

# EVALUATING VESSEL TRAFFIC IN THE US HIGH ARCTIC: PATTERNS FROM CURRENT AND HISTORIC VESSEL POSITION DATA

ALYSON AZZARA  
COMMITTEE ON THE MARINE TRANSPORTATION SYSTEM  
NOAA KNAUSS MARINE POLICY FELLOW  
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[ALYSON.AZZARA@CMTS.GOV](mailto:ALYSON.AZZARA@CMTS.GOV)

# ACKNOWLEDGEMENTS



- Officers and Crew of the NOAA Ship *Fairweather*
- Brendan Hurley



# CMTS - ARCTIC POLICY RESPONSE TO CONGRESS

- CMTS U.S. Arctic Marine Transportation System Policy Response to Congress
  - Discusses need for physical and informational infrastructure to support growing MTS in the Arctic
  - Process of interagency review
- Sparked interest in understanding current extent of MTS in Arctic
  - Who is there?
  - What are they doing?
  - Where are they?

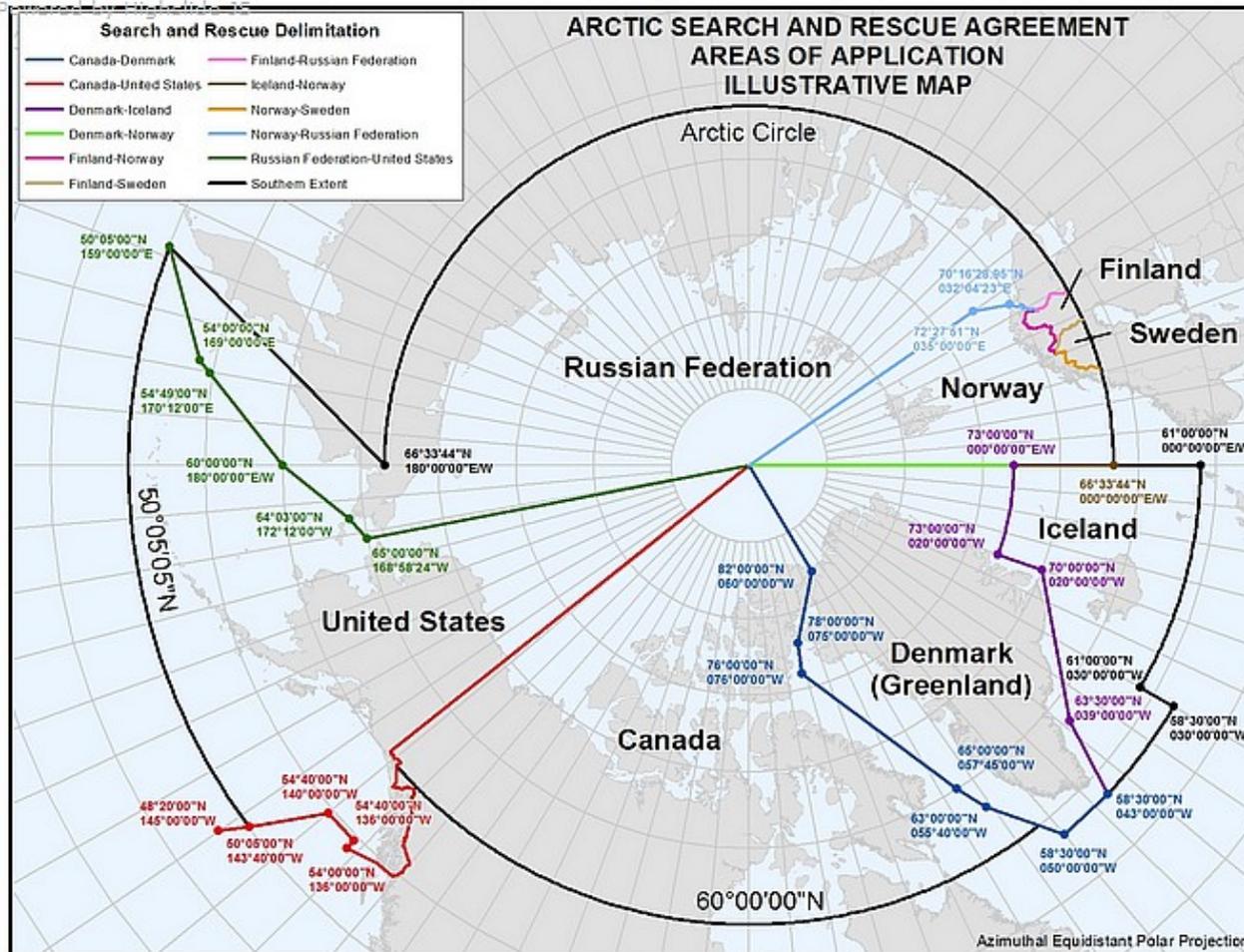
# DATA COLLECTION

- Posed difficulties
