Marine Board Workshop: Safe Navigation in the Arctic

Shipping Operations / Traffic Regulation Schemes

Vessel Traffic Monitoring & Management Options for Reducing Risk of Arctic Maritime Operations

Captain Ed Page, US Coast Guard (Ret)
Executive Director, Marine Exchange of Alaska
Marine Exchanges Date Back to 1800’s

- Honest Brokers of Maritime Information
- Initially used telescopes and semaphore
- Today radars, radios, AIS, e-mail, web, and satellites.
MISNA Vessel Tracking
North America AIS and Satellite Tracking
150+ AIS Sites - 3,500+ vessels daily
Members – Maritime Professionals
Puget Sound, Southeast Alaska,
Prince William Sound and Western Alaska

- Tanker Companies
- AMHS
- Cruise Industry
- Container Lines
- Passenger Vessel Operators
- Ports and Harbors
- Tug and Barge Companies
- Oil Spill Response Organizations
- Fishing Companies
- Pilot Associations
Why Track Vessels?

• Save Lives

• Environmental Protection

• Validate Compliance

• Emergency Response

• Improve Efficiency

• Maritime Security

• Risk Assessment

Safe, Secure, Efficient and Environmentally Sound Maritime Operations
AIS

Cornerstone of Arctic Vessel Traffic Monitoring & Management System

• Biggest maritime technological advance since GPS

• Truth serum

• Compels and monitors compliance

• Aids emergency response

• Enhances efficiency

• Manage Fleet
Alaska AIS Network
95 Automatic Identification System (AIS) Sites in Alaska
Vessel Tracking Support
Alaska Maritime Community Support of AIS Network

- Lighthouse Associations
- Pilot Stations
- Harbor Offices
- Fish Hatcheries
- Tug Offices
- Shipping Companies
- Fish Processing Plants
- Tribal Offices
- Oil Facilities
- Science Centers
- Oil Spill Response Organizations
Remote – Self Supporting Sites
Polar Endeavour tracked 225 nm from Cape Decision
What are the risks?

Arctic Maritime Activity in 2012

Colour Explanation (SHIP_TYPE):
- Tanker
- Tug
- Towing
- Towing long/wide
- Passenger
- Cargo
- Law enforcement
- SAR
- Military
- Other
## Evaluation of Maritime Activity

