



ARCTIC DOMAIN AWARENESS CENTER

A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

Developing Geofence Tools to Address Community Concerns about Large Vessel Traffic

Aaron Poe

Aleutian & Bering Sea Islands LCC (ABSI)



ALASKA MARITIME
PREVENTION & RESPONSE
NETWORK



absi

**Aleutian and Bering Sea Islands
Landscape Conservation Cooperative**

Alaska  *Shanina*



We develop science, information, and partnerships to tackle unprecedented environmental change impacting the lives, lands and waters of the Aleutian Islands and Bering Sea region.

Aaron Poe

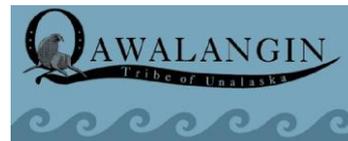
ABSILCC.org

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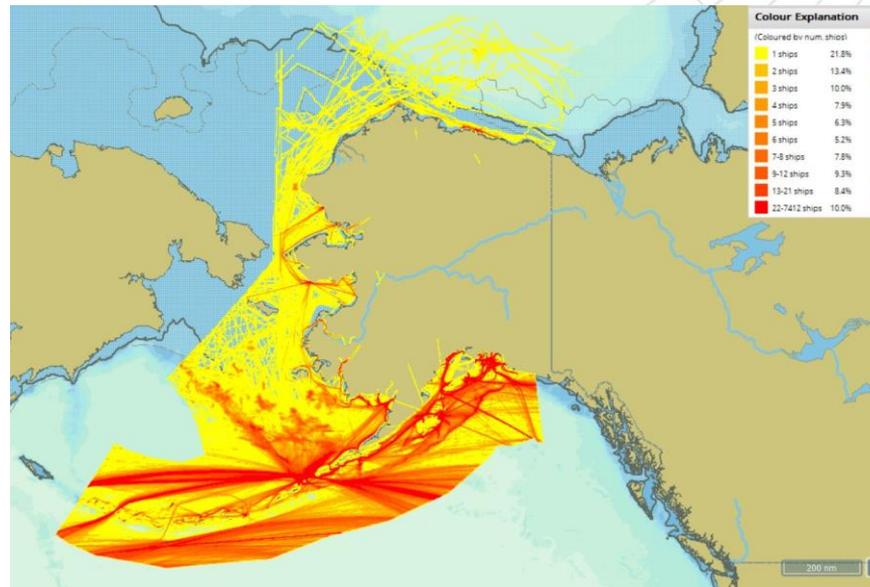
ABSI Steering Committee

- *U.S. Fish and Wildlife Service: **Robb Kaler (Co-Chair) & Jeff Williams**
- *Qawalangin Tribe of Unalaska: **Chris Price**
- *NOAA: **Shannon Fitzgerald & Seanbob Kelly**
- *U.S. Geological Survey: **Grant Hilderbrand**
- *Alaska Climate Science Center: **Jeremy Littell**
- Aleutian Pribilof Islands Association: **Karen Pletnikoff**
- Bureau of Ocean Energy Management: **Carol Fairfield**
- National Park Service: **Tahzay Jones & Jeanette Koelsch**
- Alaska Sea Grant: **Melissa Good**
- Aleut Community of St. Paul: **Lauren Divine (Co-Chair) & Pamela Lestenkof**
- U.S. Coast Guard: **Commander Justin Jacobs & Lt. Cmdr. David Parker**



The Need: Awareness & Management

- Arctic region is of national importance to the U.S. and it is *rapidly* changing...
 - Maritime security and safety
 - Protection of sensitive cultural and wildlife areas
- 100 to 400 vessels daily, over 10,000 transits annually



Objectives

- Advance Arctic maritime domain awareness and management by developing “geofencing” tools to enhance maritime safety, security, environmental protection, and vessel regulatory compliance.
- Aid decision-makers to analyze, and prioritize potential threats using “watch-dog” alarms based on specified criteria and parameters.

