ALWTRT informational webinar will begin at 1:00
This webinar is being recorded

For technical support:
Type your issue into the 'Questions' box

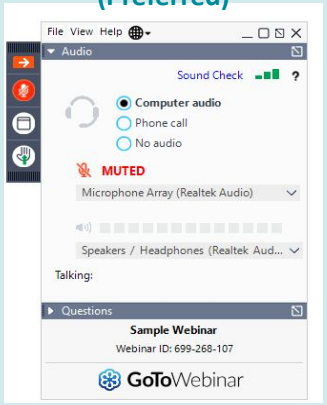
Unmuted (green) **Muted (red)**

This is the control panel

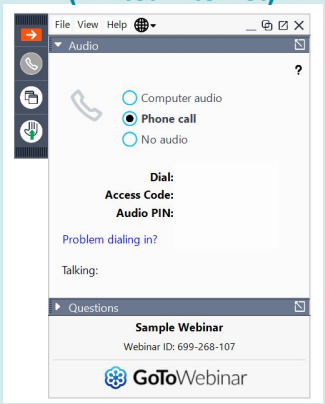
Find the **Control Panel** and open it by clicking the orange arrow. You can usually find this on the right hand side of your screen. You can expand the grey option bars by clicking the triangle on the left hand side of "Audio" and "Questions".

The **Control Panel** also allows you to mute/unmute by clicking the microphone symbol.

Computer Audio (Preferred)



Cell phone for audio (limited internet)

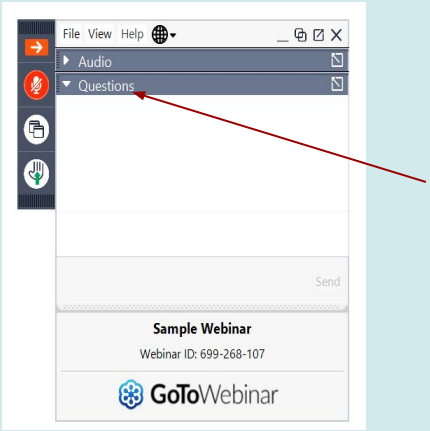


Make sure you can see a red microphone symbol  next to your name in attendees. If you cannot, you will not be able to speak.

Select your **audio settings**. Computer audio is recommended. If you dialed in on your phone and did not enter your audio pin, please redial and enter your audio pin.

Access the audio options by clicking on the grey bar that says "Audio".

This is the questions box



This is the **Questions box**, you will use this to 'get in line' for the Q&A. You can also use it to let us know if you are experiencing technical difficulties.

Access the questions box by clicking the grey bar that says "questions".

NOAA FISHERIES

ALWTRT Webinar: Assessments of Acoustic Interoperability Standards of On-Demand Gear in the Northeast

August 29, 2024

Atlantic Large Whale Take Reduction Team Coordinator: Jennifer Goebel
NEFSC Gear Team: Eric Matzen
MITRE: Justin Tufariello

Welcome and Agenda

1-1:10 pm: Welcome and Background

1:10-1:40 pm: NEFSC On-Demand Gear Research Update

1:40-2:10 pm: MITRE

- Overview of On-Demand Gear Interoperability
- Progress Update on MITRE's work
- Insights into Acoustic Interoperability and Potential Standards

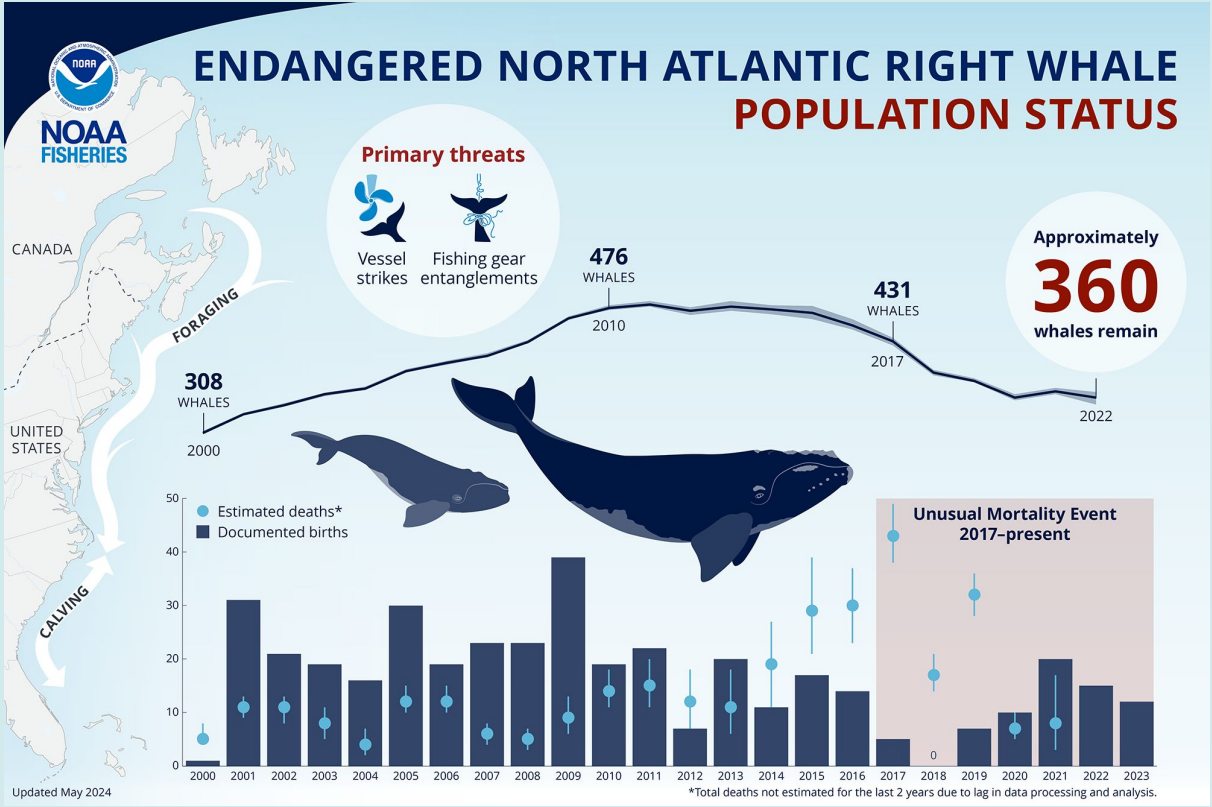
2:10-2:30 pm: Q&A (TRT members only)

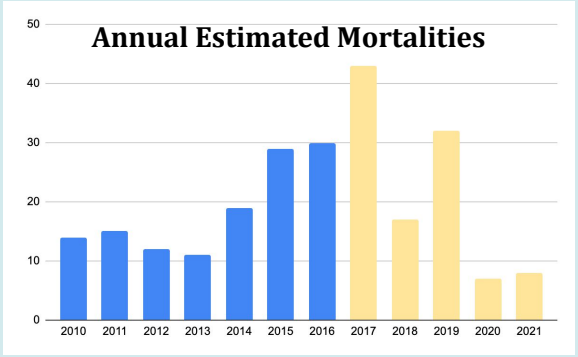
*helpful if you can note the slide number when you ask your question!

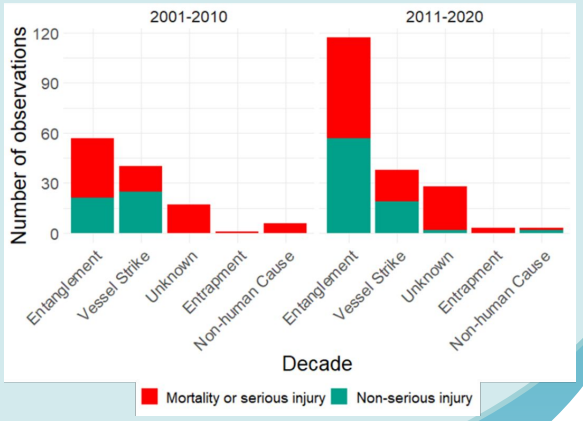
This webinar is being recorded.

