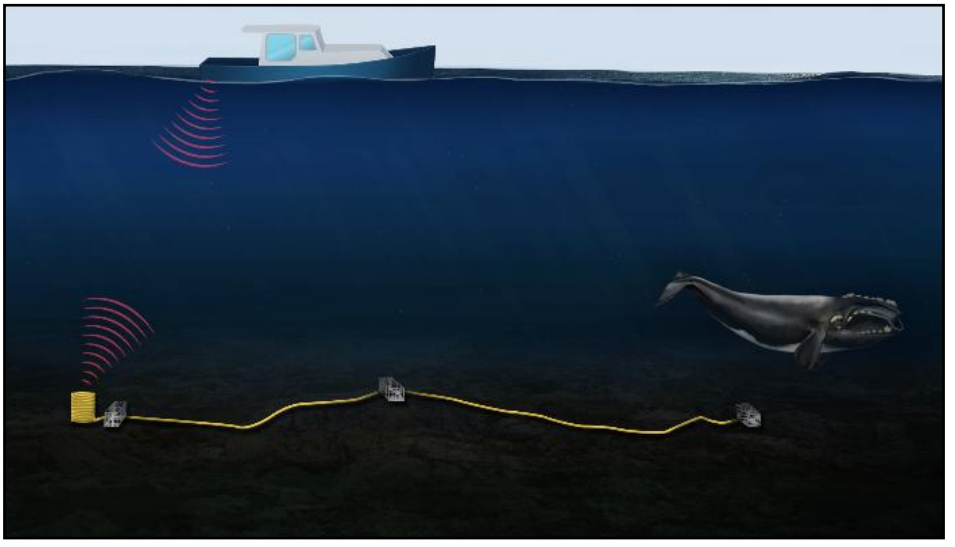
Ropeless Consortium
Annual Meeting



New Bedford Whaling Museum
New Bedford, MA USA
20-21 October 2025
www.ropeless.org

New England Aquarium
Protecting the blue planet

RCT
ROPELESS CONSORTIUM

ISLAND FOUNDATION

ROPELESS CONSORTIUM
ANNUAL MEETING

20-21 October 2025
New Bedford Whaling Museum

With Special Attendee (Onsite & Remote) Programming on 21 October 2025

MEETING FORMAT AND AGENDA

Pre-Meeting:
Prior to the meeting, all registered participants will receive a unique meeting site login code that will allow them to view all pre-recorded presentations in advance of the meeting. All underlined presentations should be viewed **in advance of the meeting** as they will not be shared live. Those presentations that are not underlined will be shared **live** during the meeting. The six-digit number preceding the presentation title corresponds to the video number on the meeting site.

Participants (both onsite and remote) may submit questions/comments for presenters in advance of the meeting using the question submission link on the meeting page.

Live Meeting:
Remote participants will be able to view the meeting, including live presentations and discussions, using the zoom access links on the meeting site.

Each live presentation will be followed by a short Q&A session with the presenter. Following any live presentations within a session, a discussion panel will take place with all presenters within that session. Presenters who are onsite will gather at the front of the auditorium and presenters who are remote will be available via the virtual meeting platform. The panel will take questions/comments from both onsite and remote meeting participants. Remote participants will be able to come off mute to ask their questions. **Remote participants – please see meeting site for important information on queuing for questions during the meeting.**

All meeting materials (both static and live) are intended for registered participants only and may not be shared in any capacity. All participants have agreed to the meeting Code of Conduct. There is no external recording (including but not limited to video, audio, screenshots, or photography) or sharing (including social media) of any material (including but not limited to presentations, presentation content, discussions) without explicit consent of the presenter, speaker, moderator, etc. The meeting will be recorded to facilitate the synthesis of meeting notes to be distributed to participants only.

The Ropeless meeting is CLOSED to the press.

*A login is required to access the Meeting page via the NARWC website (www.narwc.org)
*Times listed are EDT
*Underlined talks should be viewed **in advance** of the meeting and will not be shared live

Meeting Site Information

The onsite meeting will take place at the **New Bedford Whaling Museum**. We will be using three levels of the venue during our meeting. Additionally, registration check-in will take place in the museum lobby.

Access to each of the floors below is available by both stairs and elevators.