Project Team

Project Champion: Hank Blaney, U.S. Coast Guard Headquarters

Project Co-Leads: Buddy Custard, AMPRN & Dr. Kenrick Mock, UAA

Supporting Project:

- Ed Page, Marine Exchange of Alaska (MXAK)
- Aaron Poe Aleutian and Bering Sea Islands LCC (ABSI)
- Student Fellows: Max Zaki (UAA) & Lonnie Young (UAA)

Advisory Committee:

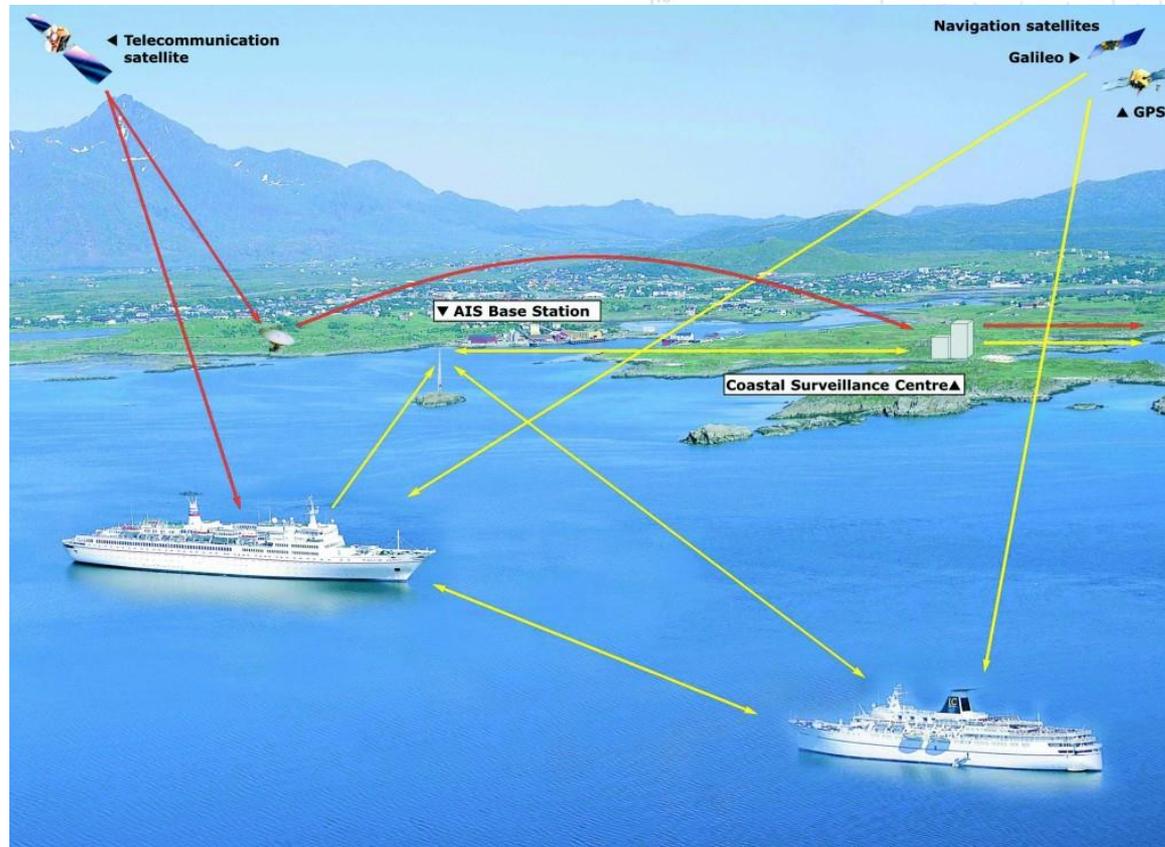
- USCG D17: LCDR Orion Bloom & Ray Dwyer (primary); LT Stephen Nolan and Chief Trevor Frommherz as alternates
- USCG Sector ANC: Cory Cichoracki (primary); LCDR Michael McNeil (alternate)
- NOAA: Kristin Mabry
- USFWS: Joel Garlich-Miller
- ADF&G: Dr. Lori Polasek
- Coastal Communities: Dr. Lauren Divine (Aleut Community of St. Paul)