NOAA FISHERIES

Endangered North Atlantic Right Whales



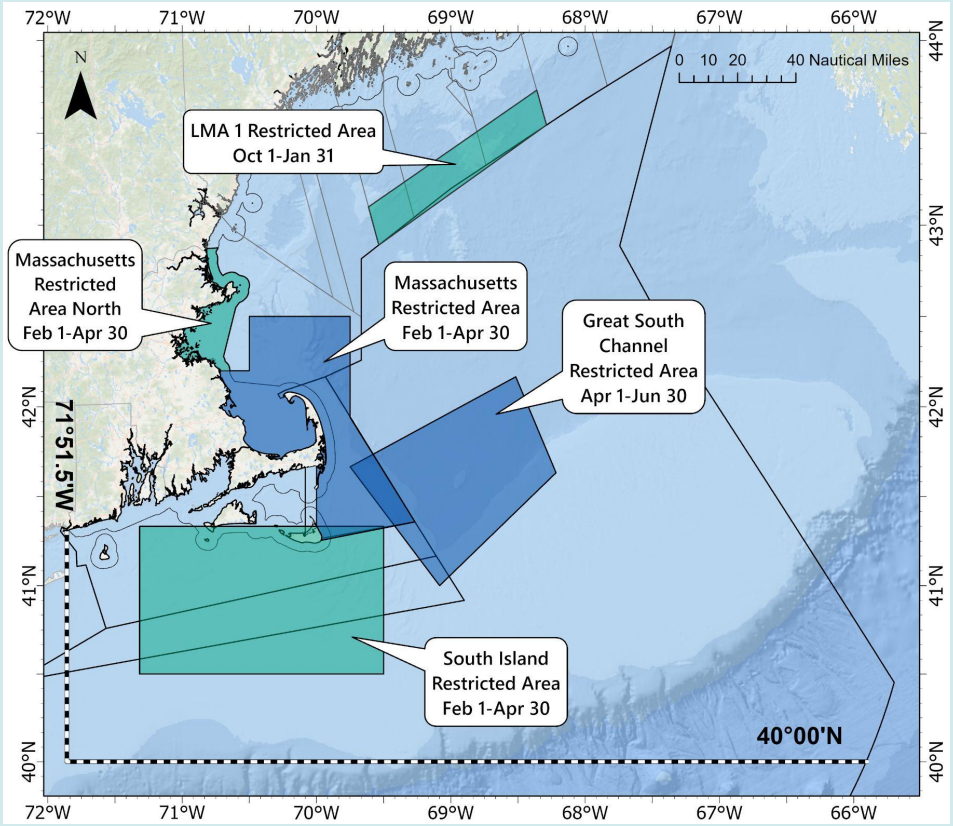




NOAA FISHERIES

“Ropeless” as Alternative to Seasonal Closures

Current Trap/Pot Restricted Areas



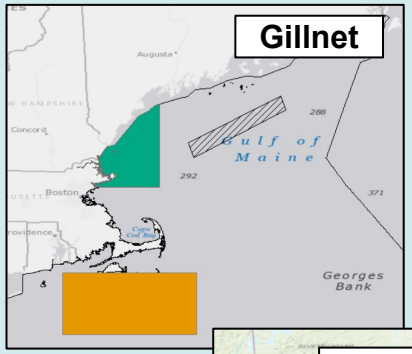
Two existing (blue) and three new (green) areas added in 2021:

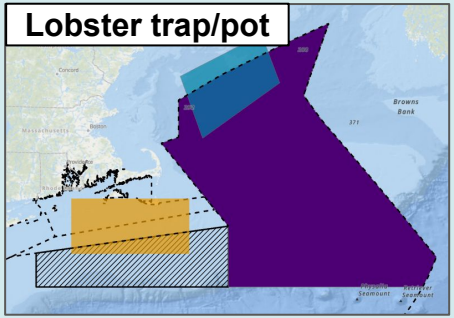
- Modified from seasonal fishing closures to vertical line closures (trap/pot)
- Expansion of the Massachusetts Restricted Area North
- Two new restricted areas (LMA 1 and SIRA)

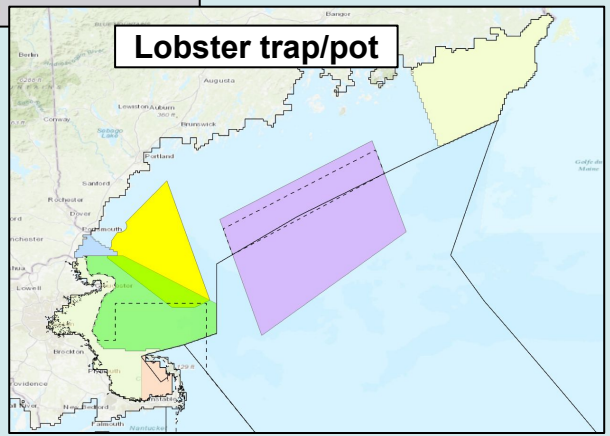
NOAA FISHERIES

Take Reduction Team 2022 Discussion of Restricted Areas

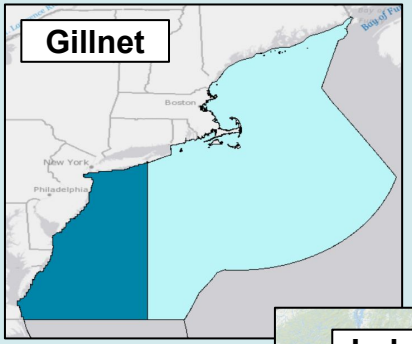
Seasonal restricted areas

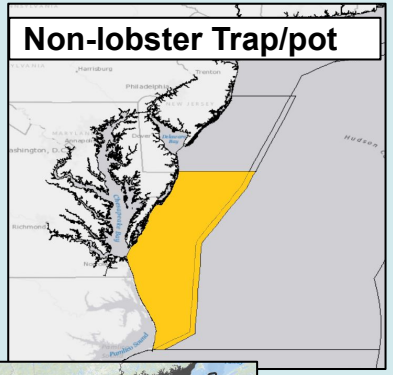


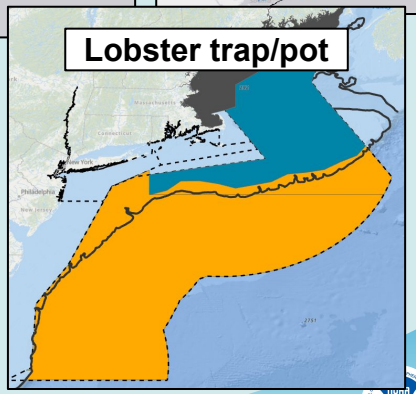




Seasonal one-end ropeless areas







NOAA FISHERIES

Consolidated Appropriations Act

December 29, 2022

Division JJ–North Atlantic Right Whales, Title I–North Atlantic Right Whales and Regulations, § 101(a)

The law deems the 2021 TRP Rule is **sufficient to ensure** that the lobster/Jonah crab authorizations are in **compliance** with the MMPA and ESA until Dec. 31, 2028.

Further, NOAA is required to:

- **Promote the "innovation and adoption of gear technologies"**, in consultation with affected states and fishing industry participants to support implementing additional mitigation measures by December 31, 2028.
- Provides funding for development of gear that will reduce the risk even further—specifically mentions ropeless fishing
- Senator King noted this was a negotiated compromise that delays further rulemaking to provide funding and time to finish developing a solution to closures.

"For example, there is a lot of discussion of something called ropeless fishing, which would be traps on the bottom and a buoy on the bottom that can be released by a radio signal, come to the surface, and then you can pull the traps up. So there is no rope in the water. Now, that is a great idea. The problem is, it is not ready for prime time. It is being tried. There are experiments going on with it. There are some serious problems with it. For example, currently, if you are a lobsterman, you go out and you see other buoys, and that tells you where other traps are, so you don't put yours down on top of theirs. In this ropeless fishing configuration, until we figure that out, we can't have multiple traps laying on top of each other and becoming entangled. The other problem is, it is very expensive. We are talking about tens and hundreds of thousands of dollars for the guy that owns this boat. So what the bill provides is funding for research of how to develop this, whether it is ropeless fishing or some other technology that we don't know right now, to mitigate whatever risk there is even further. So that is one funding in the bill."
-Senator Angus King (I-ME)

NOAA FISHERIES

2024

Late Nov/Early Dec
Informational Webinar (virtual)

Purpose: Updates, including new NARW population estimates, and entanglement incidents

Dec
Updated DST fishery layer and beta web tool

All fishery layers updated* with data through 2022 and web tool application for low resolution runs available for beta testing with internal partners

Ongoing: Talk to your stakeholders!