- General lack of data
  - Difficult to gather data
  - Short season
  - Not many vessels
  - Not much communication
- Highlights issues discussed in Policy Response

# DATA SETS COMBINED?

- Aerial Surveys of Arctic Marine Mammals (BOEM/NOAA), 1998-2010
  - Bowhead Whale Aerial Survey Project ([BWASP](#)) and
  - Chukchi Offshore Monitoring in Drilling Area ([COMIDA](#))
  - <http://www.afsc.noaa.gov/NMML/software/bwasp-comida.php>
- Vessel AIS data (courtesy of NOAA Office of Coast Survey)
  - International AIS hit date range: 6/4/11 -- 6/19/12
  - US waters AIS hit date range: 6/30/11 -- 6/19/12
- Vessel position data, 2012 (courtesy of NOAA Ship *Fairweather*)
- NOAA's National Ice Center satellite ice data
  - 5/9/11 - 9/10/12

# ARCTIC COUNCIL SEARCH AND RESCUE DELINEATIONS

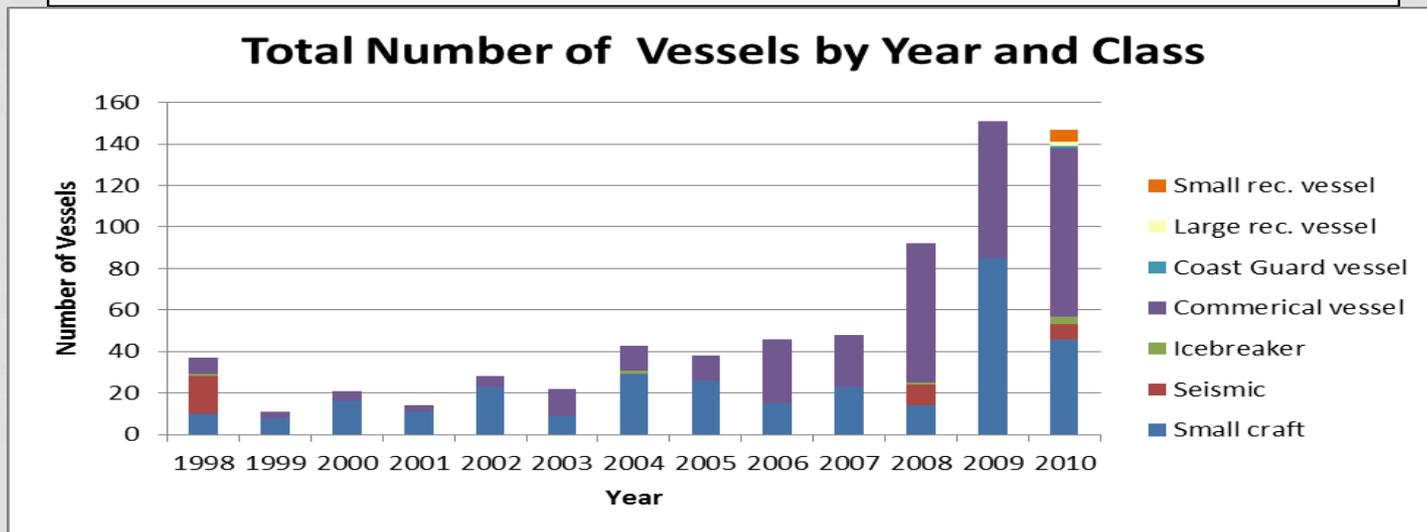
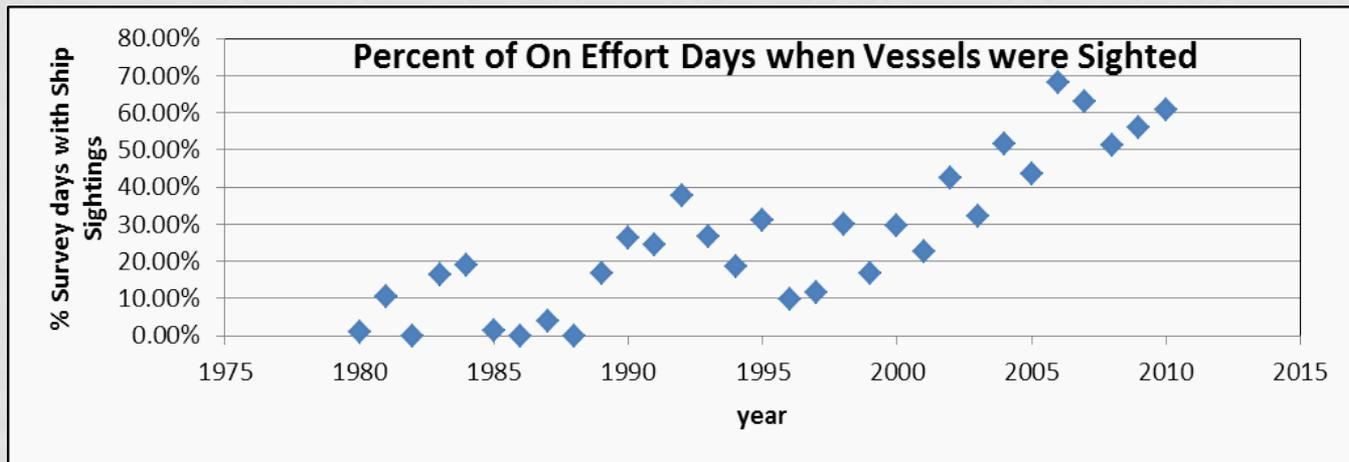


