Inuit Marine Monitoring Program

Processes for Implementing an Ecosystem Approach to Management on Shipping, Tourism, and Exploration for the Nunavut Region

June 23-27, 2019
Bergen, Norway
Concept of Inuit-led Marine Monitoring in Nunavut, Canada

Daniel Taukie
Program Coordinator
Izaac Wilman – AIS Technician
Nunavut Tunngavik Inc.
What is Nunavut Tunngavik Inc?

• NTI represents Inuit under the 1993 *Nunavut Agreement*. This modern day treaty sparked the political development for the Territory of Nunavut joining Canadian Confederation in 1999.

• Under the Nunavut Agreement; “Canada's sovereignty over the waters of the Arctic archipelago is supported by Inuit use and occupancy.” and;

• “Canada recognizes the contributions of Inuit to Canada's history, identity and sovereignty in the Arctic.”

• NTI's Mission; “Inuit Economic, Social and Cultural Well-being Through Implementation of the Nunavut Agreement.”

• On October 22, 2015 the NTI board of Director passed a resolution that stated; “Members call on the Government of Canada and the Government of Nunavut to fully involve and closely consult with Inuit on the formulation and development of any plan, strategy, policy, legislation and regulations regarding the use of and resource development in the waters of the Northwest Passage.”
Oct 2016 NTI Board Resolution

• Called on “the Government of Canada and Nunavut to strengthen monitoring and management efforts on marine shipping traffic in Nunavut waters”

• Directed “NTI and Regional Inuit Associations to establish, on a pilot basis, an Inuit-led monitoring system”
Why did NTI develop this program?

• Shipping is increasing in Nunavut and communities are concerned

• Communities have many shared concerns
  – Small vessels transiting near community harvesting areas
  – Potential for accidents, pollution, oil spills
  – Wildlife disturbance, interference with hunting, traditional practices, and well-being of marine mammals
  – Help Nunavut communities implement policy and guidelines for the Northwest Passage in the future (NWP)

• Nunavut communities needed for more information on shipping activities, tourism, yachting, near their community

• Inuit need to have greater role in shipping management
Regional Inuit Associations Core Areas of Interest

Information to collect:
• Ship characteristics (type, color, flag, etc.)
• Concerns (wildlife, noise, pollution, etc.)
• Location, speed, heading
• Behaviour/Activity
• Timing
• Suspicious vessels
• Concerns identified by the community
Canada's Arctic Passageways Are Shared by Ships and Wildlife

Vessel, whale, fish, and bird movements

Map 1

ARCTIC OCEAN

Greenland

Newfoundland and Labrador

Yukon Territory

Northwest Territories

CANADA

Alberta

Saskatchewan

Manitoba

Ontario

Quebec


© 2016 The Pew Charitable Trusts
Nunavut is the largest Province/Territory in Canada
Population: 38,396 people
2,093,190 sq. km of Land, Coastline, and Sea
26 Communities – 25 along the Coastline / 1 Inland Community

Population Ratio: 2,093,190 sq. km / 38,396 = 54 sq. km/person in Canada
385,203 sq. km / 5,258,000 = 0.07 sq. km/person in Norway

Distance between Alert Base in Nunavut and Svalbard is 1,496 km
Inuit Marine Monitoring Program

The program takes an innovative approach to vessel monitoring in Nunavut that couples:

– Inuit marine monitors
– With real-time vessel tracking technology (AIS)
Initial HTO/A invitation and monitor selection

- How do we decide where to work?
  - Assessment of heavy traffic areas within IMMP Staff and communities identified by RIA’s
  - Send invitation letters to the HTO/A
  - Once approved, send information package about the Program
  - Community visit to discuss possible monitor locations and AIS site
Marine Monitors

- Build a network of experienced hunters hired as Marine Monitors during the shipping season to record observations of vessel activities in Nunavut’s coastal areas
- Organize and utilize Inuit knowledge and local capacity
- Fill important data gaps on small vessels, local concerns
- Inform and support an emerging dynamic management regime
AIS Infrastructure

- Install AIS receivers in communities and in remote locations of cultural and environmental significance
- Refine design for seasonal, remote AIS sites
- Build a user-friendly interface
- Compliments Coast Guard system (primarily satellite-based in Arctic)
Program Objectives

• Improve AIS network through land-based infrastructure
• Collect Inuit knowledge, expertise and presence in key areas
• Improve information for communities and Inuit organizations
• Increase capacity and coordination on ship/vessel monitoring in Nunavut
• Establish a basis of information to support policy-making and participation in the shipping management regime
• Educate communities about the Program through community visits and recruitment of summer students during shipping season
Overview of IMMP Development and Lessons Learned

