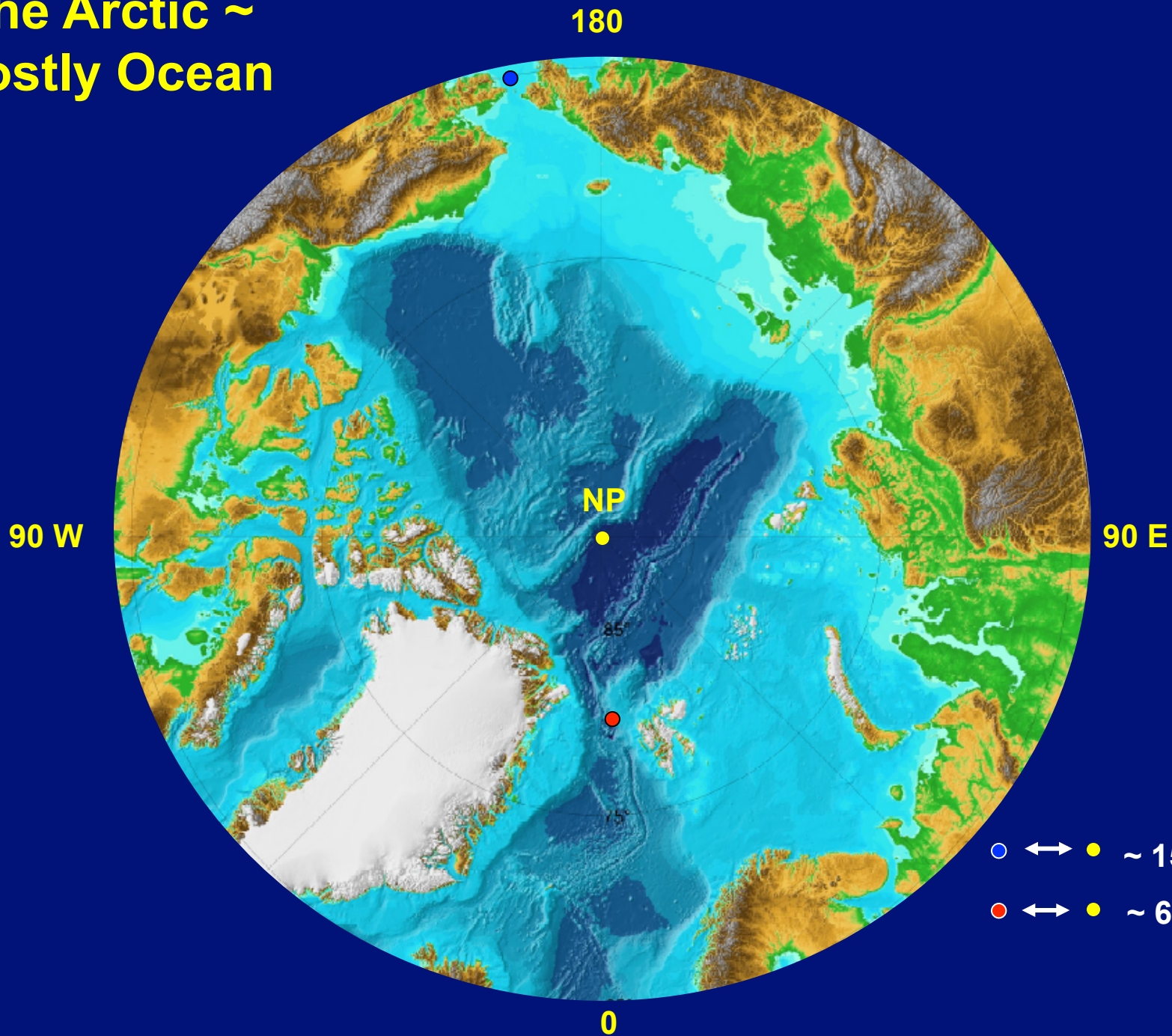


AMSA's Application to the Ecosystems Approach to Management in the Arctic

- **Rapid Climate Change**
- **Globalization ~ Arctic Natural Resources**
- **Regional & Global Geopolitics**
- **Indigenous Peoples Challenges**

**The Ecosystems Approach to Management of Arctic Ecosystems ~ UAF Conference 23-25 Aug 2016
Lawson W. Brigham ~ University of Alaska Fairbanks**

The Arctic ~ Mostly Ocean





2004 – 2009

Arctic Council ~ Intergovernmental Forum

AMSA Lead Countries for PAME ~ Canada, Finland & USA

AMSA Focus ~ Marine Safety & Marine Environmental Protection

13 Major Workshops & 14 Town Hall Meetings

Key Challenge ~ Many Non-Arctic Stakeholders

Arctic Ministers' Approval 29 April 2009 ~
Negotiated Recommendations & Text

Arctic Council
Arctic Marine Shipping
Assessment 2009 Report



Table of Contents

- Executive Summary with Recommendations
- Arctic Marine Geography Climate & Sea Ice
- History
- Governance
- Current Use/Database
- Scenarios to 2020 & 2050
- Human Dimensions
- Environmental Impacts
- Infrastructure