2025

January
30 Day Scoping Period

March 18-19
Team Meeting (virtual)

Purpose: Provide TRT with updates on ASRG population and mortality estimates

Summer
Updated Whale Layer in DST

Whale layer data to incorporate sightings through summer 2023

July 16-17
Team Meeting (in-person**)

Purpose: Provide members with TRT process training/refresher and information on updated DST. Review preliminary caucus packages

Nov 17-20
Team Meeting (in-person**)

Purpose: Preliminary package development

2026

January 13-15
Team Meeting (in-person**)

Purpose: Develop and vote on recommendations

TBD
Updated DST NE Lobster/Jonah crab fishery layer

Fishery layers expected to be updated with vessel tracking data as data becomes available

* DST fishery layer updates to occur every two years beginning 2024

** Locations of in-person meetings TBD

2027 and Beyond

Late 2026/Early 2027
Proposed Rule

Public Comment Period

Late 2027/Early 2028
Final Rule

January 2029 Final Rule effective

RISK ASSESSMENT & MITIGATION BRANCH
NORTHEAST FISHERIES SCIENCE CENTER

GEAR LENDING LIBRARY

NEFSC On-Demand Fishing Research

August 29, 2024

Gear Research Team and Collaborators

NOAA FISHERIES

NEFSC Gear Team & Gear Lending Library

Goals:

- Provide *fishermen* with technology experience
- Assist *manufacturers* in improving gear designs and durability
- Provide *policy makers* data and insight about the possibilities: benefits and constraints of fishing without vertical lines

Provide fishermen with tools to fish in areas closed to persistent buoy lines

On-Demand Fishing Explainer

- Provides options to fish in areas closed to gear using persistent buoy lines (i.e. endlines or vertical lines)
- Removes the need for a static vertical buoy line in the water column
  - On-Demand units are deployed at the end(s) of a standard trap/pot trawl or gillnet set
  - The unit receives a signal (acoustic or pre-set timer) that triggers a release mechanism
  - The unit ascends to the surface using buoys and line, or an inflated lift bag
  - The fishermen hauls the unit to retrieve the trawl/set
- On-Demand gear is fished with fewer or no surface buoys. Neighboring vessels and law enforcement need to be able to “see” or detect sub-surface gear.

NOAA FISHERIES

Research and Development Approach

1.) Training & Rigging

2.) Fishing Trials

3.) Experimental Fishery

NOAA FISHERIES

Technology & Tools Used

On-Demand Systems

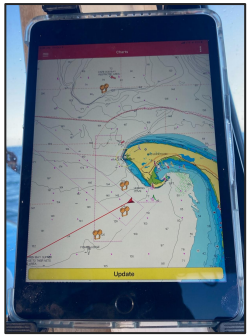
Pop-up Buoy

Inflatable Lift Bag

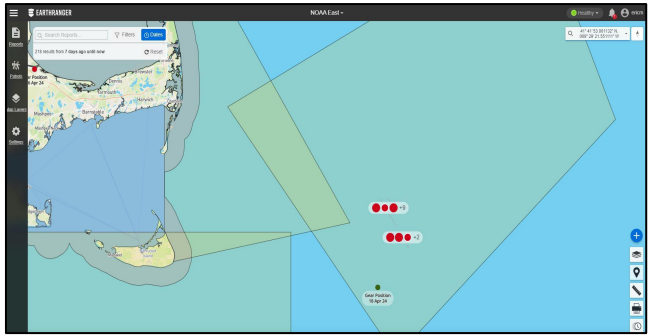
Buoyant Spool

Timer

Top Side Components



Trap Tracker App



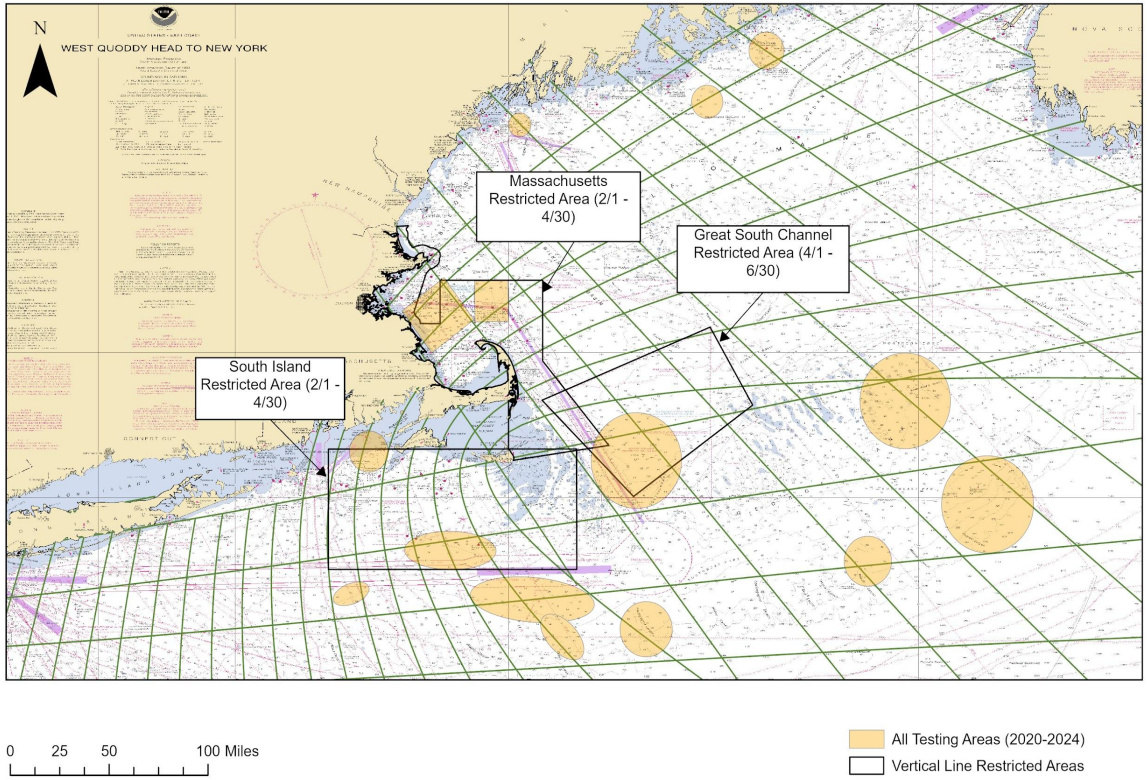
EarthRanger

TimeZero Chart Plotter

NOAA FISHERIES

The Research Fleet

- 50 + collaborating vessels
  - 3 fixed gear fisheries
  - 5 states
- Over 500 on-demand systems in the Gear Lending Library
- Over 8,000 hauls of on-demand gear
  - Hybrid trawls in open areas
  - Fully “ropeless” in closed areas



Results - Open Season Trials

2020	2021	2022	2023	2024
71%	**85%**	**90%**	**85%**	**88%**
3 Vessels	12 Vessels	21 Vessels	33 Vessels	28 Vessels
118 Hauls	750 Hauls	1,816 Hauls	2,720 Hauls	3,001 Hauls
83 Successful	640 Successful	1,635 Successful	2,313 Successful	2,627 Successful
34 Unsuccessful	109 Unsuccessful	181 Unsuccessful	391 Unsuccessful	374 Unsuccessful

As of 08/27/2024

Program Totals:

87%

37 Vessels

8,273 Hauls

As of 08/27/2024

NOAA FISHERIES

Results - Restricted Area Season Trials

Category	2023	2024
Mechanical	30	49
Acoustic	2	8
Environmental	0	3
Damage	0	1
Technological	12	6
Operational	5	20
Mix	2	5
Unknown	6	24
Did Not Recover*	2	9
Gear Conflict	0	8
Total	**59**	**133**

2023:

- **12 vessels**
  - 6 vessels in MRA
  - 6 vessels in SIRA
- **533 hauls**
  - 479 successful
  - 59 unsuccessful
- **90%** success rate

MRA	SIRA
91%	86%
6 Vessels	6 Vessels
334 Hauls	199 Hauls

2024:

- **19 vessels**
  - 8 vessels in MRA
  - 9 vessels in SIRA
  - 2 vessels in GSC
- **900 hauls**
  - 769 successful
  - 134 unsuccessful
- **85%** success rate

MRA	SIRA	GSC
88%	85%	57%
8 Vessels	9 Vessels	2 Vessels
606 Hauls	238 Hauls	56 Hauls

*Unsuccessful hauls labeled as “Did Not Recover” indicates that the on-demand systems were not recovered at the initial time the haul was attempted. However, a number of systems were able to be recovered at a later time.