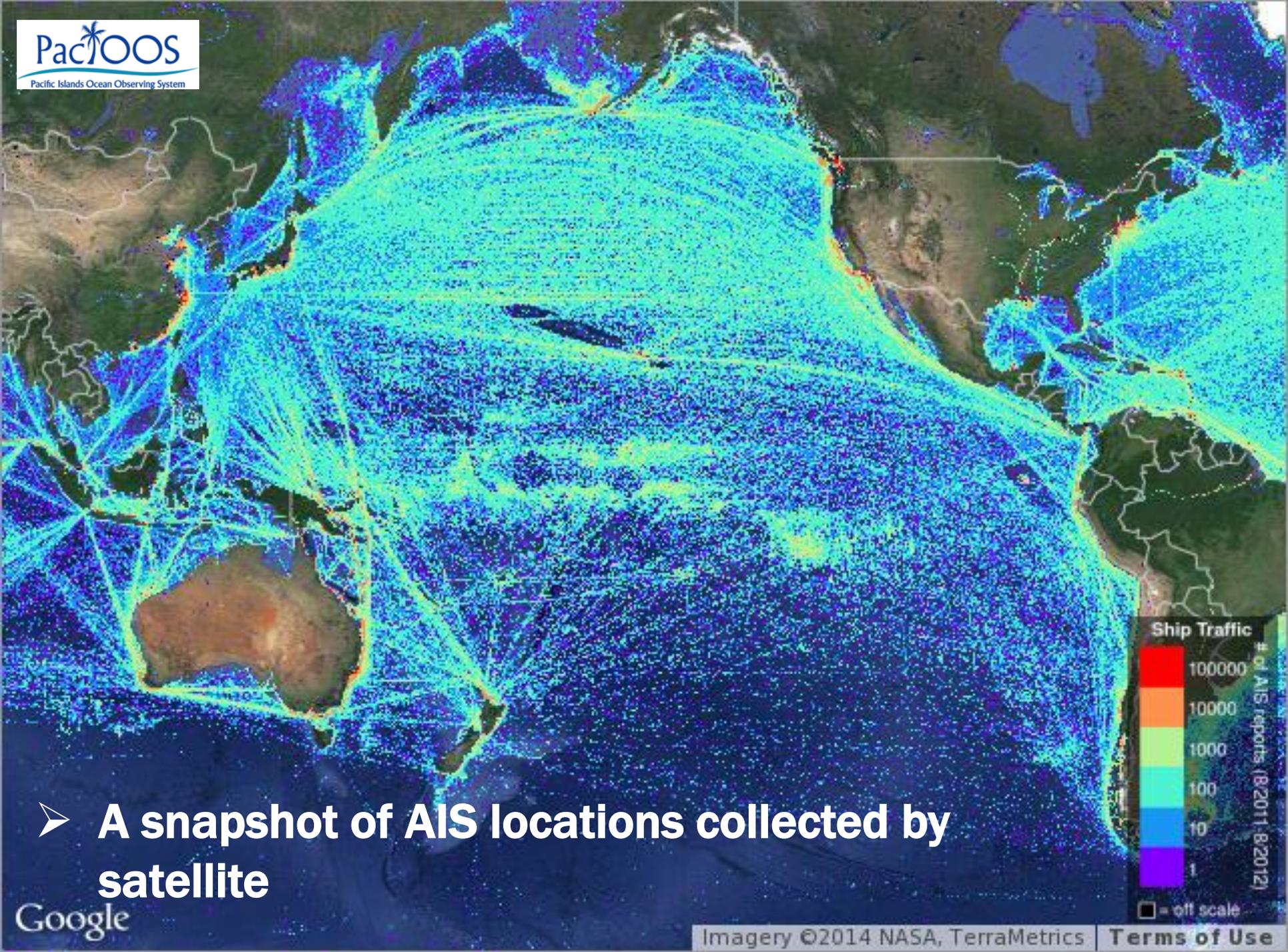
Project Phases

1. Validating end-user geofencing and alert requirements through stakeholder engagements
2. Developing enhanced AIS geofencing and alert notification software
3. Evaluating the software against stakeholder requirements

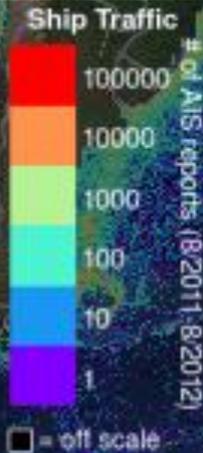
Current Automatic Identification System (AIS) Technology