ARCTIC COUNCIL
IN COOPERATION WITH
2002/2004

PAME
Partnership of the Arctic Marine Environment

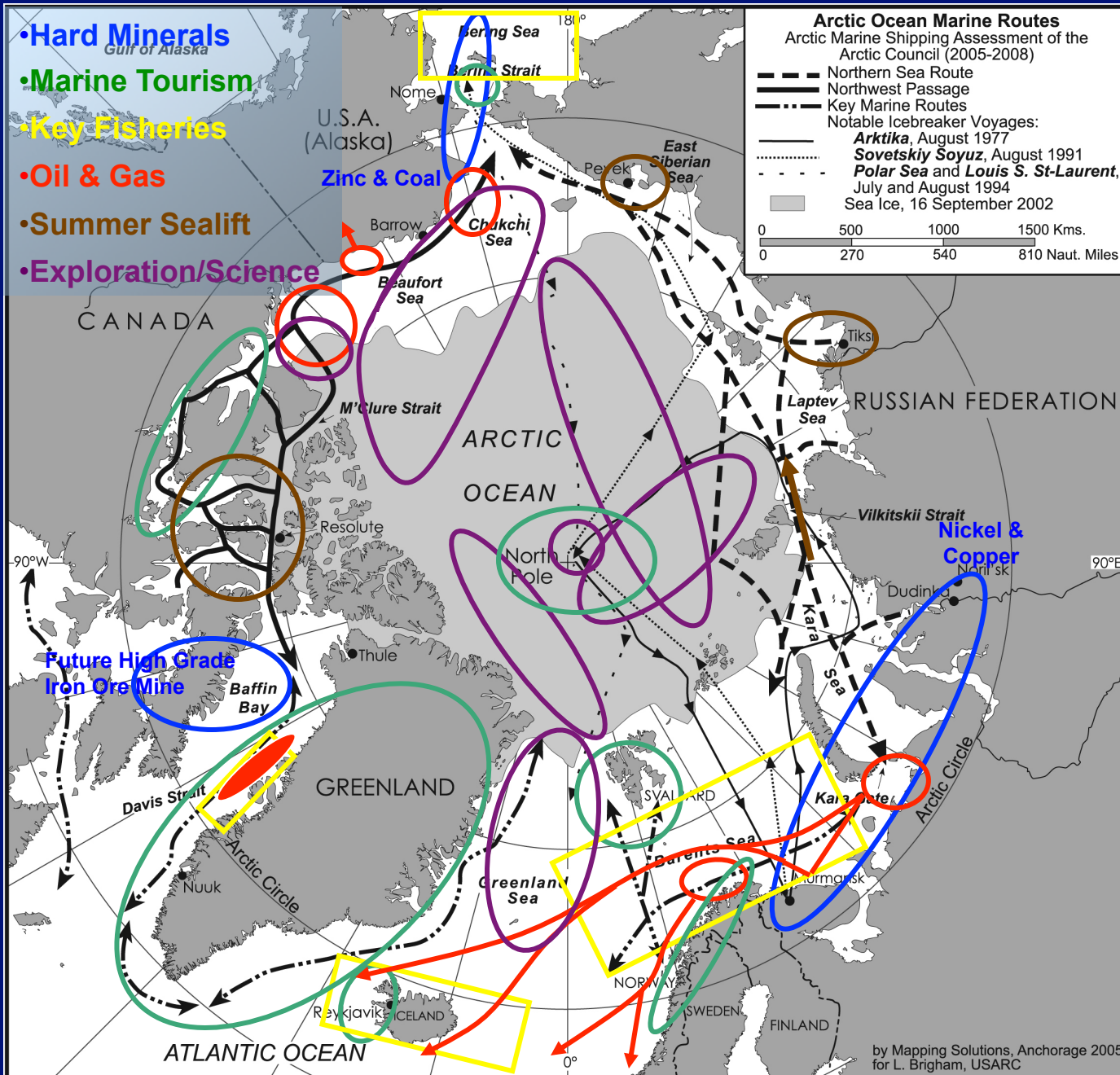
www.pame.is

What is 'Arctic Shipping'?