NOAA FISHERIES

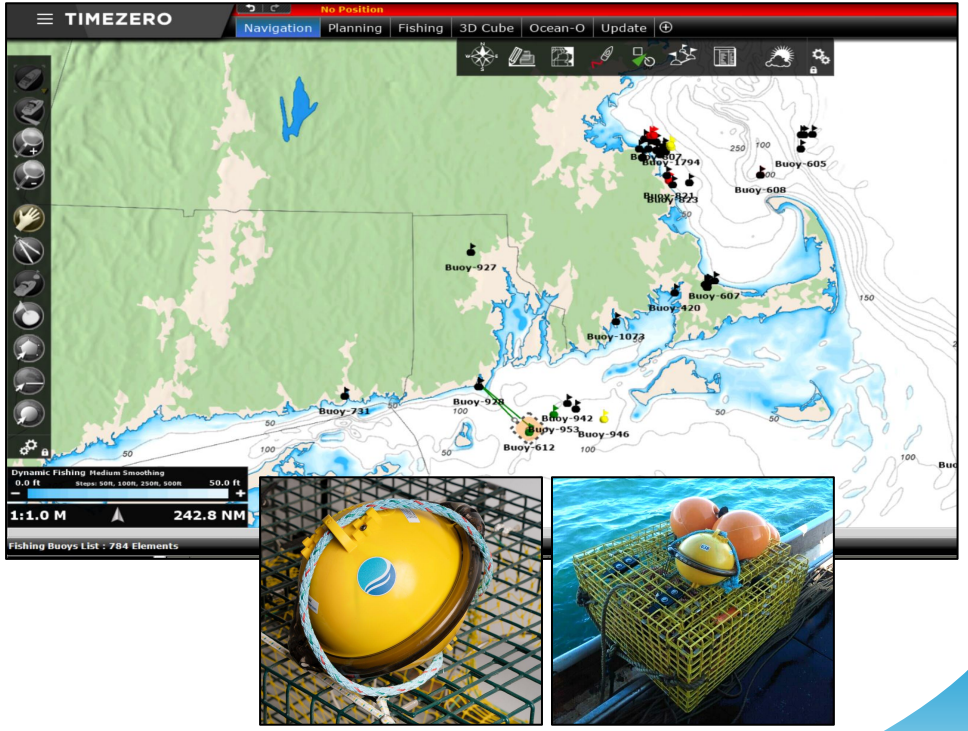
Current Capabilities

- Demonstrated Experimental Fishery in current ALWTRP Vertical Line Closures
  - At a scale that collaborators find “worthwhile” for research
    - Not compensated
  - Real time gear marking and sharing
    - Starlink or cellular service
- Demonstrated Interoperability through cloud based solutions
    - Interoperability through combination acoustic/cloud
- Demonstrated System Capabilities in real-world gear conflict/ gear recovery scenarios
  - Acoustic positioning and detection
  - Recovery of lost trawls
  - Reduced gear movement - in some storms - in some areas
- Test Pilots - research force
  - Next steps
  - Next level of user experience

Gear Marking

Progress

- TimeZero (TZ) integration with EarthRanger
  - Display on-demand gear positions on TZ. - Connectivity Required
  - Looking for mobile gear participants with TZ
- Blue Ocean Gear Plotter Link device
  - Plots Smart Buoy positions on many different chart plotters, including P-Sea Windplot.
  - EarthRanger integration planned - will send data via Plotter Link to chart plotters.
  - Looking for mobile gear participants to test tech
- Automating gear deployment and recovery marking
  - Investigating technologies to automatically mark gear on chart when deployed, automatically remove from chart when recovered.
  - More accurate than button pushing.

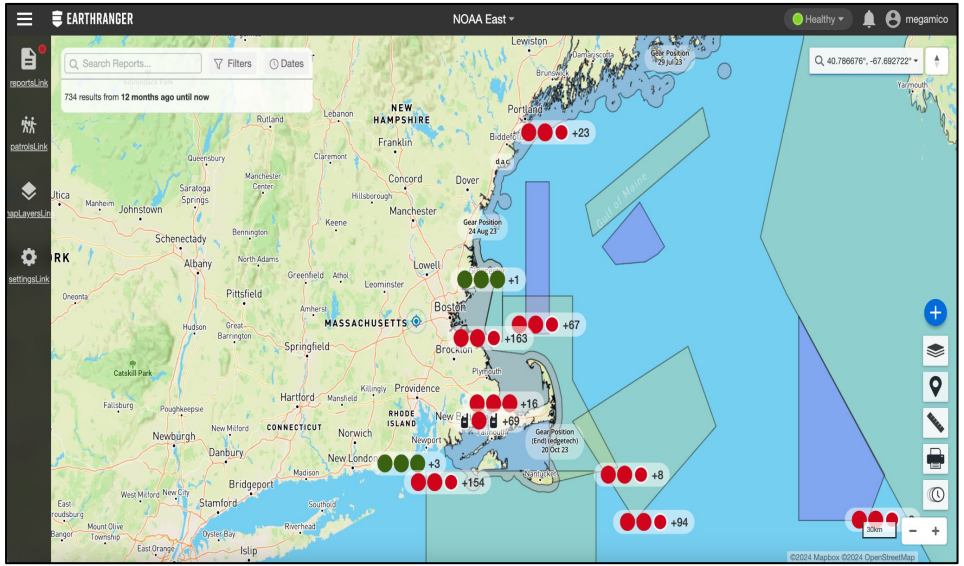


NOAA FISHERIES

Interoperability

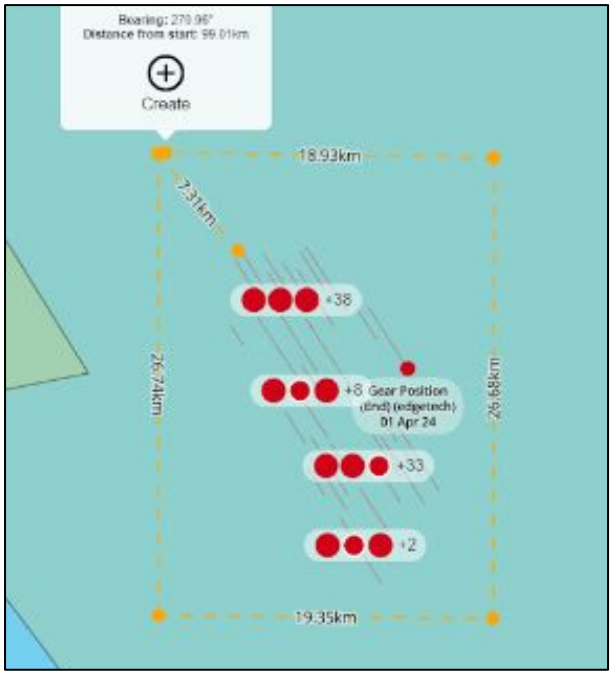
Progress

- NOAA published an *On-Demand Interoperability Workshop Report*
- Cloud Interoperability
  - Earthranger and RMW integrations are underway
  - *EarthRanger Buoy* -Mobile app ready for beta testing next month - looking for mobile gear testers
- Acoustic Interoperability
  - MITRE is conducting a technical evaluation of proposals from the manufacturers, including a gear conflict map and signal analysis framework
    - Report to NOAA by end of the calendar year



Gear Conflict Avoidance

- Collaborators are all familiar with conflicts in regular traditional operations
  - Middle ground between traditional fishing and on-demand opportunities
  - Fishing wisdom
  - Coordination on research planning
    - Caution expanding Experimental Fishery
- NEFMC OD GC WG - Jan 2023 meeting discussed research planning, fishing awareness, and coordinating efforts to minimize conflict
- Outreach efforts -
  - Permit Holder Letters,
  - Council presentations
  - Cold calls
  - Sector Manager Outreach
  - Possible VMS Geofence messages
- On-demand benefits when gear conflict does occur -
  - Detection, recovery, aids grappling efforts



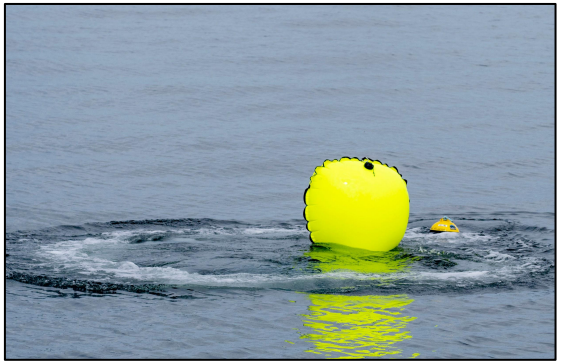
What's Next?