SAR Agreement: <http://library.arcticportal.org/1709/>

Link to the map: <http://gcaptain.com/arctic-council-agreement-signed/>

# INCREASE IN VESSEL PRESENCE AND DIVERSITY OVER TIME

\*Based on NMML Aerial sighting data. Ships were recorded on opportunistic basis during on effort whale surveys. Not all ships sighted were recorded; ships categories are subject to observer bias. Ship counts represent all ships seen not unique ship counts.\*

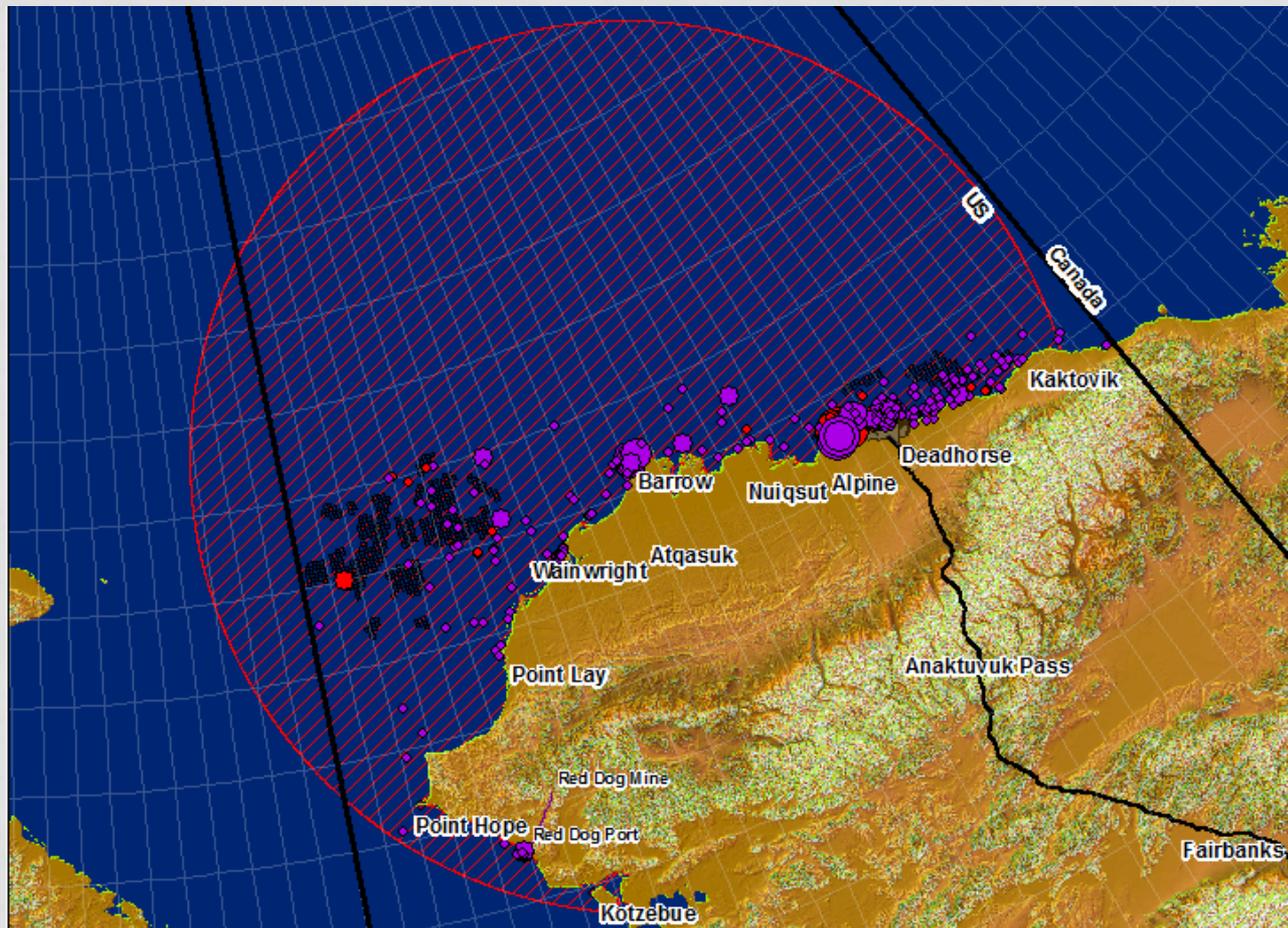