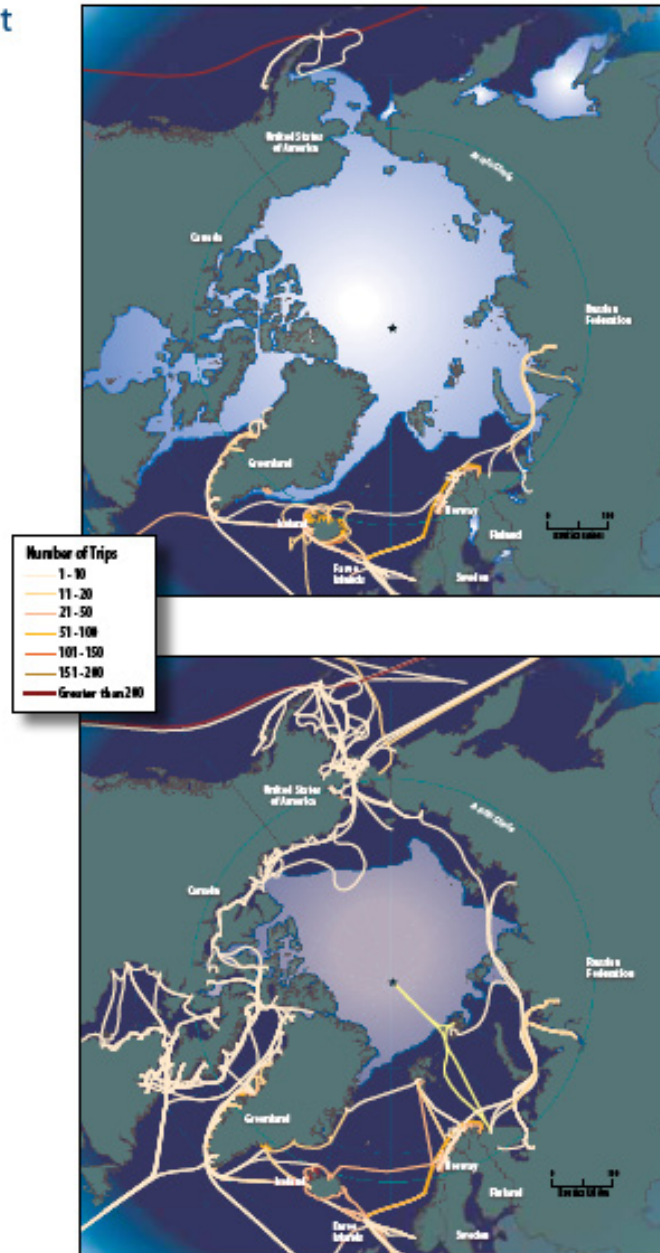
- *AMSA ~ Holistic View:*

- What type vessels.....what activity they undertake....what cargo they may be carrying.
- Comprehensive Arctic vessel activity database (annual).
 - Bulk carriers, container ships, general cargo vessels, tankers, oil/gas service & supply ships, passengers ships, government vessels, tug/barges, fishing vessels, pleasure craft, unknown.
- *PAME Arctic Ocean Review: Arctic Marine Operations & Shipping*

Summer Arctic Commercial Marine Use



Sea Ice Extent Differences



January 2004 Traffic

July 2004 Traffic

Maritime Traffic 1 June to 30 November 2013 Marine Exchange of Alaska

Colour Explanation (SHIP_TYPE)

- Tanker
- Passenger
- Cargo
- Tug
- Towing
- Towing long/wide
- Fishing
- SAR
- Law enforcement
- Military
- Pleasure
- Sailing

A map of Alaska and the surrounding waters, including the Gulf of Alaska, Bering Sea, and Chukchi Sea. The landmasses are colored in a light tan or yellowish-brown, while the water is light blue. A green rectangular boundary is drawn around the central and southern parts of the map, encompassing the main body of Alaska and the Gulf of Alaska. The text is centered over the Gulf of Alaska region.

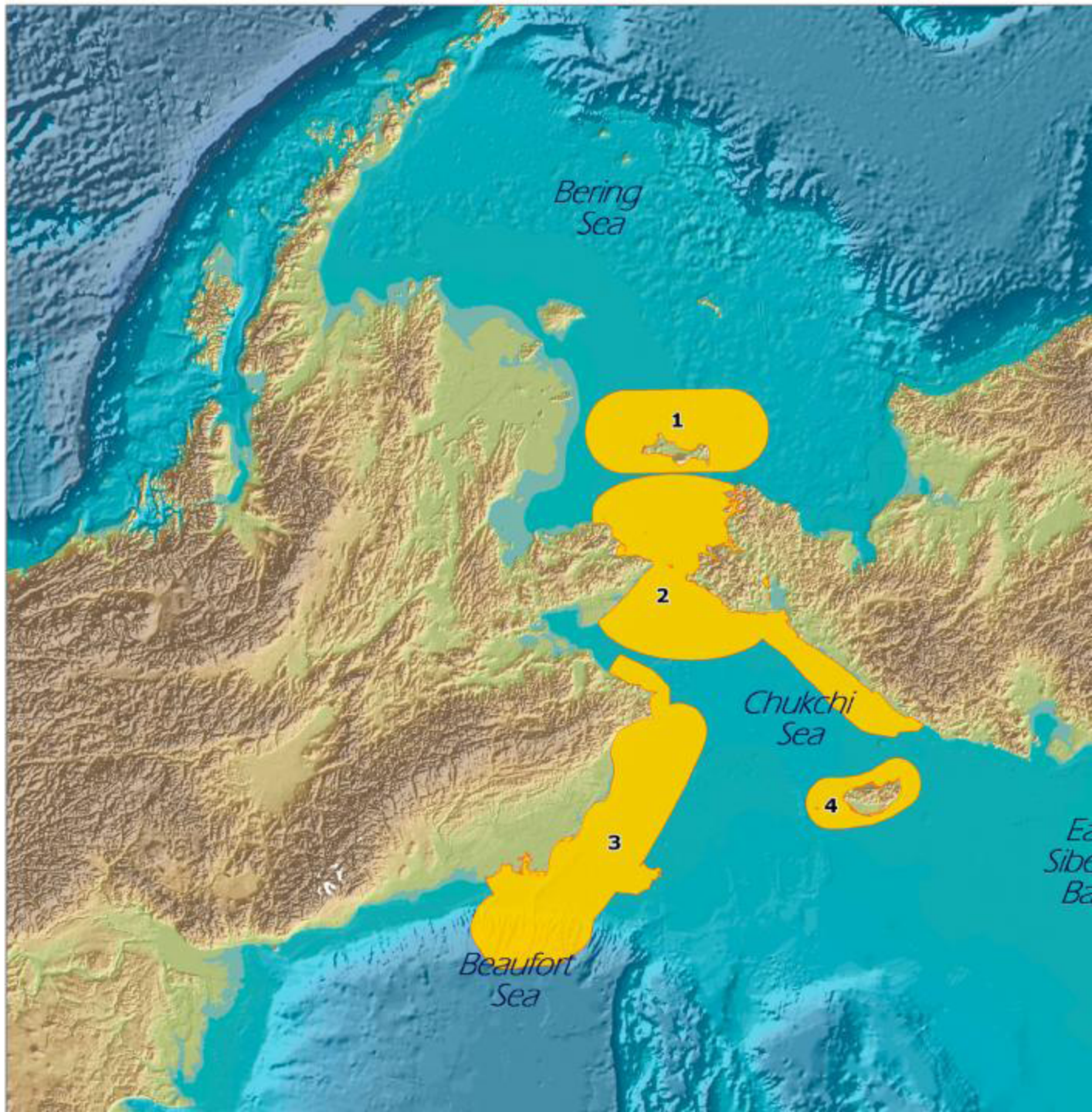
Maritime Traffic
1 Jan to 31 May 2013
Marine Exchange of Alaska