- Gear conflicts happen with traditional gear - goal is to make digital gear marks that can replace the current functions of surface buoys, while appreciating opportunities in gear marking technology to improve conflict risk (orientation of full trawl)
  - Technology is developing that will make it easier for vessels to see gear that is marked electronically

- Continue improving user experience
  - Improve success rates
  - Find methods to decrease line snarls

- Improve outreach down to the captains and crews

- IRA funding / support ahead of 2028
  - More staff
  - More on-demand systems and more manufacturers
  - Expanded compensation for additional fishermen collaborators



NOAA FISHERIES

Thank You!

For More Information:

For more information on On-Demand research or other experimental fishing gear, please visit the Gear Research Team's website by going to https://www.fisheries.noaa.gov/ and searching *Protected Species Gear Research*.

For general inquiries, contact the Gear Research Team at nec.gearlibrary@noaa.gov

MITRE Updates on the Assessments of Acoustic Interoperability of On-Demand Gear in the Northeast

Presentation to Take Reduction Team

Justin Tufariello

MITRE | SOLVING PROBLEMS FOR A SAFER WORLD®

Presentation Purpose

The purpose of today's presentation is to increase awareness of the behind-the-scenes efforts advancing on-demand gear, with a specific focus on evaluating acoustic interoperability approaches in the Northeast.

MITRE

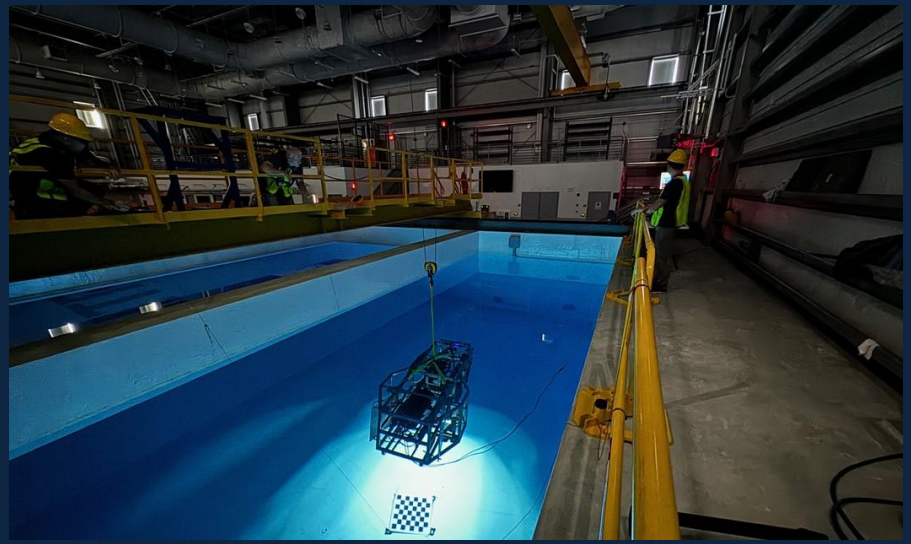
About MITRE

MITRE is a not-for-profit organization with no commercial interest – we do not compete with industry

- We operate 6 federally funded R&D centers, MITRE Labs and an independent research program

MITRE's Blue Tech Lab is a national resource for advanced undersea testing, innovation, and collaboration.

- Features one of the longest and largest test tanks in the region
- Unique instrumentation for data acquisition and underwater optical tracking



106' long x 40' wide x 19.5' deep

620,000 gallons of fresh water

2-ton overhead hoist capability

Movable bridge crane across width of tank

MITRE

About the project team

- The MITRE team is comprised of technologists with wide interdisciplinary skill including acoustics, oceanography, communication theory, and data science.

- MITRE is under contract with NOAA to serve as an independent technical evaluator of interoperability approaches which will allow for on-demand fishing gear to be deployed at scale within areas subject to fishing closures while protecting the integrity, needs, and future of the fishing industry.

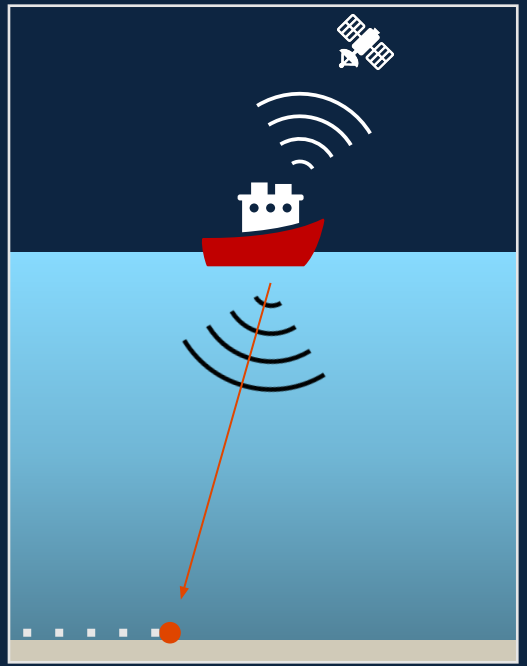
MITRE

Overview of On-Demand Gear Interoperability

MITRE

On-Demand Gear Acceleration

- **On-demand fishing gear is diverse**
  - Over a dozen manufacturers with different operating principles
- **Interoperability may be necessary for gear localization, scalability, and enforcement**
  - Acoustic interoperability for subsea localization and cloud-based interoperability for GPS marking and data management
- **Different fisheries have very different requirements**
  - Gear density drives complexity and cost
  - Marine environment drives performance requirements
- **On-demand gear has not yet been demonstrated at-scale in busy fixed-gear fisheries under the continued presence of mobile ground fishing operations**



MITRE

Purpose & Potential Outcomes of a Standard

The purpose for evaluating standards and other implementations is to inform a comprehensive and effective framework that:

1. Enhances the sustainability of fishing practices
2. Supports the fishing community
3. Assesses the impact on marine mammals

Potential outcomes of standard on the use of on-demand gear

- **Large Scale Feasibility**
- **Improve Gear Tracking and Recovery**
- **Mitigate Impact on Marine Mammals**
- **Promote Technological Integration**
- **Optimize Acoustic and Data Efficiency**
- **Foster Marketplace Choice**
- **Enhance Community and Environmental Benefits**

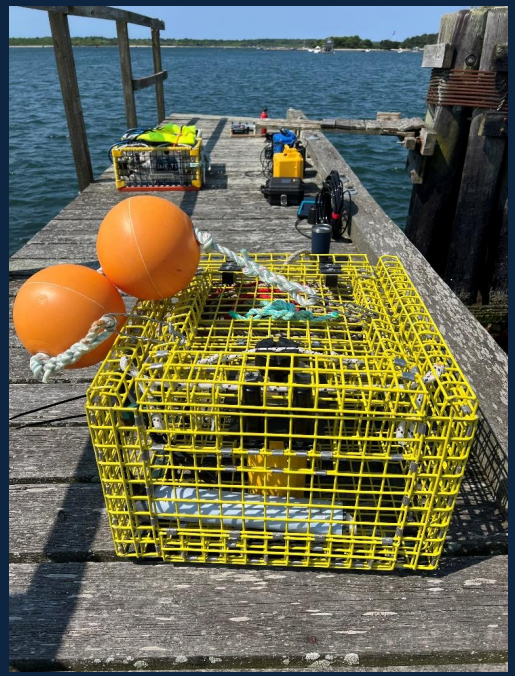
MITRE

Progress Update on MITRE's Work

MITRE

Task Objective

Assessment of Acoustic Interoperability Approaches of On-Demand Gear in the Northeast



- Objective: ***Quantify the efficacy of acoustic interoperability approaches*** and assess in ***real-world*** situations, both common and rare within fisheries, for the purpose of gear localization, deployment and retrieval at-scale.
- Approach: Conduct a technical evaluation using ***fishery data*** with ***modeling and simulation approaches*** to assess acoustic interoperability ***at-scale***, across a variety of conditions (i.e. busy fixed-gear fisheries, under the presence of mobile ground and fishing operations)
- Goal: Accelerate a solution for fishers to operate ***in closed zones*** using on-demand gear, ***limiting economic impact*** and ***possible effects to marine life***

MITRE

2024 Evaluation Overview

Primary Research Questions

1. Where is GPS-only ropeless gear marking sufficient and where may underwater acoustic localization be necessary based on fishery gear density, mobile and ground fishing operations?
2. Is FONTUS effective in Northeast fishery conditions?
3. What is the cumulative acoustic emission level within a region subject to ropeless fishing and will it perturb, inhibit or harm marine life*?