Lobby and Lower Level

Lobby

- 10/20 and 10/21 Check In

Cook Memorial Theater

- 10/20-10/21 Main Meeting Room
- 10/21 Workshop - Reconsidering North Atlantic Right Whale Detection Ranges, Source Levels, and Ambient Noise Assumptions in the March Towards a Real-time PAM Listening Network

Conference Room

- By reservation only

Main Level

Lagoda Room

- 10/20 Reception

Media Lab

- By reservation only

Upper Level

Harbor View Gallery

- 10/20-10/21 Lunch, Breaks and Breakout Session seating
- 10/21 Workshop - Bridging the Divide: Disentangling Conflict to Meet Challenges Collaboratively

Wi-Fi information: NBWM Public Wireless **password:** nbwm2019

The entire museum is open to meeting participants. Please respect the museum's policy of no food or drinks in the theater. The museum also requests that food and drinks not travel between spaces.

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ROPELESS AND NARWC 2025 ANNUAL MEETINGS SPECIAL PROGRAMMING
Tuesday, October 21, 2025

Workshops

There are two workshops being held on the afternoon of October 21, 2025. These are independently organized - please see Workshop page at narwc.org for more information and registration information.

3:30-5:30PM: **Bridging the Divide: Disentangling Conflict to Meet Challenges Collaboratively** (Harbor View Gallery) *Please note that this workshop does NOT have remote participation available.*

Are you frustrated with conflict getting in the way of solutions in the take reduction process? Are you struggling to make connections, communicate, and collaborate? Participants in this workshop will learn practical, dignity-centered skills arising from research and on-the-ground experience to build understanding and get things done, even when stakes are high and tempers are hot. We will discuss common pitfalls that arise when people with different perspectives are trying to solve problems together. Participants will discuss and practice dignity-centered engagement techniques and how they apply to current programs and activities. They will leave with new, more effective ways to connect and collaborate.

3:30-5:30PM: **Reconsidering North Atlantic Right Whale Detection Ranges, Source Levels, and Ambient Noise Assumptions in the March Towards a Real-Time PAM Listening Network** (Cook Memorial Theater)

This is a technical workshop that will focus on defining guidelines for currently accepted North Atlantic right whale source levels, detection ranges, and ambient noise assumptions, as based upon the best available science. The goals of this workshop are to 1) develop a framework for determining assumptions used for modelling NARW detection ranges, including topics such as source level distribution, ambient sound distribution within appropriate decidecade bands, and detection methods, including thresholds and probability of detection, that align with the best available science, 2) lead a discussion to incorporate these scientific community-accepted guidelines in US regulatory actions , 3) engage stakeholders from the scientific, regulatory, conservation, and industrial sectors, and 4) carry these newly defined guidelines forward in the development of an autonomous real-time PAM listening network. This workshop is meant to define these guidelines using the best available science, with the ultimate goal of implementing these guidelines in the creation of a larger PAM listening network.

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ROPELESS CONSORTIUM

2025 Annual Meeting

Agenda

Monday, October 20, 2025

800-830AM **Check in – Museum Lobby**
Late arrivals please check in at the registration desk during a break.
Coffee - Lobby area
PLEASE NOTE - NO COFFEE allowed in the Cooke Memorial Theater, only water with lid

830AM **Opening**

900AM **Session 1: Gear Location Marking**
Moderated by: Mark Baumgartner, Woods Hole Oceanographic Institution

01.01.01 **Standardizing methods to evaluate the accuracy of localizing on-demand gear** (Speed)
- *Mark Baumgartner, Woods Hole Oceanographic Institution*

01.01.02 **Evaluating the localization accuracy of gear location marking strategies for high density fisheries in Atlantic Canada** (Speed)
- *Hannah Drake, Canadian Wildlife Federation*

01.01.03 **Where is "there"? Assessing geolocation performance between surface buoys, GPS marks, and acoustic positioning systems from the perspective of a fisherman** (Speed)
- *Emily Patrick, Maine Department of Marine Resources*

01.01.04 **Understanding gear localization and marking in the Northeast US** (Speed)
- *Eric Matzen, NOAA Fisheries, Northeast Fisheries Science Center*

01.01.05 **Functional trawl densities using on-demand gear** (Speed)
- *David Chosid, Massachusetts Department of Marine Fisheries*