Terrestrial & Satellite AIS

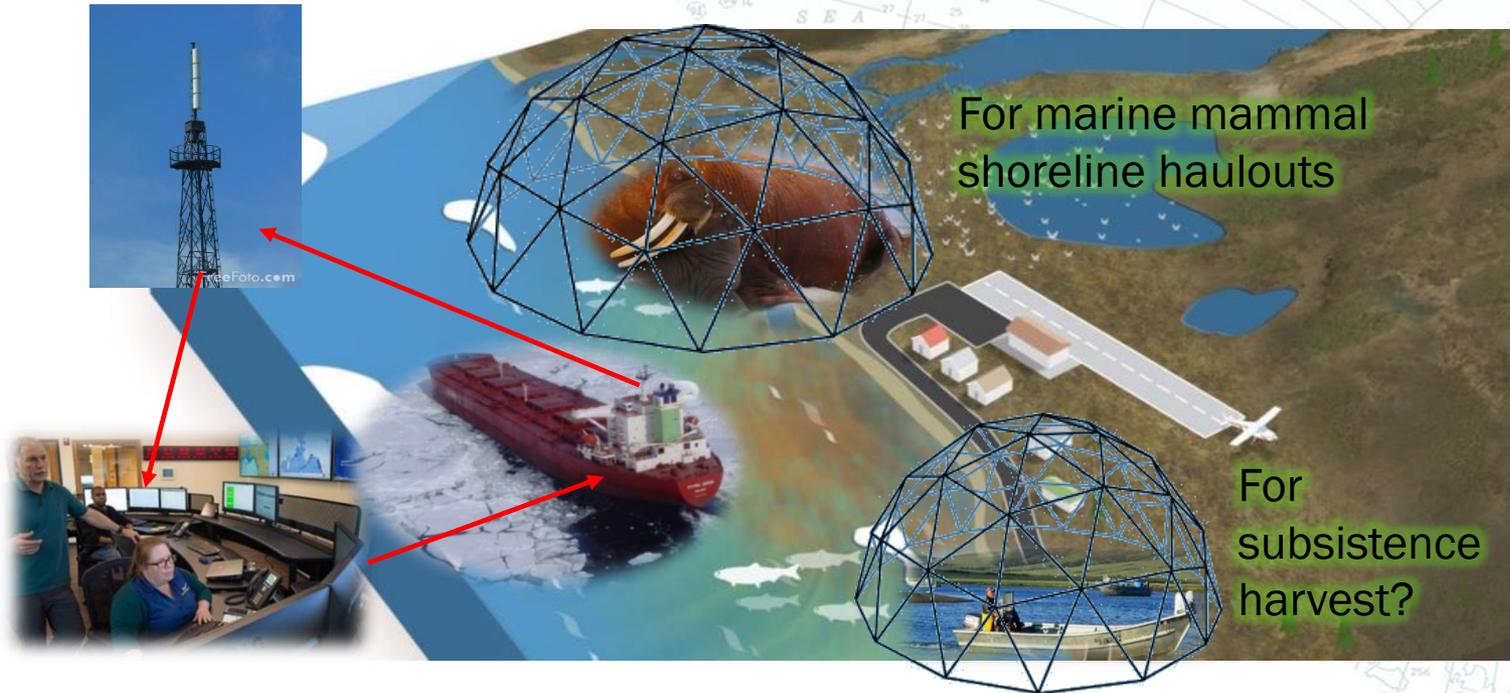




➤ A snapshot of AIS locations collected by satellite



“Geofence” – How Could it Work?



- A GPS-based virtual perimeter for **large vessels** triggered by vessel using Automatic Identification System (AIS).
- It creates temporary, virtual fences to minimize impacts to species and communities and promote safe vessel transit

Geofence Components: How it works

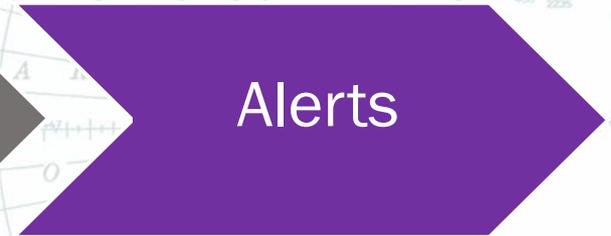
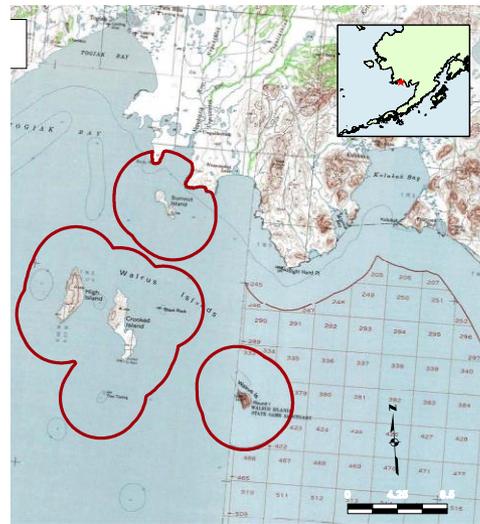


Vessel's
Navigation Status:

- ✓ All
- Under way using engine
- At anchor
- Not under command
- Restricted manoeuvrability
- Constrained by her draught
- Moored
- Aground
- Engaged in fishing
- Under way sailing



In this area:



Result in a
notification:

Notification interface showing vessel details and alert information:

- ★ Jen Karnik 🇷🇺 Yesterday JK
- Tanker in Summit Island Zone... [Details](#)
- To: Shawn Mauldin
- UTC: 18-10-11 19:28, Local: 18-10-11 11:28, Alarm: Tanker in Summit Island Zone, Type: On Enter, MMSI: 212744000, Name: NORDISLE, Call Sign: 5BWH2, Type: Tanker, SOG: 10 knt, COG: 266°, Lat: 57°59.363'N, Lng: 165°37.517'W, Dest.: SINGAPORE, ETA: 2018-11-01 09:00, Msg: A tanker has entered the Summit Island Zone.
- Sent by Siitech Web VTS www.siitech.com

Geofencing - Filters



Filters help you capture only the vessels that interest you.