**IUCN-NRDC 2010 Workshop
on Important/Vulnerable
Arctic Marine Areas**

**Pacific/Beaufort Region
Super EBSA**

Super EBSA

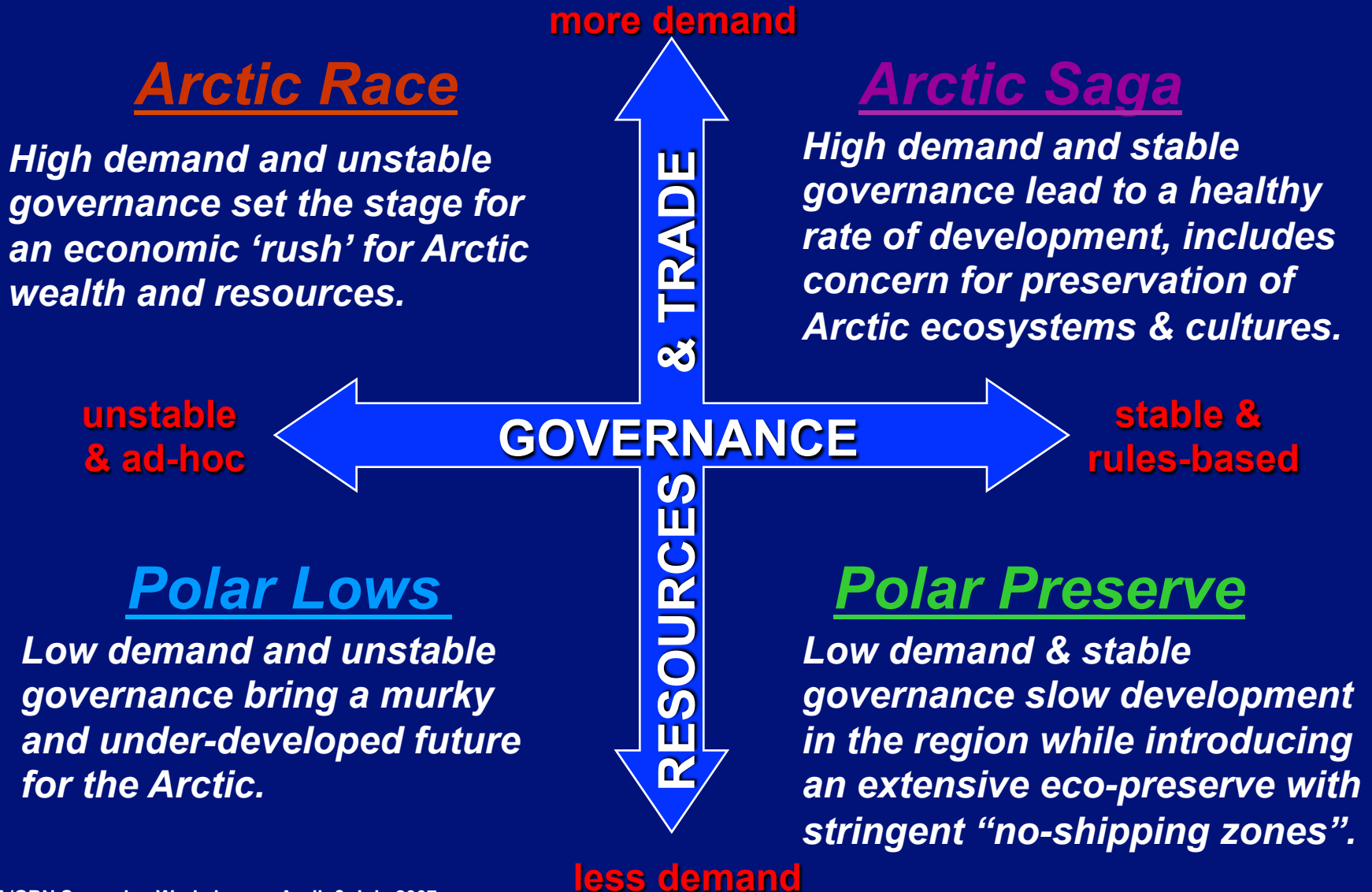
- 1. St. Lawrence Island
- 2. Bering Strait
- 3. Chuckchi Beaufort Coast
- 4. Wrangel Island