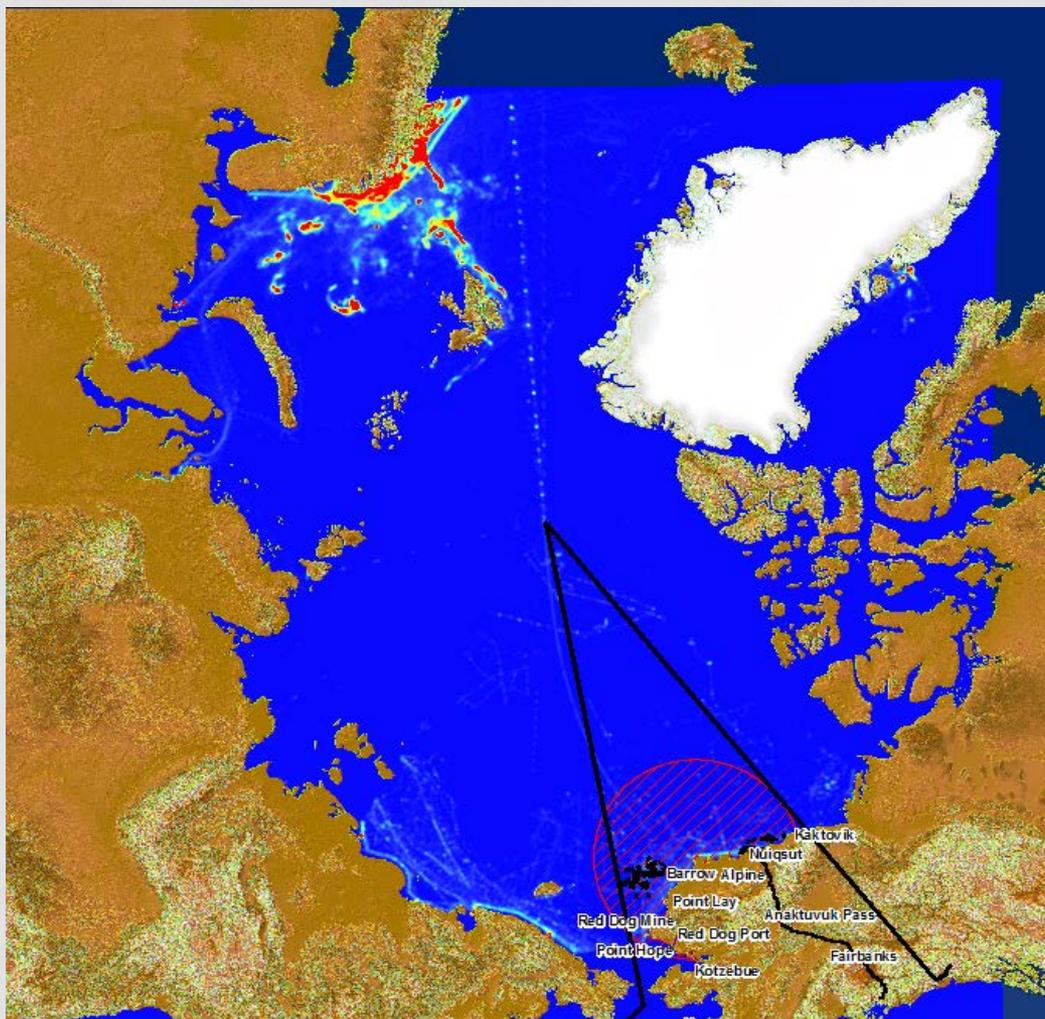
# COMMERCIAL VESSELS AND LEASES

\*Overlaps commercial vessels from 1998-2010 (purple) and Seismic vessels (red) from 1998, 2008, and 2010 (only) b/c those are the only years that categorize seismic vessels specifically (see slide above with bar graph). Concentrations on lease blocks, along Barrow and Deadhorse, Prudhoe Bay become apparent. \*



# FULL ARCTIC KERNEL DENSITY ANALYSIS 2011-2012 AIS DATA

Automatic Identification