- Already know your vessel(s)?
 - Filter by vessel id (Name or Call Sign; MMSI or IMO numbers)
- Focused on tankers? Cargo ships? Fishing vessels?
 - Filter by Vessel Type
- Curious about loiterers?
 - Filter by Navigational Status and/or Speed
- Wondering about size?
 - Filter by Length

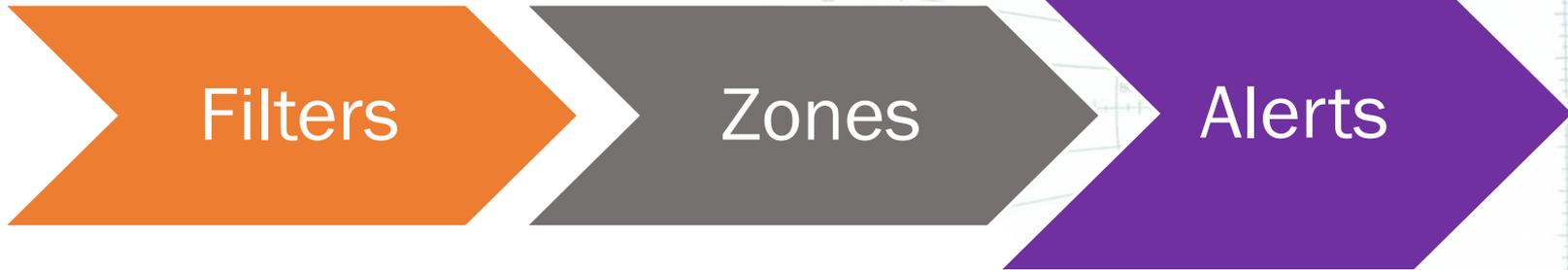
Geofencing - Zones



Zones let you define a particular place, or area of interest.

- Zones created three different ways
 - Lines – created with only two points
 - Circles – variable sizes centered on one point
 - Polygons – the most flexible of zones
- Zones are importable/exportable
 - Use zones from your other applications (e.g., GIS layers)
- Using existing zones

Geofencing - Alerts



Be Alerted when vessel(s) of interest are in your zone(s) of interest

- Alerted when vessels enter or exit your zone(s)
- Alerted when their condition changes
 - Vessels in zone speed up or slow down beyond a threshold
- Alerts emailed, texted, or pushed to other applications
- Customized reports emailed to you



Example: Vessel of Concern

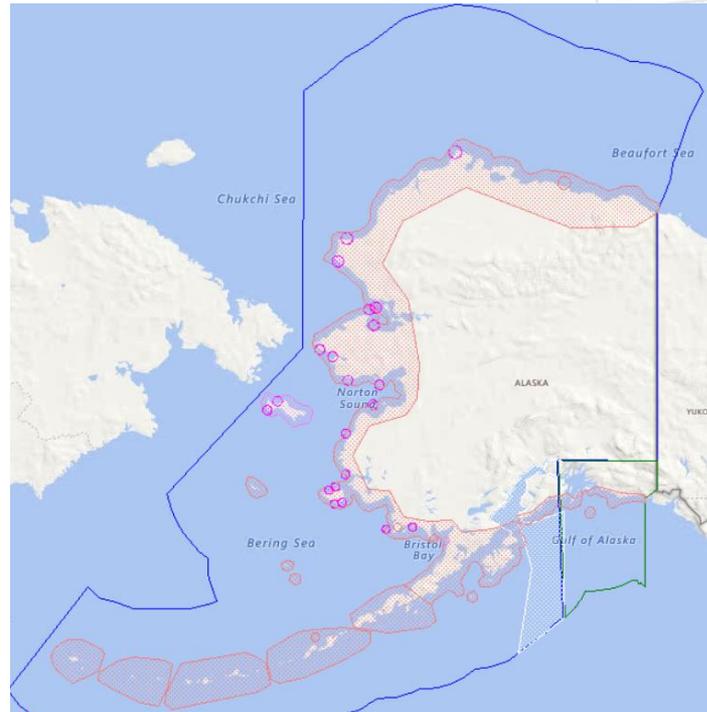
Filters

Zones

Alerts

NAV STATUS

- ALL
- UNDER WAY USING ENGINE
- less than 3 knt
- more than 3 knt
- AT ANCHOR
- NOT UNDER COMMAND
- RESTRICTED MANEUVERABILITY
- CONSTRAINED BY HER DRAUGHT
- MOORED
- AGROUND
- ENGAGED IN FISHING
- UNDER WAY SAILING