<table>
<thead>
<tr>
<th>NAME OF VESSEL</th>
<th>TYPE OF SHIP</th>
<th>FLAG</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLARIS IV</td>
<td>SAR</td>
<td>FR</td>
<td>Support Drilling Ops</td>
</tr>
<tr>
<td>FENNICA</td>
<td>ice breaker/tug supply</td>
<td>Finland</td>
<td>Part of Shell's Drilling Program</td>
</tr>
<tr>
<td>NORDICA</td>
<td>ice breaker/tug supply</td>
<td>Finland</td>
<td>Part of Shell's Drilling Program</td>
</tr>
<tr>
<td>STENA POSEIDON</td>
<td>product tanker</td>
<td>Finland</td>
<td>Transited Northern Sea Route Murmansk to Daesan South Korea August 2012</td>
</tr>
<tr>
<td>BILLY BUDD</td>
<td>sailing yacht</td>
<td>No further Information</td>
<td></td>
</tr>
<tr>
<td>ORESTINA</td>
<td>product tanker</td>
<td>Gibraltar</td>
<td>Crossed Bering Sea between Slavyanka Russia and Dutch Harbor</td>
</tr>
<tr>
<td>ESPERANZA</td>
<td>Greenedace Yacht</td>
<td>Netherlands</td>
<td>Came to do &quot;research&quot; near Shell's Drilling prospects</td>
</tr>
<tr>
<td>MARILEE</td>
<td>product tanker</td>
<td>Norway</td>
<td>Traveled from Murmansk Russia to Incheon Korea July and August 2012 via northern sea route</td>
</tr>
<tr>
<td>MARIKA</td>
<td>product tanker</td>
<td>Norway</td>
<td>Bound from Murmansk to Korea via the Northern Sea Route</td>
</tr>
<tr>
<td>TOR VIKING II</td>
<td>ice breaker/tug supply</td>
<td>Sweden</td>
<td>Part of Shell's Drilling Program</td>
</tr>
<tr>
<td>KRASIN</td>
<td>ice breaker</td>
<td>Russia</td>
<td>Northern Sea Route Operations</td>
</tr>
<tr>
<td>VASILY BURKHANOV</td>
<td>RORO</td>
<td>Russia</td>
<td>Made a port call in Magadan otherwise in Russian Far East</td>
</tr>
<tr>
<td>KAPITAN SERGIEVSKIY</td>
<td>containership</td>
<td>Russia</td>
<td>Trades Vladivostok to Magadan and other Russian Far East Ports</td>
</tr>
<tr>
<td>ROSHCHINO</td>
<td>product tanker</td>
<td>Russia</td>
<td>Trades Nakhodka to Petropavlovsk</td>
</tr>
<tr>
<td>LEDA DV</td>
<td>product tanker</td>
<td>Russia</td>
<td>Trades Nakhodka to Petropavlovsk Kamchatka</td>
</tr>
<tr>
<td>VENGERY</td>
<td>anchor handling/tug supply</td>
<td>Russia</td>
<td>Transited Murmansk to Magadan to Russian Far East</td>
</tr>
<tr>
<td>ALDAN</td>
<td>general cargo</td>
<td>Russia</td>
<td>Trading to Magadan and Provideniya frrom Russian Far East</td>
</tr>
<tr>
<td>TANIR</td>
<td>general cargo</td>
<td>Russia</td>
<td>Trading to Vladivostok Petropavlovsk Kamchatky</td>
</tr>
<tr>
<td>TOBOL</td>
<td>general cargo</td>
<td>Liberia</td>
<td>Made about 5 trips between Vladivostok and Archangel Russia on the BALTIC via the Northern Sea Route</td>
</tr>
<tr>
<td>SELENGA</td>
<td>general cargo</td>
<td>Russia</td>
<td>One trip from Everett Washington to Vladivostok via the Bering Sea</td>
</tr>
<tr>
<td>GENNADY TSYGANKOV</td>
<td>general cargo</td>
<td>Russia</td>
<td>Trades Russian Far East up to Anady</td>
</tr>
<tr>
<td>SIMUSHIR</td>
<td>general cargo</td>
<td>Russia</td>
<td>Traded from Everett to Russian far east</td>
</tr>
<tr>
<td>GEROY</td>
<td>general cargo</td>
<td>Russia</td>
<td>Trades Russian Far East to Magadan</td>
</tr>
<tr>
<td>INDIGA</td>
<td>product tanker</td>
<td>Russia</td>
<td>According to Lloyds has been in the Baltic all year; must be wrong . . .</td>
</tr>
<tr>
<td>EGVEKinOT</td>
<td>product tanker</td>
<td>Russia</td>
<td>Came from Archangel on the Baltic to Anady in Russian Far east via Northern Sea Route</td>
</tr>
<tr>
<td>VARZUGA</td>
<td>product tanker</td>
<td>Russia</td>
<td>Lloyds says in Baltic Sea all year . . . Must be wrong</td>
</tr>
<tr>
<td>AKADEMIK FERSMANN</td>
<td>Oceanographic Research</td>
<td>Russia</td>
<td>Seen in the Sea of Okhotsk and Anady</td>
</tr>
<tr>
<td>GEO ARKITIK</td>
<td>Oceanographic Research</td>
<td>Russia</td>
<td>Called in Nome on a voyage from Busan Korea</td>
</tr>
<tr>
<td>PROFESSOR KHROMOV</td>
<td>Oceanographic Research</td>
<td>Russia</td>
<td>Operates out of Vladivostok</td>
</tr>
<tr>
<td>PROFESSOR KAGANOVSKI</td>
<td>Oceanographic Research</td>
<td>Russia</td>
<td>Operates out of Vladivostok seen near Gambell Alaska recently</td>
</tr>
<tr>
<td>POLAR ENDURANCE</td>
<td>Towing</td>
<td>USA</td>
<td>Coastwise voyages US Ports</td>
</tr>
<tr>
<td>NORTON SOUND</td>
<td>Fishing</td>
<td>USA</td>
<td></td>
</tr>
</tbody>
</table>
Arctic Maritime Activity from AIS Monitoring