AMSA Scenarios ~ Key Uncertainties for Future Arctic Marine Navigation

- Stable legal climate
- Radical change in global trade dynamics
- Climate change is more disruptive sooner
 - Safety of other routes
- Socio-economic impact of global weather changes
- Oil prices (55-60 to 100-150 USD?)***
- Major Arctic shipping disasters***
 - Limited windows of operation (economics)
 - Rapid climate change
 - Maritime insurance industry
- China, Japan & Korea become Arctic maritime nations
 - Transit fees
- Conflict between indigenous & commercial use
 - Arctic maritime enforcement
- Escalation of Arctic maritime disputes
 - Shift to nuclear energy***
 - New resource discovery
 - World trade patterns
- Catastrophic loss or change in Suez or Panama Canals
 - Global agreements on construction rules and standards

Scenarios on the Future of Arctic Marine Navigation in 2050

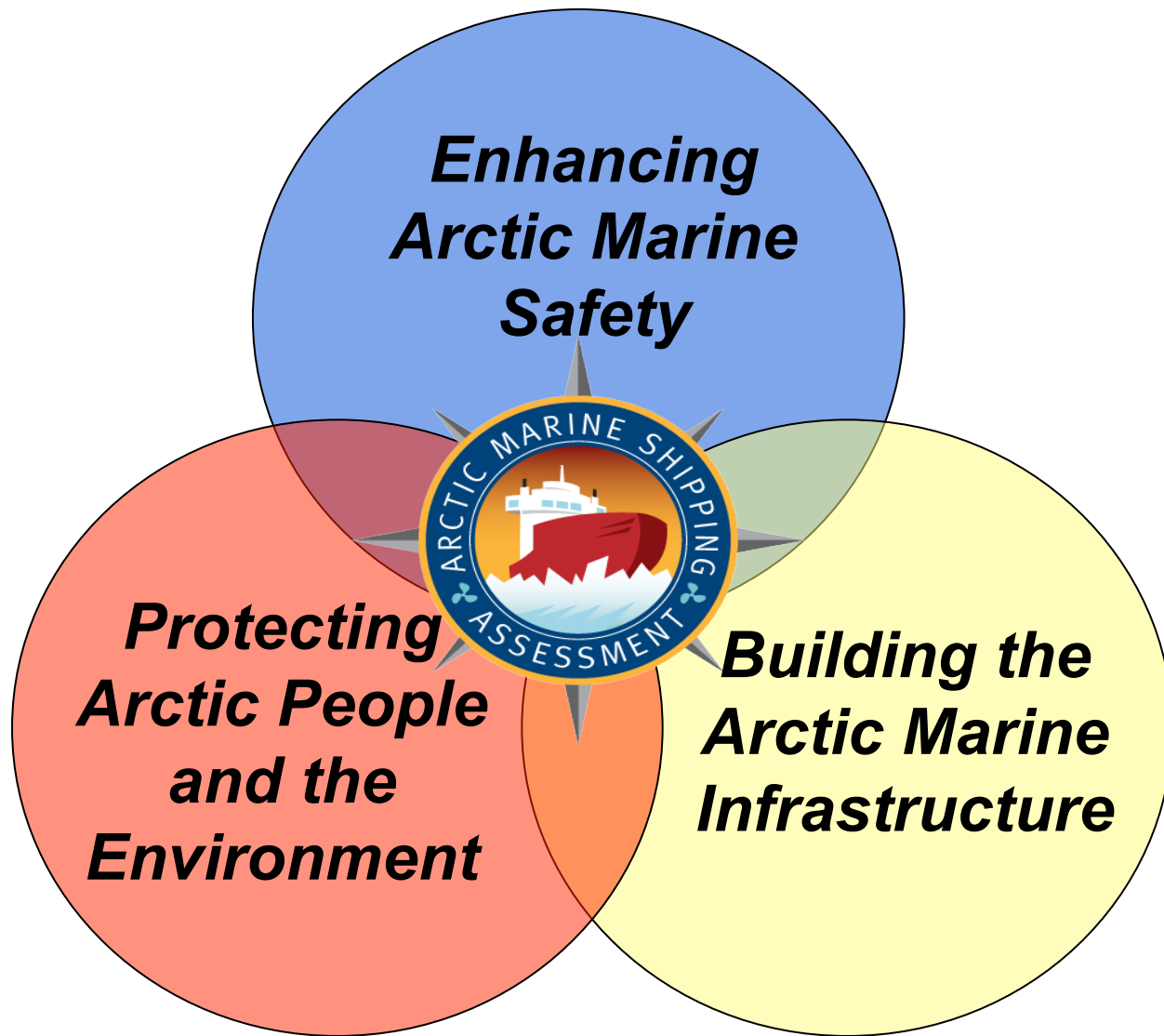


AMSA Scenarios ~ Successes

- **Facilitated New & Unconstrained Thinking**
- **Identified Major Drivers & Key Uncertainties**
- **Educated Arctic Council ‘Customers’ & Many Stakeholders**
- **Identified Linkages to the Global System**
- **Established an Integrated View of Arctic Marine Navigation**

Arctic Linkages to the Global Economic System

- **International Fishing (10%)**
- **Hard Minerals ~ Palladium (40%), Nickel (22%), Diamonds (20%), Platinum (15%), Zinc (10%)**
- **Estimated Arctic Hydrocarbons ~ Undiscovered Natural Gas (30%) & Oil (13%)**
- **Potential: Rare Earths (25%), Coal & Fresh Water**
 - **Global Marine Tourism industry**
 - **Regional Trade to Northern Communities & Infrastructure Development**