System (AIS) is required by the IMO for all international vessels larger than 300 gross tons. The AIS system transmits a position at least every two minutes with the ship identification number and origin and expected destination. From this, it is possible to map areas of highest density and resolve vessel transit lanes



## Legend

### AIS density

hits per square mile

High : 934.38

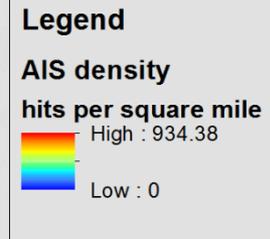
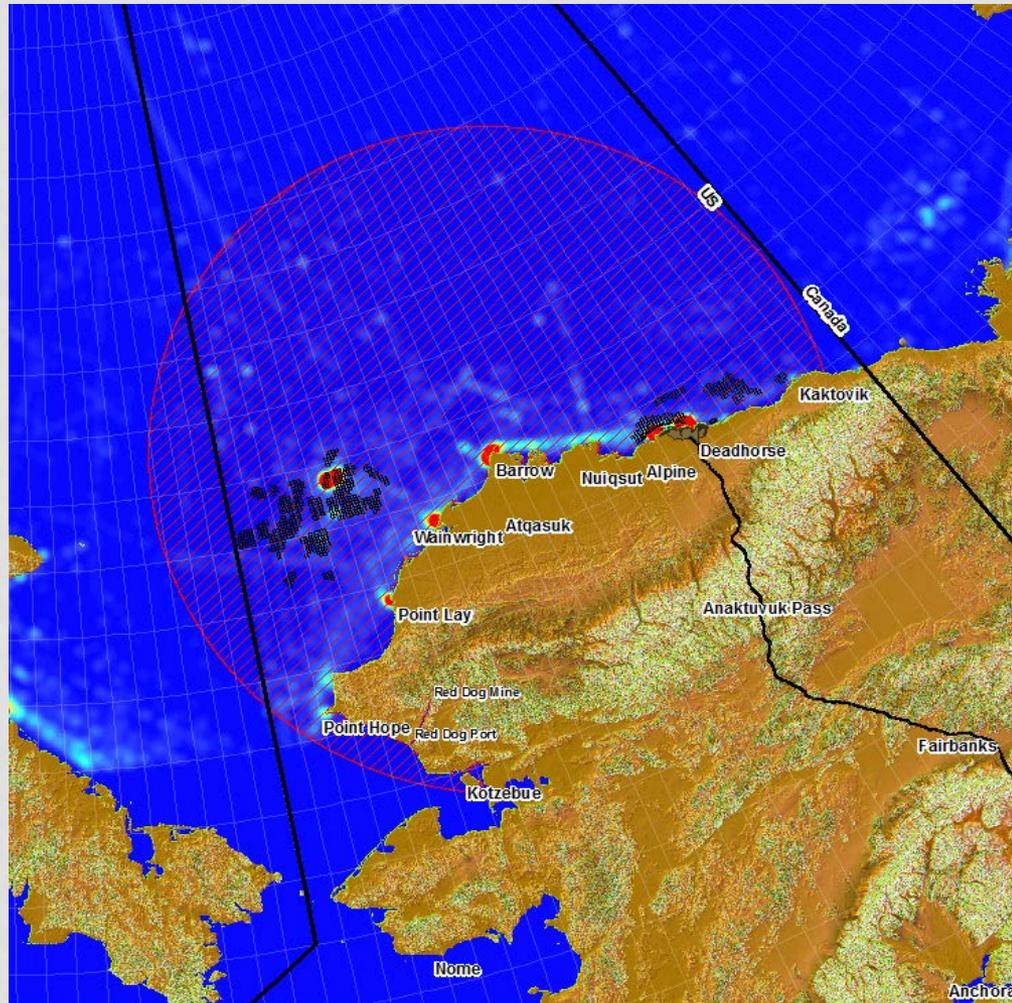