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towing</td>
<td>38</td>
</tr>
<tr>
<td>Bulk Carriers</td>
<td>19</td>
</tr>
<tr>
<td>Product Tanker</td>
<td>12</td>
</tr>
<tr>
<td>General Cargo</td>
<td>9</td>
</tr>
<tr>
<td>Oceanographic Research</td>
<td>8</td>
</tr>
<tr>
<td>Icebreaker (various types)</td>
<td>8</td>
</tr>
<tr>
<td>Anti Pollution</td>
<td>5</td>
</tr>
<tr>
<td>Fishing</td>
<td>5</td>
</tr>
<tr>
<td>Landing craft</td>
<td>4</td>
</tr>
<tr>
<td>Offshore Supply</td>
<td>4</td>
</tr>
<tr>
<td>US Coast Guard</td>
<td>4</td>
</tr>
<tr>
<td>Unidentified</td>
<td>4</td>
</tr>
<tr>
<td>Canadian Coast Guard Icebreaker</td>
<td>1</td>
</tr>
<tr>
<td>Chemical Tanker</td>
<td>2</td>
</tr>
<tr>
<td>Containership</td>
<td>1</td>
</tr>
<tr>
<td>Dredging (probably incorrect)</td>
<td>1</td>
</tr>
<tr>
<td>Drill Ship</td>
<td>1</td>
</tr>
<tr>
<td>Greenpeace Yacht</td>
<td>1</td>
</tr>
<tr>
<td>Integrated tug barge</td>
<td>2</td>
</tr>
<tr>
<td>MODU</td>
<td>1</td>
</tr>
<tr>
<td>Anchor Handling Tug Supply</td>
<td>2</td>
</tr>
<tr>
<td>Passenger</td>
<td>2</td>
</tr>
<tr>
<td>Reefer Cargo</td>
<td>1</td>
</tr>
<tr>
<td>RORO</td>
<td>1</td>
</tr>
<tr>
<td>Sailing Yachts</td>
<td>2</td>
</tr>
<tr>
<td>SAR</td>
<td>1</td>
</tr>
</tbody>
</table>
Arctic Maritime Activity
Puget Sound Maritime Activity
Barrow Passage Line
What are Issues of Concern?

- Groundings
- Collisions
- Loss of Power
- Ice Encounters
- Sinking
- Oil Spills
- SAR/Medivacs
What are the Vessels of Concern?

- Tankers
- Cargo Ships
  - Offshore Supply Vessels
  - Drilling Vessels
  - Tugs and Oil Barges
  - Fishing Vessels
  - Tugs and Deck Barges
  - Landing Craft
  - Oil Spill Response Vessels
  - Yachts
Where are the areas of Concern?
Big Diomede Island (Russia), 2.1 miles NW of Little Diomede Island, rises to a height of 1,667 feet; close to the W shore are some bare rocks, and a light is shown from the N end. Natives report numerous uncharted shoals between the islands; passage should not be attempted by large vessels.
Bering Strait Transits by Section – 2010

Northbound transits west of dateline: 22
Northbound transits east of dateline: 249
Southbound transit west of dateline: 33
Southbound transit east of dateline: 

Total 2010 transits recorded: 568
99.9% Success = Public Outrage

Exxon Valdez

Rena

Costa Concordia
What are the Risk Mitigation Options?