AMSA RECOMMENDATIONS (17) ~ THEMES

- **Arctic State Linkages++**
- *IMO Measures*
- *Uniformity of Governance*
- *Passenger Ship Safety*
- **SAR Agreement++++**



Enhancing Arctic Marine Safety

- **Infrastructure Deficit**
- **Arctic Marine Traffic System+**
- **Environmental +++++ Response Capacity**
- **Hydrographic, Met & Ocean Data**

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure



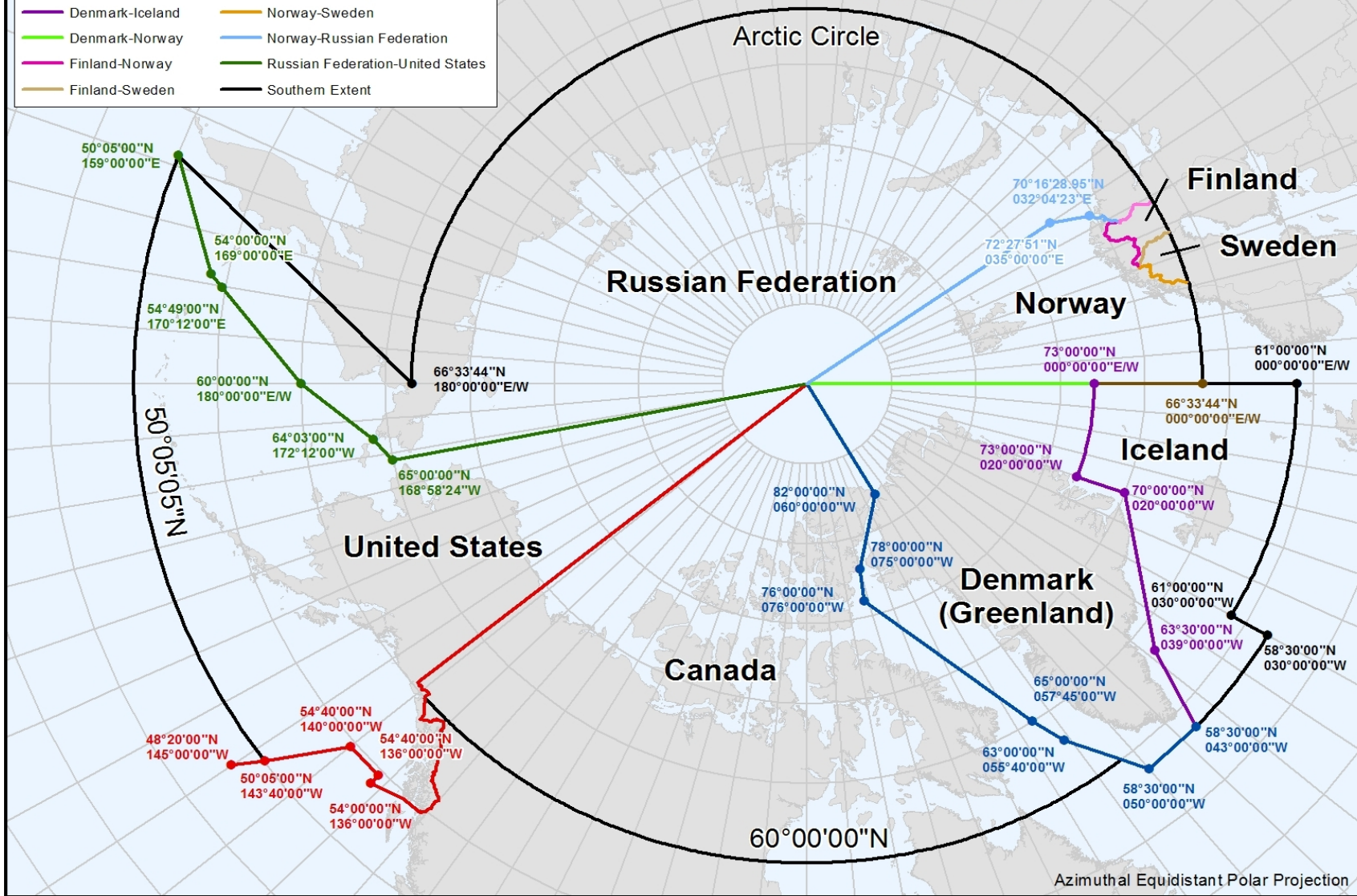
- **Indigenous Use+**
- **Community Engagement++**
- *Invasive Species*
- **Eco-Significant Areas++**
- *Oil Spill Prevention*
- **Marine Mammal Impacts**
- *Reducing Air Emissions*