Daniel Taukie
Program Coordinator
Plans for 2018/2019

Marine Monitors

• Expand Monitors to 8 communities (16 Marine Monitor Captains and 16 Helpers)
  – Cambridge Bay, Clyde River, Qikiqtarjuaq, Iqaluit, Kimmirut, Coral Harbour, Resolute, and Chesterfield Inlet
• Train monitors:
  ➢ AIS Assembly/Dismantling
  ➢ Vessel Identification
  ➢ SVOP (Small Vessel Operators Proficiency)
  ➢ Improve Data Collection / Management
  ➢ Introduction to Hydroball
  ➢ Understand and study wildlife stressors from prey or close proximity to ship/vessel and marine mammals observations will be documented
• One training session in Rankin Inlet was administered by NFMTC and the Marine Institute:
  – Marine Basic First Aid; Marine Emergency Duties; Radio Operators Certificate; and Small Vessel Operators Permit and all participants received certification
• Revise protocols and reporting to Canadian Coast Guard Operations Centre and NTI during deployment will improve information gathering from Monitor
• Cabins will be built in some key areas to support Monitor safety
NTI (Nunavut Harvesters Support Program)

- Non-profit Organization within NTI’s Inuit Programs and Services
- Support HTO/A’s in community cabin infrastructure for Elders and Youth to engage in cultural practices
- Cabins will also support the marine monitors in finding suitable monitoring location to house monitors and researchers for safety
What is AIS?

- Automatic Identification System
- Relatively new technology used to track vessels
- IMO requirement for large ships – but many smaller ships elect to use it
- Designed to transmit long distances over VHF
Ships not required to transmit AIS

- Pleasure craft
- Any ship that is under 300 tons
- Yachts carrying limited passengers
- Personal speed boats and other small vessels
- There is no legislation to keep AIS on to track vessels under 300 tons. It can be turned off anytime
Info broadcasted by AIS transceiver

Every 2 to 10 seconds while underway:
- MMSI identification number
- Navigation status – "at anchor", "under way using engine(s)", "not under command", etc.
- Rate of turn
- Speed over ground
- Position
- Course over ground
- True heading
- True bearing at own position

Every 6 minutes:
- IMO ship identification number
- Radio call sign
- Name of the vessel
- Type of ship/cargo
- Dimensions of ship
- Location of positioning system's antenna on board the vessel
- Type of positioning system
- Draught of ship
- Destination
- ETA at destination
How can AIS be used?

- Collision avoidance
- Fishing Fleet Monitoring and Control
- Vessel traffic services
- Maritime Security
- Aids to navigation
- Search and rescue
- Accident investigation
- Ocean currents estimates
- Infrastructure Protection
- Fleet and cargo tracking
Outcomes from 2017

AIS

- AIS was developed in partnership with Marine Exchange of Alaska
  - Custom remote AIS design
  - Training for NTI and Oceans North staff
  - Data hosting and technical support
  - Back-end website development
- Remote AIS stations were deployed and installed outside Cambridge Bay, Clyde River and Iqaluit. These were taken down in the Fall and used for troubleshooting.
- Animal interference with exposed cables, poor satellite connectivity and insufficient power generation compromised data collection from some units.
- In-town AIS receivers were installed in Kimmirut, Rankin Inlet and Chesterfield Inlet. These units will be decommissioned and used for parts for 2018/2019 as NTI/Oceans North switch to Canadian Suppliers from the Marine Institute.
Why These Systems?

• The ability to track and identify these vessels in areas of concern for the affected communities. Currently we have seen Approximately 100-150kms in range during our testing. Maximum of 200km at higher elevation.

• The ability to provide live weather information about these areas which includes wind speed/direction, Temperature, Barometric pressure, and humidity to the Harvesters within the community.

• Our equipment is now Canadian made and relatively easy to use, with the potential to add more capabilities as the project develops towards the future.
Why These Systems?

As per Transport Canada regulations, vessels 300+ gross ton, 65+ feet in length, as well as Yacht vessels with 12+ passengers on board are required to be equipped with an AIS transmitter.