01.01.06 **One-way acoustics for ropeless fishing** (Speed)
- *Erin Fischell, Acbotics Research, LLC*

1015AM **BREAK (Upstairs in Harbor View Gallery)**

1045AM **Session 2: Market Incentives**
Moderated by: Amy Knowlton, Anderson Cabot Center for Ocean Life, New England Aquarium

01.02.01 **Discussing market challenges for seafood caught with on-demand gear** (Full)
- *Michelle Cho, Anderson Cabot Center for Ocean Life, New England Aquarium*
- *Anne DiMonti, Sustainable Fisheries Partnership*

1100AM **Session 3: Management**
Moderated by: Erica Fuller, Conservation Law Foundation

01.03.01 **Data governance for on-demand fishing** (Full)
- *Erica Fuller, Conservation Law Foundation*

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01.03.02 **NEFMC Update on the On-Demand Working Group and progress on revising fishery management plans and regulatory requirements** (Full)
- *Emily Bodell, New England Fishery Management Council*

01.03.03 **Insights from the Maine Innovative Gear Library** (Full)
- *Briony Donahue, Maine Department of Marine Resources*

01.03.04 **Implementation of an on-demand gear grant program in Massachusetts** (Full)
- *Erin Burke, Massachusetts Department of Marine Fisheries*

01.03.05 **Research to reality: Steps towards providing fishermen an option to use on-demand fishing systems in Greater Atlantic Region federal fisheries** (Full)
- *Heidi Henninger, Azura Consulting LLC in support of NOAA Fisheries Northeast Fisheries Science Center*

01.03.06 **Management update of on-demand Gear in the U.S. South Atlantic black sea bass pot fishery** (Speed)
- *Katline Barrows, Spatial Front Inc./NOAA Fisheries Southeast Regional Office*

Additional panelists: TBD

1230PM **Lunch (Upstairs in Harbor View Gallery)**
Due to the size of the meeting, we will have lunch in two shifts - while one half of participants are at lunch, the other half are invited to explore the New Bedford Whaling Museum exhibits
- *If your last name begins with A-L, please proceed upstairs to lunch at 12:30*
- *If your last name begins with M-Z, please proceed to lunch at 1:15PM*

200PM **Session 4: Harvester Panel**
Moderated by: Regina Asmutis-Silvia, Whale and Dolphin Conservation
Panel will consist of harvesters who have expressed interest in participating AND we welcome other harvesters in attendance (in person and remote) to join and share their perspectives.

315PM **BREAK (Upstairs in Harbor View Gallery)**

345PM **Session 5: Ropeless Fishing**
Moderated by: Sean Brillant, Canadian Wildlife Federation

01.05.01 **Comparing three years of experimental fishery data**
- *Neal McIntosh, NOAA Fisheries, Northeast Fisheries Science Center*

01.05.02 **Integrating fishermen's perspectives into on-demand gear research: Insights from over 14,000 hauls across the Northeast U.S.**
- *Rob Martin, Azura Consulting in support of NOAA Fisheries Northeast Fishery Science Center*

01.05.03 **2025 EFP testing of Sub Sea Sonics/Guardian ropeless gear: On-demand fishing goes wide-scale in California trawl fishery**
- *Ryan Halonen, Sub Sea Sonics*

01.05.04 **Successful testing of on-demand gear in a California deep-water trap fishery**
- *Kim Sawicki, Sustainable Seas Technology*

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01.05.05 **Embedding scientific protocols in commercial fishing operations: Lessons from fisher-led trials of on-demand gear in the Gulf of St. Lawrence**

- *Lyne Morissette, M-Expertise Marine Inc., Institut des sciences de la mer de Rimouski (UQAR-ISMER)*

01.05.06 **Advancing pop-up gear testing in California fixed gear fisheries: Progress and insights from collaborative trials**

- *Greg Wells, National Marine Sanctuary Foundation*

01.05.07 **Advancing ropeless fishing gear in the California coonstripe shrimp fishery**

- *Geoffrey Shester, Oceana*

01.05.08 **2025 Updates to CanFISH program**

- *Sahra Ferderber-Skripsky, Canadian Wildlife Federation*

Additional panelists: TBD

500PM **Open Discussion**

600PM **Day 1 Wrap**

600-730PM **Onsite Reception (Lagoda Room)**
Light appetizers and cash bar
Attendees on own for dinner