AMSA RECOMMENDATIONS (17) ~ THEMES

ARCTIC SEARCH AND RESCUE AGREEMENT AREAS OF APPLICATION ILLUSTRATIVE MAP

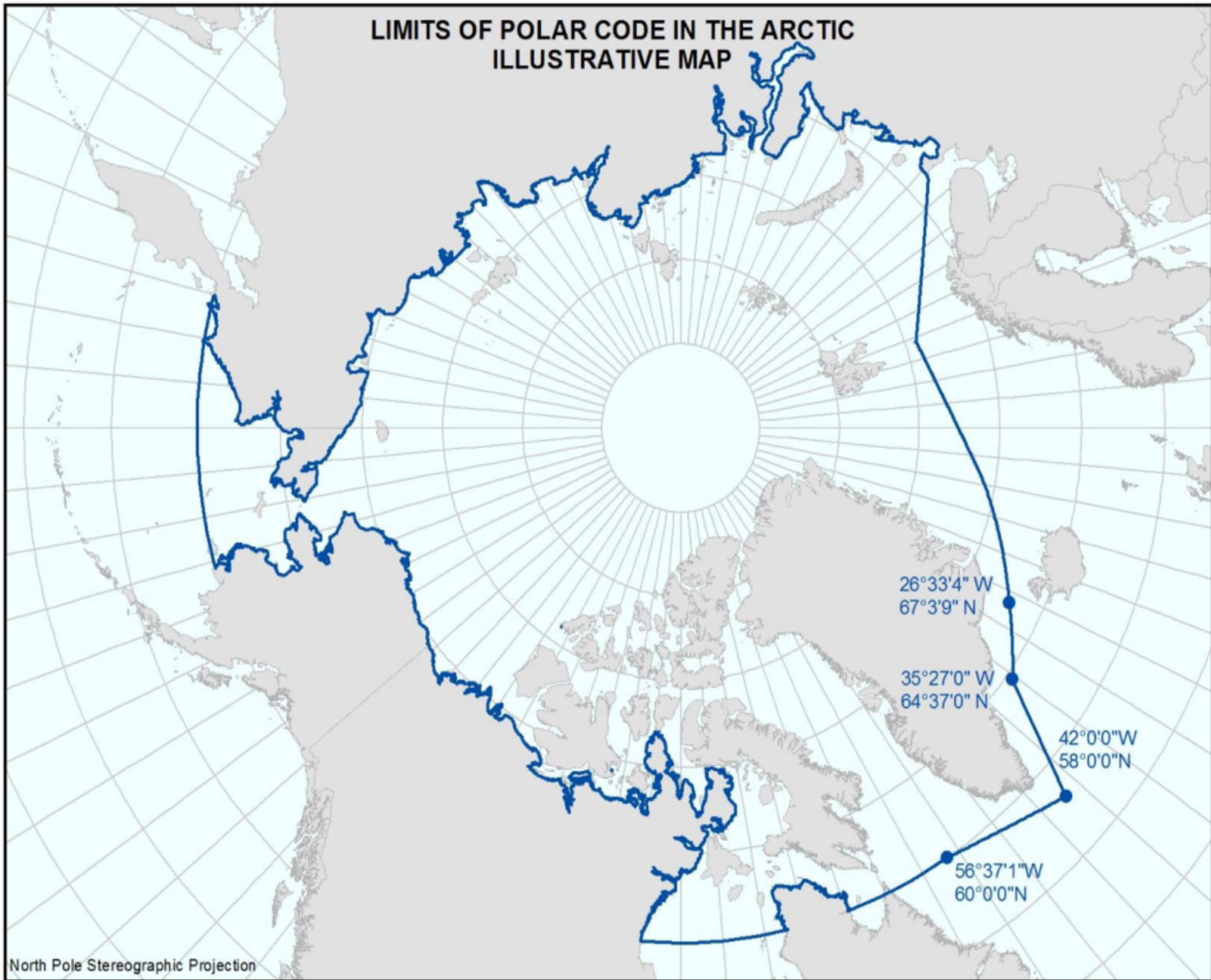
Search and Rescue Delimitation

- | | |
|---|---|
| — Canada-Denmark | — Finland-Russian Federation |
| — Canada-United States | — Iceland-Norway |
| — Denmark-Iceland | — Norway-Sweden |
| — Denmark-Norway | — Norway-Russian Federation |
| — Finland-Norway | — Russian Federation-United States |
| — Finland-Sweden | — Southern Extent |



Azimuthal Equidistant Polar Projection

LIMITS OF POLAR CODE IN THE ARCTIC ILLUSTRATIVE MAP



North Pole Stereographic Projection



AMSA 2009:

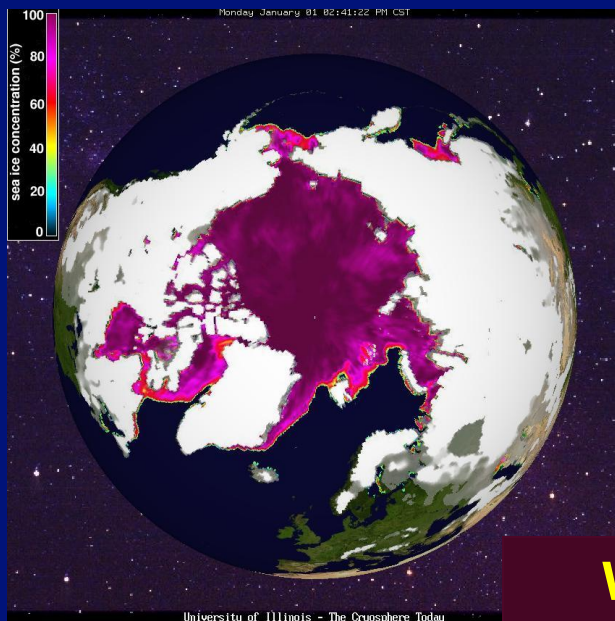
- **Baseline Assessment**
- **Arctic Council Policy Document**
~ Negotiated Text Approved 29 April 2009 ~
- **Strategic Guide**