Low : 0

1 mile cell size  
Search radius: 10 miles  
Density in square miles

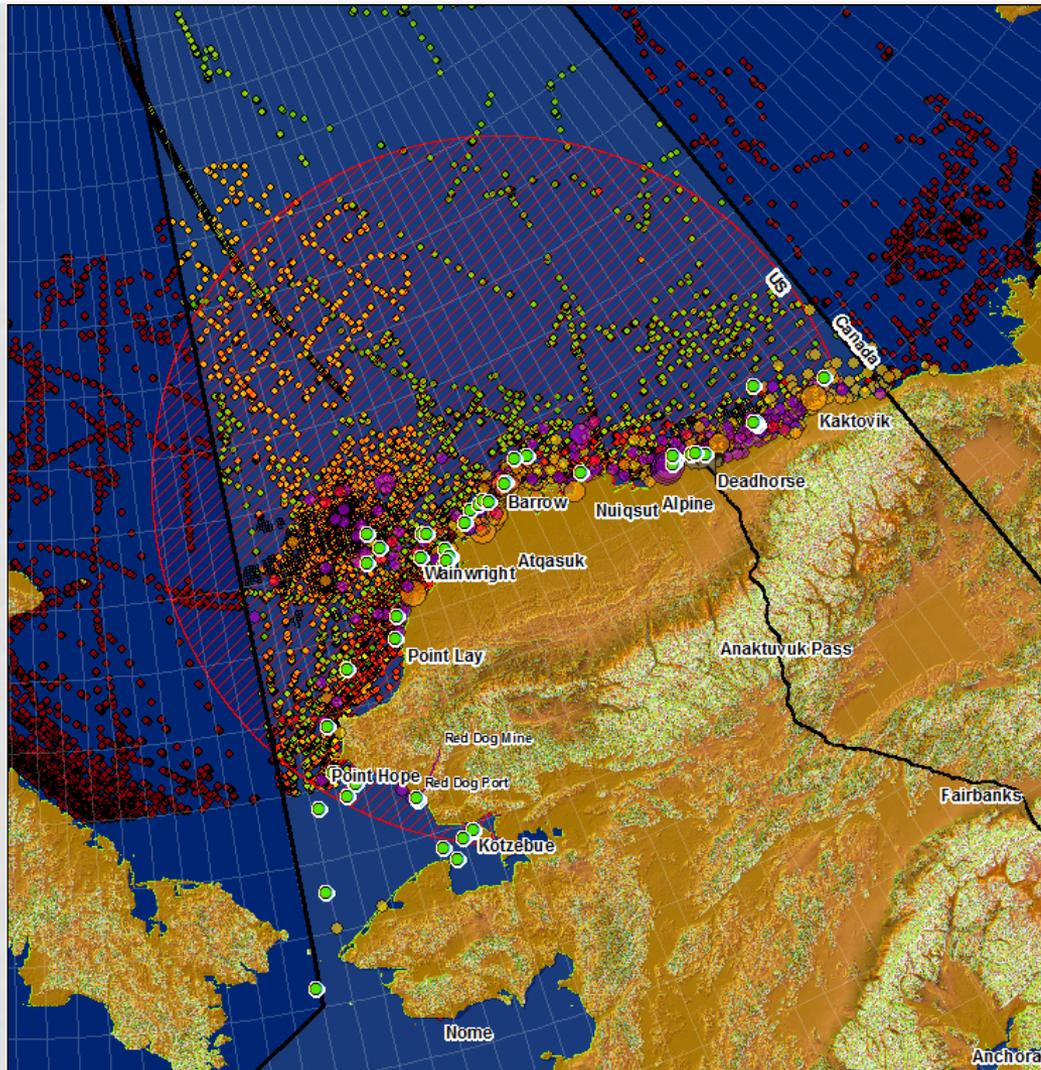
# U.S. NORTH SLOPE KERNEL DENSITY ANALYSIS AIS 2011-2012 DATA

Based on the AIS ship data it is possible to resolve vessel hot spots such as those by Deadhorse, Barrow, Wainwright and the lease blocks as well as vessel transit patterns along the coast.