* To be addressed in conjunction with NOAA bioacoustics subject-matter experts

Acoustic Interoperability Approaches to be Evaluated

FONTUS — Acoustic interoperability framework proposed by Woods Hole Oceanographic Institute

On-Demand Manufacturer Community Proposals — Approaches from RMW Hub and EdgeTech CAPRI

Approaches to be evaluated for efficacy in **real-world fishery environments** and in the context of **all 5 acoustic vendor implementations**

2024 Evaluation Scope

- Northeast US
- GPS-based interoperability
- Acoustic interoperability

Assumptions

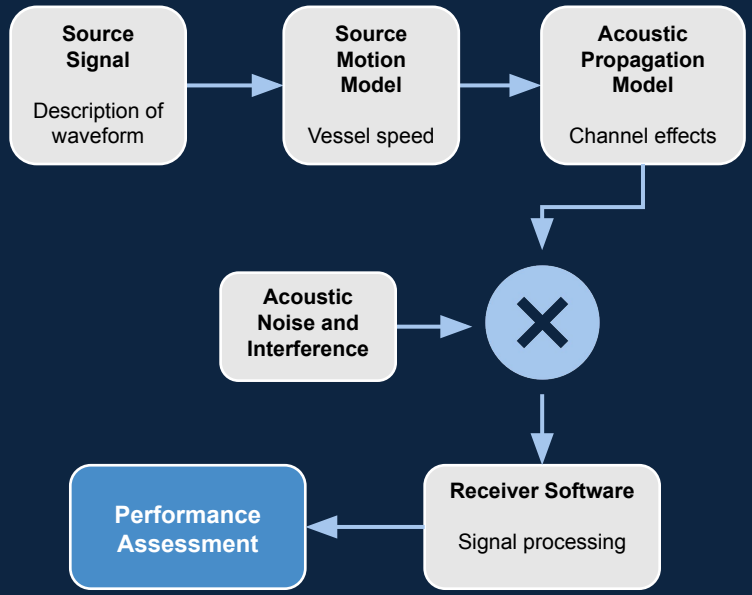
- Assumes internet accessible on all vessels in near future
- Assumes standardized cloud solution

MITRE

Our Standard Evaluation Strategy: Standards and Approaches to Acoustic Interoperability

We are generating products based on geospatial data analysis and acoustical simulation software to:

1. Quantify the unique, objective requirements of the fisheries where ropeless gear is and will be used
2. Evaluate acoustic interoperability approaches in context of existing ropeless fishing gear
3. Evaluate the general efficacy of signaling schemes in proposed standards
4. Quantify cumulative acoustic emissions from ropeless gear under standard operation



MITRE

Approach

Assessment of Acoustic Interoperability Approaches of On-Demand Gear in the Northeast

Data Sources

1. **Mobile Fisher Data**
   - Source: VMS
   - 2019-2023
2. **Fixed Gear Density**
   - Source: DST
   - 2017-2021
3. **Vertical Line Closures**
   - Source: NOAA Fisheries
   - 2017-2021
4. **Underwater Environmental**
   - 8-years sound speed data
   - 6-years bathymetry survey data
   - 6-years sediment survey data

Technical Evaluation

Conduct geospatial data analysis to create gear conflict map of NE US

Develop acoustic simulation framework to evaluate approaches

Results

A report on…

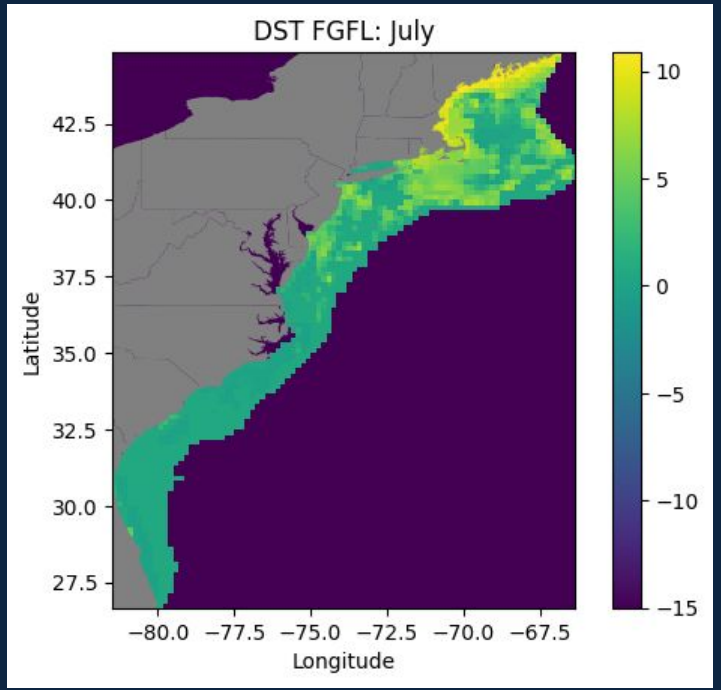
Efficacy of proposed acoustic interoperability approaches

Cumulative acoustic emission effect on marine life

MITRE

Gear Conflict Map

- A gear conflict map is being created to identify areas where precision gear localization will be necessary to sustain interoperable fishing
- Answers the question: *“Where is acoustic localization necessary? Where is surface GPS marking sufficient?”*
- Utilizing data sourced from DST, estimates of monthly gear density per square nautical mile are available from logbooks, trip reports and statistical samples [1]
- Sourcing VMS data from NOAA Fisheries, estimates of mobile fishing effort may be determined through filtering of vessel telemetry and permit issuance



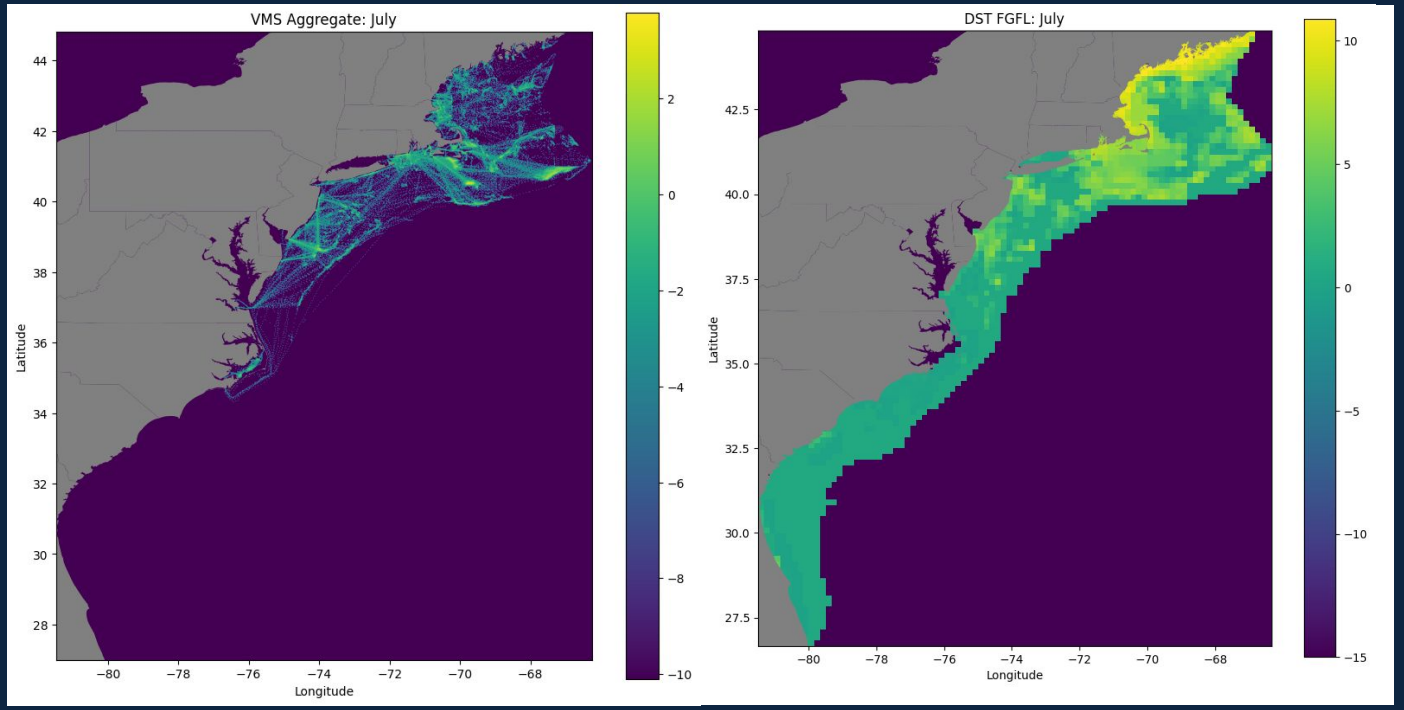
10 NM² Gear Density Resolution

[1] A. S. Miller, L. Solinger, B. Shank, A. Huamani , M. J. Asaro, M. D. Duffing Romero, C. Franco and M. L. Trego, "A decision support tool to assess the risk of entanglement mortality to large whales from commercial fixed-gear fisheries in the Northwest Atlantic," Woods Hole, 2024.