[**www.pame.is**](http://www.pame.is)

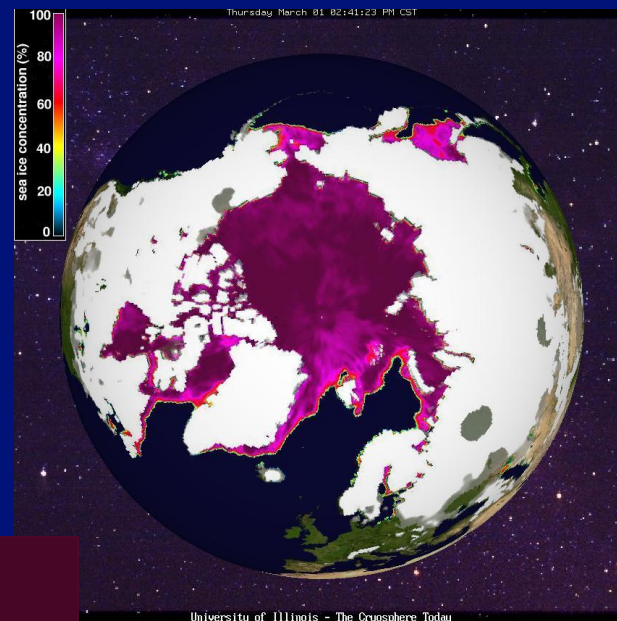
AMSA Outcomes & Applications

- **Integrated Arctic Marine Use Across Sectors & Seasonality**
 - **Strategies to Handle Complexity**
- **Scenarios Approach Provided Plausible Futures & Impacts**
- **AMSA ~ Negotiated Recommendations with Consensus Provided a Policy Framework**

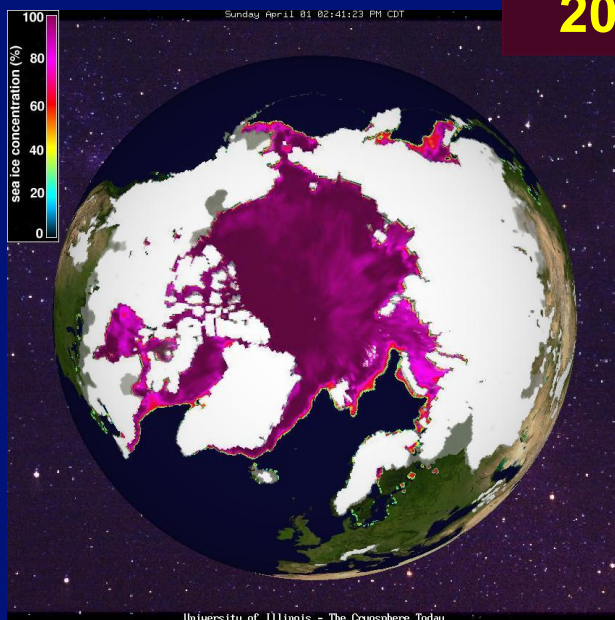
1 January



1 March

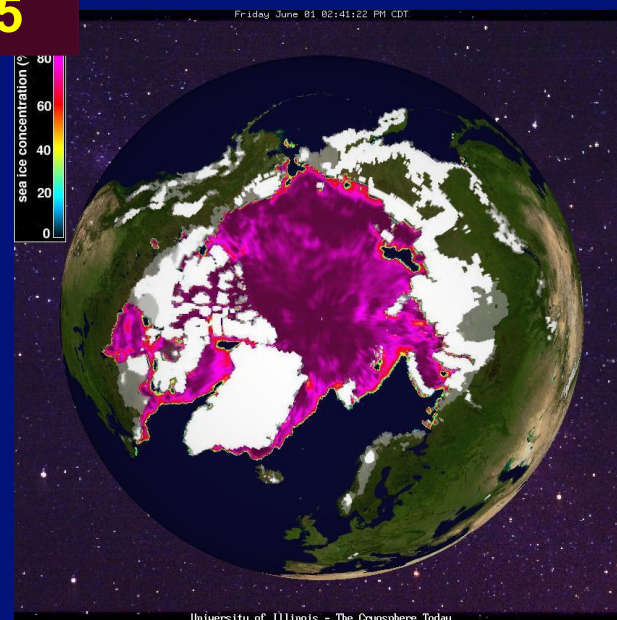


1 April



**Winter &
Spring Months
2014 & 2015**

1 June



Timeless Arctic Marine Transport: Indigenous Use of the Arctic Ocean



Elements of the IMO Polar Code

Amendments to SOLAS and MARPOL (1 Jan 2017)

Commercial Carriers & Passenger Ships (500 tons or more)

- **Polar Ship's Structural & Equipment Standards (IASC Ice Classes: PC1/ PC7)**
 - **Marine Safety and Lifesaving Equipment**
 - **Training & Experience of Polar Mariners (STCW)**
- **Polar Ship Certificate (Issued by Flag State; Ship Classes A,B,C)**
 - **Polar Waters Operations Manual (Ship Specific)**
 - **Environmental Rules ~ MARPOL Annexes:**
 - **Annex I ~ Oil & Oily Mixtures (No Discharge)**
 - **Annex II ~ Noxious Liquid Substances (No Discharge)**
 - **Annex IV ~ Sewage**
 - **Annex V ~ Food Waste/Garbage**