★ Jen Karnik Yesterday JK

Tanker in Summit Island Zone... Details

To: Shawn Mauldin

UTC: 17-08-15 07:31, Local: 17-08-14 11:31, Alarm:
Vessel not under command, Type: Upon Activation,
MMSI: 338417000, Name: SIKULIAQ, Call Sign:
WDG7520, Type: Other, SOG: 4knt, COG: 324°, Lat:
71°56.911'N, Lng: 160°55.942'W, Dest.: 72 North,
ETA: 2017-08-14 19:00, Msg: A vessel has reported
not under command.

Sent by SiiTech Web VTS
www.sitech.com

Example: “Area To Be Avoided” Geofence

Filters

Zones

Alerts

- ✓ All
- Under way using engine
- At anchor
- Not under command
- Restricted manoeuvrability
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Sent by Siitech Web VTS
www.siitech.com

50 nautical miles around Attu Island in the Aleutians

Possible Example: Walrus Islands Game Sanctuary

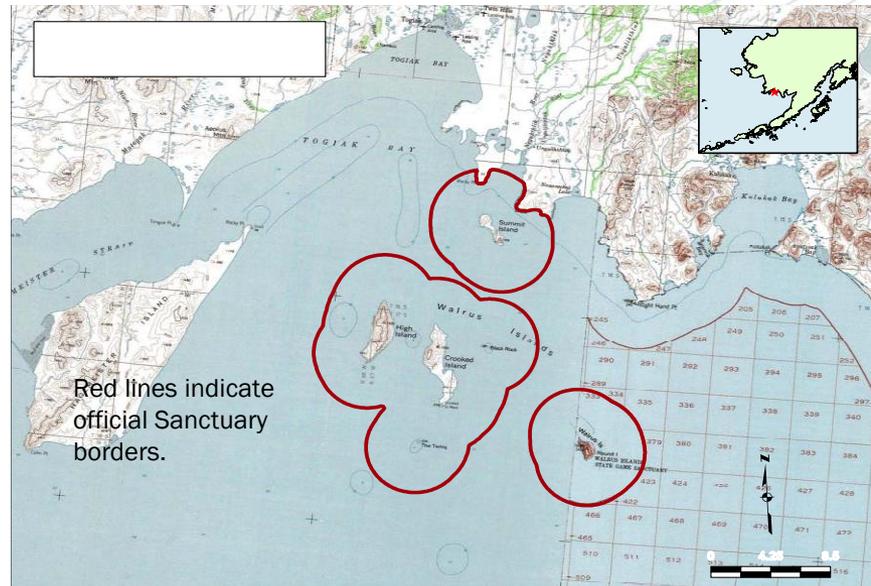
Filters

Zones

Alerts

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Buffer haulouts for Pacific Walrus as defined by ADF&G & USFWS



Early notification to USFWS and ADF&G to facilitate communication with vessels to avoid the sanctuary completely.