MITRE

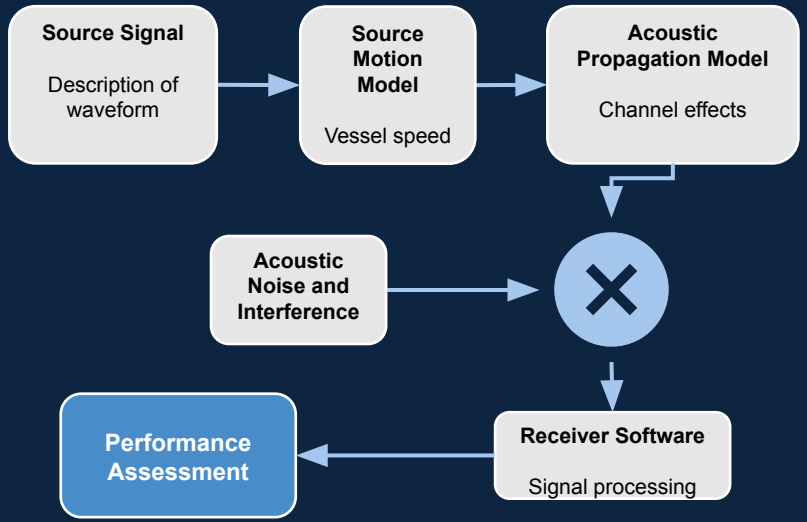
Gear Conflict Map

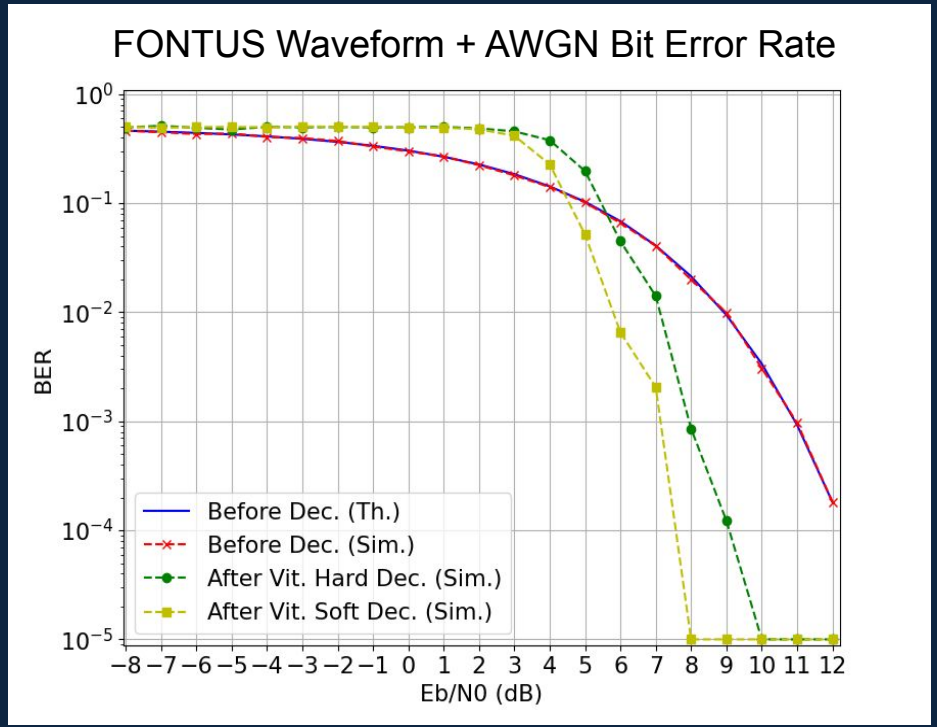
Fusion of VMS and DST data across common coordinate points in time to yield joint probability of gear conflict based on high-gear density and intersection with mobile fishing



Acoustic Simulation Framework
for Signal Analysis Performance Modeling

- A simulation framework has been created at MITRE to assess acoustic waveform performance under modeled fishery conditions
- Answers the question: *Which acoustic standard will work best under fishery conditions common and rare?*