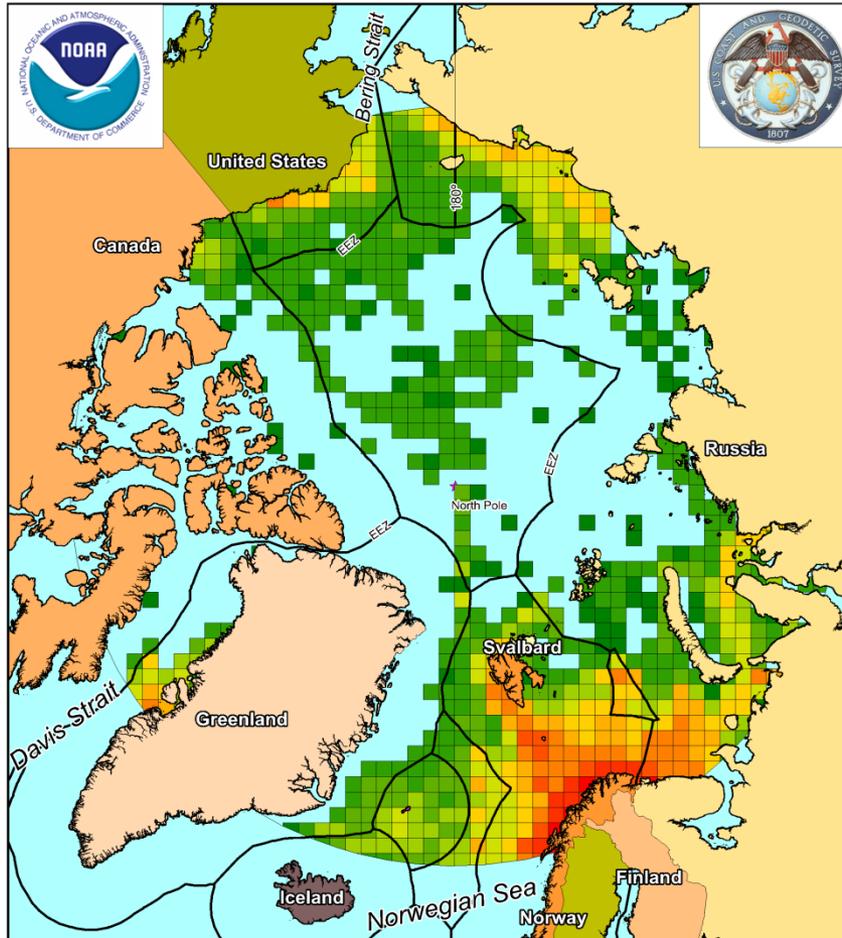


1 mile cell size  
Search radius: 10 miles:  
Density in square miles

# ARCTIC SAR AGREEMENT 1998-2010 NMML AERIAL SURVEY, AIS, AND FAIRWEATHER VESSEL POSITIONS

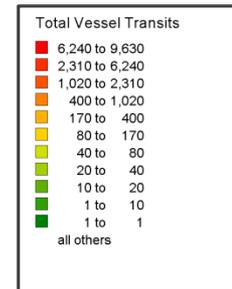


# VESSEL TRANSITS PER DAY (BY 1000 KM GRID CELL)



## Arctic Vessel Traffic All Vessel Types

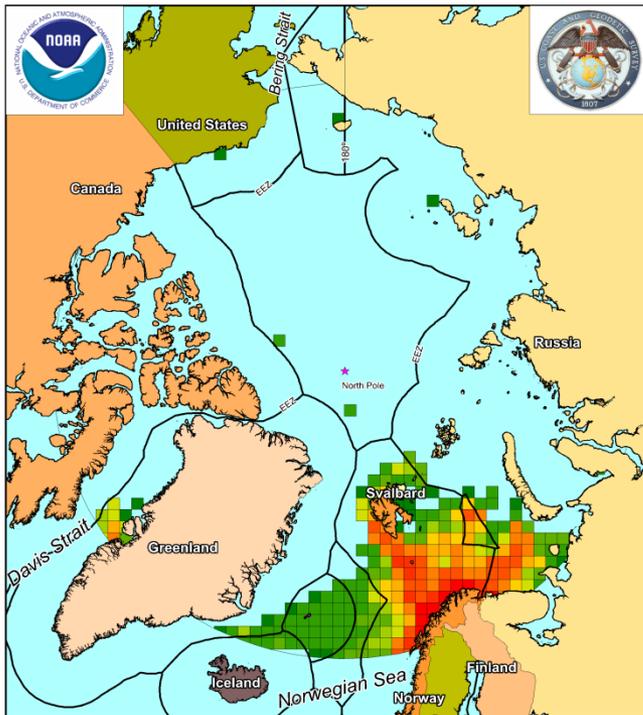
Data Source: ORBCOMM and exactEarth  
Satellite AIS Receivers  
Data Provided By: United States Coast Guard  
Dates: May 2011 - June 2012



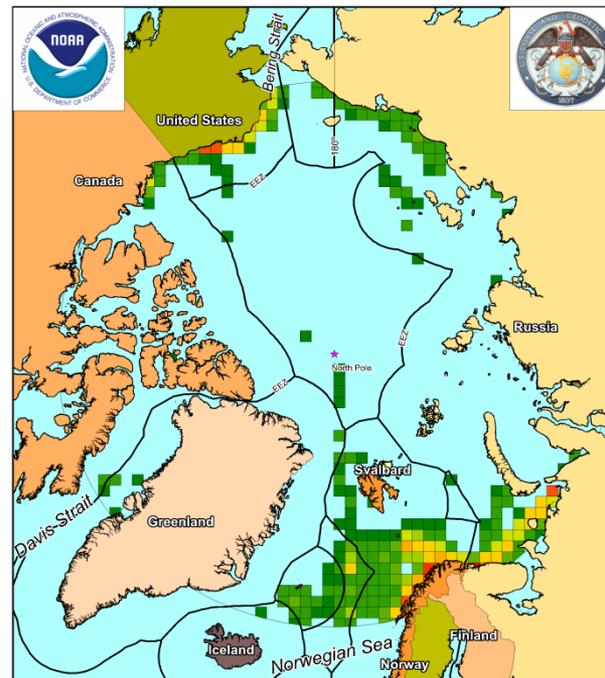
Produced by: NOAA National Ocean Service  
Office of Coast Survey  
Date: 4 September 2012

Map prepared by NOAA Office of Coast Survey for the PAME Working Group of the Arctic Council; shows the number of vessel transits by grid cell per day. Able to resolve areas of high vessel traffic and, additionally, break that traffic down by vessel type as seen on the next slide

# COMPARISON OF VESSEL TYPES (BY 1000 KM GRID CELL)



## Fishing Vessels



## Towing Vessels

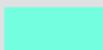
# FURTHER ANALYSIS DIRECTIONS

- Collaboration with USACE / Alaska Ports
  - Incorporation of commodities data for North Slope ports
- Breakdown vessel calls by vessel type
  - Better understand which ports support which vessel types
- Understanding which ports are critical for MTS infrastructure
  - i.e. can we identify primary investment needs
- Add in VMS fishing vessel information for Alaskan waters
  - Not for North Slope but Bering Sea would expand understanding of vessel traffic

# LEGEND FOR ICE/VESSEL MOVIES

## Legend

### Ice Coverage percent

	0 - 30
	30 - 50
	50 - 70
	70 - 90
	90 - 100
	Shore ice (100%)

### AIS hits within US waters Vessel Type

-  Anchor handling vessel
-  Buoy Ship
-  CCG Search and Rescue
-  Canadian CG - Ice breaker
-  Cargo
-  Coast Guard
-  Fishing vessel
-  High Speed Craft
-  Icebreaker
-  Large Towing vessel
-  Merchant Tug
-  Other
-  Pusher Tug
-  Research Vessel
-  Research/survey vessel
-  Special vessel
-  Tanker
-  Towing vessel
-  Tug boat
-  large towing vessel
-  passenger ship