Example: Domain Awareness for Whalers

Filters

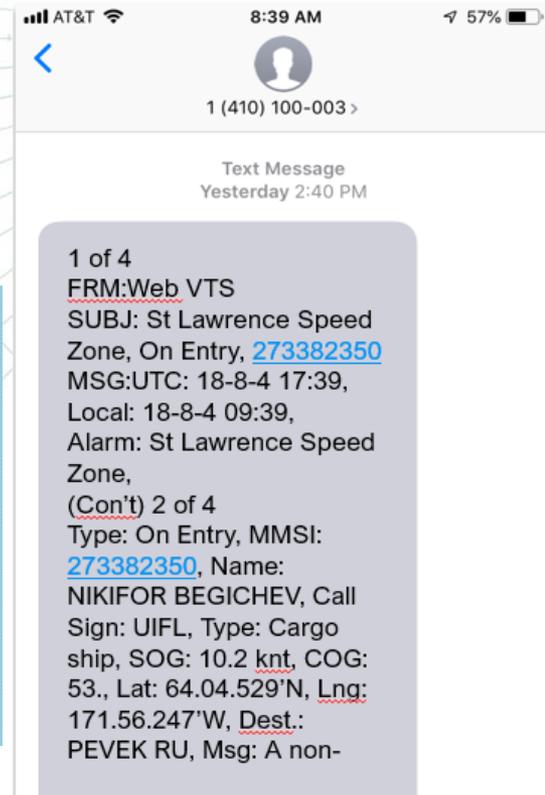
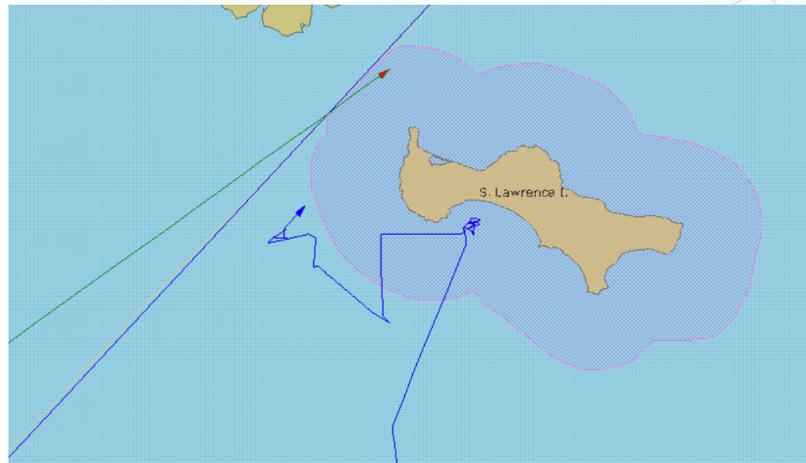
Zones

Alerts



Notify local residents when vessels (excluding fishing vessels) enter the area at speeds greater than 10 kts.

~20 nautical mile buffer around St. Lawrence Island.



Collecting Feedback on Tool Development

- October: Advisory Committee formed
- November-December: Engage with coastal tribal and community representatives
 - **Alaska Tribal Conference of Environmental Managers**
 - Indigenous People's Council for Marine Mammals (IPcoMM) and possibly individual marine mammal co-management councils
 - Aleutian and Arctic Waterways Safety Committees?
 - Other opportunities?
- **More Opportunities: January-March:**
 - Alaska Marine Science Symposium
 - Alaska Forum on the Environment
 - Others?
- Advisory Committee check-ins along the way

Your Feedback on Types of Filters?

Filters

- By vessel identification
(MMSI, Name, IMO, or Call Sign)
- Vessel type or size
- Important Activity filters?

- ✓ All
- Under way using engine
- At anchor
- Not under command
- Restricted manoeuvrability
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Your Feedback on Types of Zones?

Zones

- What existing zones of importance?
- Best ways to provide zone information to us?
- Concerns about sharing zones with others?

Zones created three different ways

- Lines – created with only two points
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Zones are importable/exportable

- zones from your other applications (GIS layers)
- Upload/download coordinates

Your Feedback on Types of Alerts?



Alerts

- Alert delivery by email, text, or other platforms like social media?
- Daily, weekly, monthly, summary reports?
- Key message content?

Other Feedback for us...

- Could this tool be appropriate for seasonal subsistence harvest areas?
- Who would be the appropriate representatives to develop location and timing?
- What else should we be thinking about?

Next Steps

- Continued engagement with decision makers
- Pilot a version with this feedback within project scope
 - Geographic marine areas of concern
 - Alerting criteria
- Commence software development
- Pilot the use in summer of 2019



Questions & Comments

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