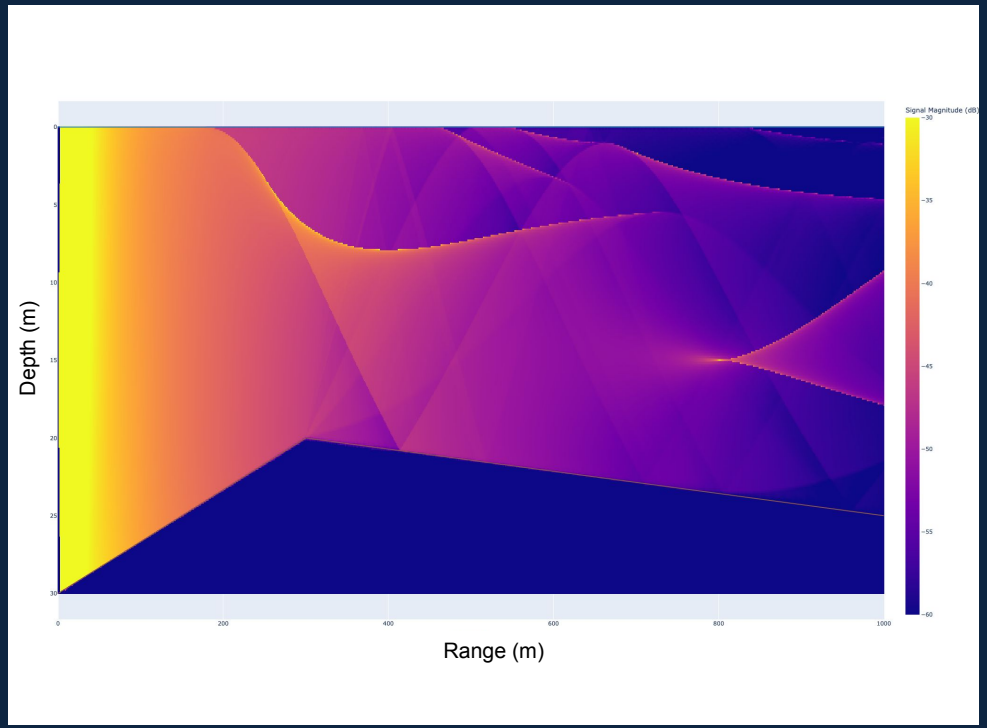




MITRE

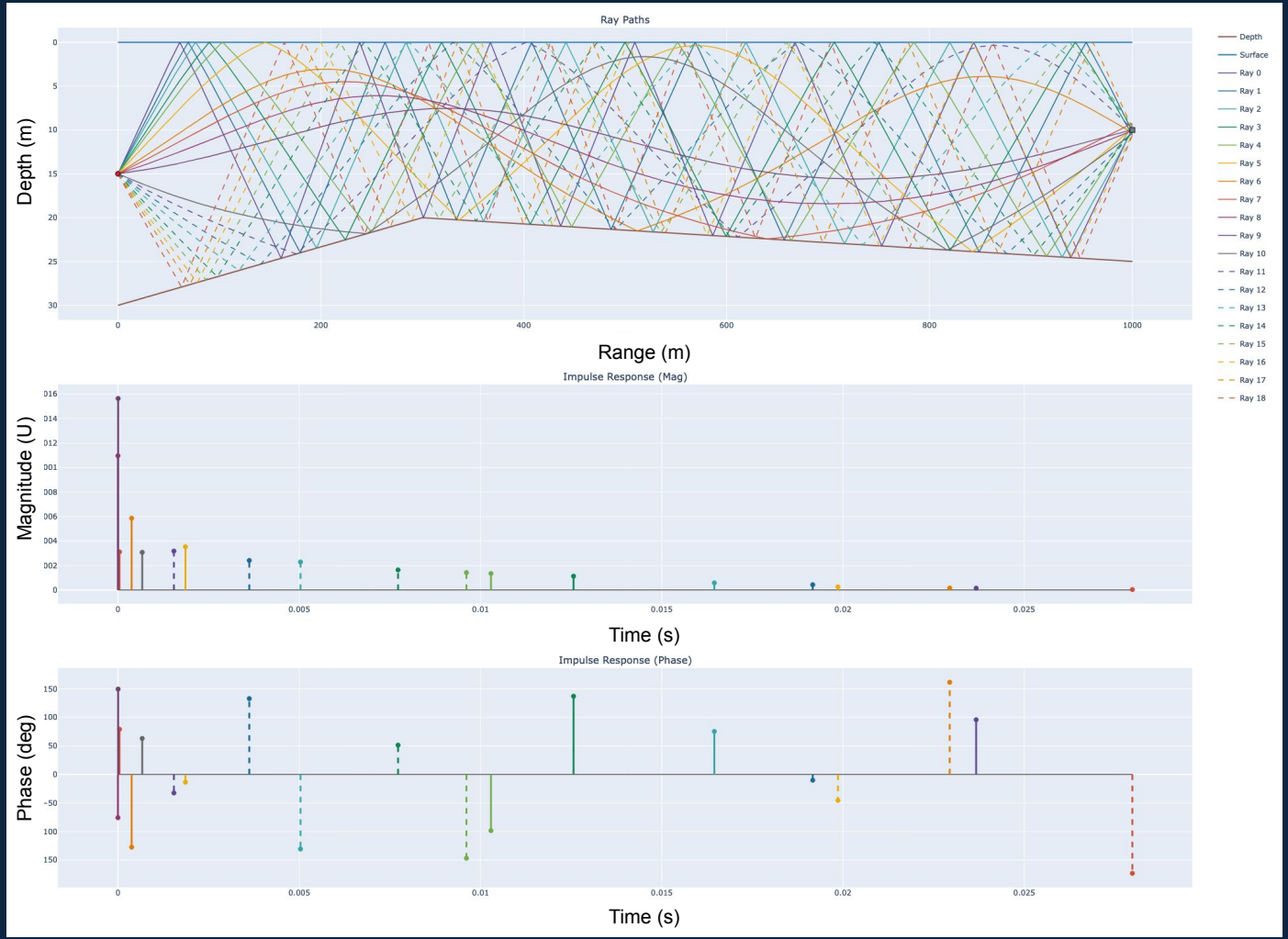
Acoustic Simulation Framework
for Signal Analysis Performance Modeling

- RoPy is a Python language, MITRE-developed, open-source acoustic modeling environment developed for this task. RoPy:
  - models acoustic propagation of on-demand gear waveforms in Bellhop
  - ingests sound speed profiles, sediment layer data, bottom roughness parameters from scientific survey databases
- Plotted results showing transmission loss maps, acoustic ray paths, and complex channel impulse response



MITRE

- RoPy is designed to simulate characteristics with levels of realism based on oceanographic open data sources and careful physical modeling of effects.
- Shown here are littoral underwater environments that are acoustical complex and reverberant.



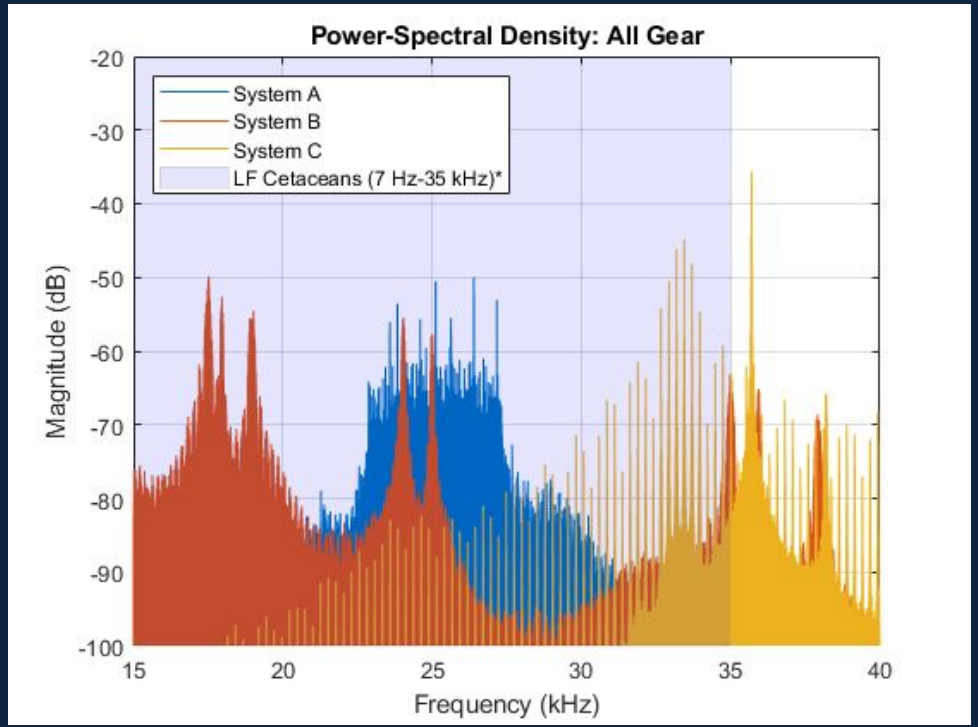
MITRE

Acoustic Emissions and Marine Life

- The gear conflict map and acoustic simulation framework will inform NOAA bio acousticians on the effect of on-demand gear acoustic emissions to marine life
- Answers the question: "*How much sound power will a proliferation of on-demand gear generate? Is it below the NMFS EFA thresholds?*"

This question is answered by:

- Utilizing the gear density maps as a notional approximation of on-demand gear acoustic source density
- Accumulating non-coherent acoustic emissions from the source distributions to generate a time-averaged metric across frequencies



* NOAA Fisheries, "National Marine Fisheries Service: Summary of Endangered Species Act Acoustic Thresholds," NOAA, January 2023. [Online].

MITRE

Additional questions to be addressed in the 2024 evaluation

In addition to the primary research questions, the MITRE team will aim to address the following questions:

1. Can a single approach to a standard accommodate the diverse needs of the multitude of different fisheries which may be subject to vertical endline closures?

2. How much of the current offering of manufactured ropeless gear complies with the specifications of the example interoperability standard?

3. What is the technical complexity of proposed standards? (to inform an initial understanding of cost)

MITRE

Mock Results

for illustrative purposes only

"Surface marking is adequate in marked zones with following characteristics:

- *>XX ft avg depth*
- *<YY / NM² fixed gear density per month*
- *<ZZ mobile fishers / day*

…"

"Zones where surface marking is adequate include:

- *Justin's bay*
- *Maddy's bank*

Acoustic localization required in all other zones"

"Frequency and magnitude of simulated acoustic emissions do not exceed threshold, which indicates minimal impact to marine life"

"Acoustic localization in FONTUS standard effective in XX% of fishery locations in Northeast"

"X number of vendors currently have capability to support FONTUS acoustic waveform reproduction"

MITRE

Outputs

- By the end of the 2024 calendar year MITRE will deliver to NOAA a report of findings on the efficacy of acoustic interoperability approaches across a variety of situations common and rare within fisheries, and the implications to nearby marine life
- Findings will be examined by NOAA toward the implementation of an eventual standard
- Future plans to release a software simulation framework to allow for similar feasibility studies to be conducted as technology matures
- Future large-scale experimentation needed for validation of simulation results
- **MITRE will share preliminary findings at the Ropeless Consortium October 2024**

MITRE

Takeaways

- **A potential standard could...**
  - Enable Large Scale Feasibility
  - Ensure Seamless Integration
  - Mitigate Impact on Marine Mammals
  - Promote Technological and Operational Stability
  - Optimize Acoustic and Data Efficiency
  - Foster Marketplace Choice
  - Enhance Community and Environmental Benefits

- **This study has no pre-conceived notion of a "correct" answer**
- We are evaluating based on empirical data & at-scale simulations
- Our assessment takes complexities of fisheries into account

MITRE

Any Questions?

Justin Tufariello
Group Leader
jtufariello@mitre.org

MITRE

What's Next

Upcoming Presentations and Publications

MITRE

- Webinar targeted to manufacturers (date TBD)
- Update at the Right Whale Consortium in October 2024
- Final Report at the end of 2024

On-Demand Working Group

- ODWG report at NEFMC Meeting on September 26

NOAA

- Next iteration of Ropeless Roadmap, providing steps to making on-demand fishing operational, expected this fall

EarthRanger

- Version 1.0 of EarthRanger App available for testing in a few weeks

NOAA FISHERIES

Thank You for Joining Us

More questions?
nmfs.gar.alwtrt@noaa.gov