aeronautical and maritime SAR).
- Considering the conduct of surveys of Arctic marine use by indigenous communities and determining if effective communication mechanisms exist between Arctic communities and the shipping industry regarding new marine activities.
- Identifying Arctic areas of heightened ecological and cultural significance, and exploring the need for internationally designated Arctic areas for the purpose of environmental protection (designations such as Special Areas or Particularly Sensitive Sea Areas).
- Arctic state ratification of the IMO International Convention for the Control and management of Ships Ballast Water and Sediments.
- Enhancing mutual cooperation in the field of oil spill prevention and, in collaboration with industry, supporting research and technology transfer to prevent release of oil into Arctic waters.
- Engaging with relevant international organizations to further assess the effects on marine mammals due to ship noise, disturbance, and strikes in Arctic waters.
- Supporting the development of improved practices and innovative technologies for ships in port and at sea to help reduce current and future emissions of greenhouse gasses, nitrogen oxides, sulfur oxides and particulate matter.
- Development of a comprehensive Arctic marine traffic system to improve monitoring and tracking of marine activity, and continued development of circumpolar environmental response capabilities.
- Investing in hydrographic, meteorological and oceanographic data in support of safe navigation and voyage planning in Arctic waters.

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.



Returadresse:
Den Norske Atlanterhavskomiteé
Fr. Nansens pl. 8
0160 Oslo



Selected Findings in the AMSA 2009 Report

- Global Climate Model simulations indicate a continuing “retreat” of Arctic sea ice through the 21st century. Importantly, all simulations indicate that an Arctic sea ice cover remains in winter.
- Coastal state authority to regulate foreign shipping in the Arctic Ocean in order to prevent, reduce and control marine pollution was bolstered by Article 234 of UNCLOS.
- Most shipping in the Arctic today is destinational, moving goods into the Arctic for community resupply or moving natural resources out of the Arctic to world markets.
- Marine shipping is one of many factors affecting Arctic communities, directly or indirectly. While economic effects of marine shipping may be positive, there are many concerns expressed by Arctic coastal communities about social, cultural and environmental effects.
- Natural resource development and regional trade are the key drivers of increased Arctic marine activity. Global commodities prices for oil, gas, hard minerals, coal, etc. are driving the search for Arctic natural wealth.
- A large number of uncertainties define the future of Arctic marine activity, including the legal and governance situation; degree of Arctic state cooperation; climate change variability; radical changes in global trade; new resource discoveries; oil prices and other resource commodity pricing; and future marine technologies.
- Increased marine traffic in the central Arctic Ocean is a reality – for scientific exploration and tourism.
- A lack of major ports and other maritime infrastructure, except for those along the Norwegian coast and Northwest Russia, is a significant factor (limitation) in evolving and future Arctic marine operations.
- Release of oil into the Arctic marine environment, either through accidental release, or illegal discharge, is the most significant threat from shipping activity.
- There are certain areas in the Arctic region that are of heightened ecological significance, many of which will be at risk from current and/or increased shipping.
- Significant portions of the primary Arctic shipping routes do not have adequate hydrographic data, and therefore charts, to support safe navigation. The operational network of meteorological and oceanographic observations in the Arctic, essential for accurate weather and wave forecasting for safe navigation, is extremely sparse.

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