• Compelling compliance with;
  – Areas to Be Avoided
  – Traffic Separation Schemes
  – Safe Distance Offshore
  – Reduced speed regions

• Providing information on;
  – Locations of Ice
  – Locations of native whalers/hunters
  – Locations of whales
  – Location of response vessels

• Caching Emergency Towing Systems
Means of Ensuring Compliance with Risk Reduction Measures
ENFORCE

Speed cameras
## AIS
Detect, Deter, Enforce

<table>
<thead>
<tr>
<th>Safety related acknowledgement</th>
<th>Acknowledgement of received addressed safety related message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety related broadcast message</td>
<td>Safety related data for broadcast communication</td>
</tr>
<tr>
<td>Interrogation</td>
<td>Request for a specific message type (can result in multiple responses from one or several stations)(^{(4)})</td>
</tr>
</tbody>
</table>
Application of AIS in Alaska Today

Environmental Protection
AIS vessel tracking of Cruise Ships provides:

- frequent position reports
- greater detail
- lower cost

Verification of compliant maritime operations.

Environmental monitoring.
Cruise ship enters Whale Waters at less than 13 knots
Automatic generation of e-mail and text msg alerts
Preventing Vessel /Aircraft Collisions

Red arrows represent vessel direction to trigger "entering" alert
Green arrows represent vessel direction to trigger "clear" alert
Shell Exploration Fleet Monitoring
Area To Be Avoided (ATBA) Monitoring
Olympic Coast Marine Sanctuary
Long Term Voluntary Compliance with ATBA
Fiber Cable Watchdogs
M/V Golden Seas
Case Study
Tor Viking
Traditional VTMS
Vessel Traffic Monitoring System

SAFETY THROUGH COMMUNICATION

SHIPPING INFORMATION-VTMS

BASIC RULES
1. Responsibility as to safe navigation always remains with the master or skipper on board the vessel.
2. A continuous listening watch on the assigned VHF channels should be maintained to be kept well informed about the traffic situation.
3. Information should be given on request of the VTMS authority. No VTS-operator.
4. The VTMS provides information, navigational assistance when deemed necessary and possibly traffic instructions on behalf of the Harbourmaster.
5. All communication should be brief and relevant.
6. Any particulars with regard to navigation or the vessel's equipment should be reported.
7. The language to be used is primarily Dutch and secondly English with the exception of the sectors Maas Approach (VHF 1), Pilot Maas (VHF 2) and Maas Entrance (VHF 3), where the language to be used is English and secondly Dutch.
Traditional Vessel Traffic Centers – Port Centric – Radar & Radios
Radars and Voice Communications
Arctic VTMS Tools

- Terrestrial AIS Transceivers
- Satellite AIS Receivers
- Satellite transponders
- Weather Sensors and Transmitters
- Digital Selective Calling Radios
- Electronic watchdogs
- Radars at choke points...AIS validation
Comparison Terrestrial AIS (MXAK) and Satellite AIS

Satellite AIS
Report 7 hrs 24 minutes old
73 miles east of Sanak Island

Terrestrial AIS (MXAK)
Report 1 minute old
23 miles west of Sanak Island
Yukon River Trip
Satellite Tracking of Vessels
International Component – Russian use of Northern Sea Route
The Western Alaska Alternative Planning Criteria (WA-APC) is a prevention focused option for oil tankers and vessels transporting oil as a secondary cargo to meet the Coast Guard oil pollution prevention regulations in 33 CFR 155 when operating in Western Alaska waters.

The Alaska Maritime Prevention and Response Network is a non-profit organization established to provide the capabilities required to implement the WA-APC’s prevention and response measures to protect Alaska waters from environmental harm.

As the present oil spill removal capabilities in Western Alaska do not fully meet the Coast Guard requirements, the only currently available compliance option for oil tankers and vessels transporting oil as a secondary cargo operating in Western Alaska waters subject to 33 CFR 155 Subpart D is through participation in the WA-APC approved by the Coast Guard as meeting the environmental protection objectives of OPA-90.

The Alaska Maritime Prevention and Response Network is a non-profit maritime organization established to implement alternative spill response and prevention measures that most cost effectively meet the environmental protection objectives of state and federal regulations.
Locating Vessels Able to Respond to Vessel in Distress
Funding and Support

Maritime Safety, Security, Efficiency Environmental Protection