AIS enables us to address some of the main areas of interest identified by RIAs such as, Ship characteristics (type, color, flag, etc.) Location, speed, heading Behavior/Activity, Timing, and Suspicious vessels.
NTI’s 2 Types Of AIS Units

Remote AIS Unit

In-Town AIS Unit
Remote AIS systems

- Our remote AIS systems are powered by 2 solar panels as well as a single wind turbine. Two Deep cycle batteries are able to provide sufficient power storage to run the system on only a few hours of sun a day during winter months.
- Our remote systems are capable of receiving and transmitting live AIS and weather data, which will be made available to the community that is chosen for the AIS system.
In-Town AIS Units

- Our In-Town AIS units are made to be installed in doors with an antenna installed on the roof of the building.
- Rather than transmitting data via satellite, these units utilize internet to transmit AIS data.
- Our New Yellow AIS Units are now sourced from within Canada.
Components of a remote AIS system

- Aluminum frame
- Wind Turbine
- Solar panels
- MET (weather) station
- Satellite transmitter
- Battery box with 2 batteries
- Remote AIS unit
Summer Minimum Sea Ice Concentration in the NWP, 1974-2015, with Number of Vessel Voyages through the Canadian Arctic per Year

- **Total Ice Concentration**
- **Voyages per Year (Nordreg)**
- **Linear Trendline - Ice Concentration**

**YEAR**
- 1974
- 1975
- 1976
- 1977
- 1978
- 1979
- 1980
- 1981
- 1982
- 1983
- 1984
- 1985
- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015

**SUMMER MINIMUM SEA ICE CONCENTRATION**
- 0.0
- 0.05
- 0.1
- 0.15
- 0.2
- 0.25
- 0.3

**NUMBER OF VOYAGES PER YEAR (AS REPORTED BY NORDREG)**
- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
Very different trends according to ship type
Plans for 2018-2019

AIS

• Transfer to Canadian AIS equipment and data servers
  – All AIS data hosting and AIS equipment procurement contracts are being transferred to Canadian providers.

• Seven remote AIS sites and 3 additional in-town sites
  – Outside Kimmirut, Cambridge Bay, Clyde River, Coral Harbour, Resolute, Kimmirut and Iqaluit; and additional in-town AIS will be installed in Rankin Inlet, Chesterfield Inlet, Qikiqtarjuaq, and Gjoa Haven.
  – Adding weather stations to all remote sites
  – Possible additions may include time-lapse cameras
  – Improved design to enhance battery efficiency with wind turbines

• Improve technical capacity:
  – Monitors will receive training on AIS equipment installation, dismantling and trouble-shooting.
  – A full-time AIS Technician/Trainee has been hired to manage and expand the AIS network.
Projected 2018-2019 Program Expansion

Marine Monitors

AIS Sites
AIS Community Reports for 6 Communities in 2017 and 8 Community Reports 2018/2019

- Cambridge Bay
- Iqaluit
- Kimmirut
- Clyde River
- Rankin Inlet
- Chesterfield Inlet
Plans for 2019

Information Use

• A public-facing website featuring low-bandwidth, real-time vessel tracking map will be launched in 2018/2019
• Improvements to AIS equipment and reporting will ensure better data collection
• Community posters, radio appearances and pamphlets will be used to promote the program and information use in communities
• Data will be used to:
  – Provide communities with real time information
  – Support partnership with Canadian Coast Guard and other organizations, as appropriate
  – Provide NTI and other Inuit Orgs data on shipping activities to inform initiatives such as low-impact shipping corridors and MPA planning
Markers refresh about every minute, hover on marker for name, click for info

Vessel Type
- Pleasure
- Tanker
- Cargo
- Towing
- Passenger
- Fishing
- Pilot
- Sailing
- Other

Delorme
inReach

© Mapbox © OpenStreetMap
Improve this map
Government of Canada partnership

2-year Pilot Project

– Real-time information sharing with MCTS – AIS data and Marine Monitor observations
– Support for technical capacity building in Nunavut
– Support for evolution of Marine Monitor roles, which could include:
  • Emergency response
  • Community-based hydrography
  • Aids to Navigation
  • Scientific monitoring
  • Expanding VHF coverage
Training Support

- AIS training support from Marine Institute (Newfoundland)
- Monitor training via NTI (Nunavut Tunngavik Inc.) and NFMTC (Nunavut Fisheries and Marine Training Consortium)
- Transport Canada
- Canadian Coast Guard
- Tides Canada
Long Term Vision/Goals

• Increase capacity and coordination in ship/vessel monitoring and policy development in Nunavut
• Inform policy development to the Government of Canada and International Maritime Organization
• Provide a basis for Nunavut Inuit to engage with the Government of Canada on new ways to strengthen monitoring, stewardships, and management efforts on marine shipping traffic in Nunavut waters
• Help communities to engage and educate in marine wildlife monitoring to reduce cumulative impacts from shipping/tourism towards the future
Thank you! Nakurmiik!

Acknowledgements and Partners

Questions?

Contact: dtaukie@tunngavik.com