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ROPELESS CONSORTIUM 2025 ANNUAL MEETING

Tuesday, October 21, 2025

800-830 AM **Check in – Museum Lobby**
Late arrivals please check in at the registration desk during a break.
Coffee - Lobby area
PLEASE NOTE - NO COFFEE allowed in the Cooke Memorial Theater, only water with lid

830AM **Session 1: Manufacturers**
Moderated by: Michael Moore, Woods Hole Oceanographic Institution
Heather Pettis, Anderson Cabot Center for Ocean Life at the New Egland Aquarium.

02.01.01 **Advancing reliability and longevity of buoyancy-based ropeless gear through field-driven redesign** (Speed)
- *Cormac Hondros-McCarthy, LiftLabs, Inc.*

02.01.02 **National Fish and Wildlife Foundation project update - Adaptive, economically viable on-demand fishing systems as an alternative to time-area closures in New England trap fisheries** (Speed)
- *Ryan Halonen, Sub Sea Sonics*

02.01.03 **Operational and economic assessment of Ropeless RISER™ use in the box crab fishery in California** (Speed)
- *Harold 'Bud' Vincent, Ropeless Systems*

02.01.04 **EdgeTech Ropeless 5112 On Demand Fishing System, Trap Tracker updates for 2025** (Speed)
- *Brendan Smith, Edgetech*

915AM **Session 2: Interoperability**
Moderated by: Sean Brillant, Canadian Wildlife Federation

02.02.01 **Continued development of Fontus for gear location marking, gear retrieval, lost gear recovery and enforcement** (Full)
- *Mark Baumgartner, Woods Hole Oceanographic Institute*

02.02.02 **An open source and affordable wideband acoustic communication modem for on-demand fishing** (Full)
- *Thomas Ebersole, delResearch LLC*

02.02.03 **Challenges in platform integration of a cloud based integrated web and mobile platform for tracking on-demand fishing gear** (Full)
- *Doug Poirier, EarthRanger*

02.02.04 **The rmwHUB On-Demand Fishing Interoperability System: Updates, integrations, enforcement portals and EFP trials** (Full)
- *Bart Chadwick, Ropeless Manufacturers Working Group*

Additional panelists: TBD

1030AM **BREAK (Upstairs in Harbor View Gallery)**

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1100AM **Session 3: Visualizing on demand gear**
Moderated by: Mark Baumgartner, Woods Hole Oceanographic Institution

02.03.01 **An open-source device to facilitate mobile fishers' real-time awareness of deployed on-demand fixed gear** (Speed)
- *Mark Baumgartner, Woods Hole Oceanographic Institute*

02.03.02 **Deployment of a low-cost, Iridium-based solution for interoperability of on-demand gear** (Speed)
- *Kortney Opshaug, Blue Ocean Gear*

02.03.03 **SMELTS development of interoperable multi-function display and automatic gear marking** (Speed)
- *Richard Riels, SMELTS*

02.03.04 **Update on an interoperable chart plotter and deckbox for on-demand gear marking** (Speed)
- *Bob Melvin, Teledyne*

02.03.05 **NMEA committee for on-demand message standards, progress report** (Speed)
- *Doug Traeger, Blue Ocean Gear, Inc.*

02.03.06 **Advancing on-demand fishing gear: Chartplotter integration, automatic gear marking, and data standardization** (Speed)
- *Brian Galvez, NOAA*

1215PM **LUNCH (Upstairs in Harbor View Gallery)**
Due to the size of the meeting, we will have lunch in two shifts - while one half of participants are at lunch, the other half are invited to explore the New Bedford Whaling Museum exhibits.
- *If your last name begins with M-Z, please proceed upstairs to lunch at 12:15*
- *If your last name begins with A-L please proceed to lunch at 12:55PM*

130PM **Open Discussion Part 2**
Moderated by: Erica Fuller, Conservation Law Foundation

300PM **Meeting Wrap and Close**

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Understanding gear localization and marking in the Northeast US

Amico, M.[1]; Artigues, V.[2]; Baumgartner, M.[3]; Galvez, B.[1]; Henninger, H.[2]; Martin, R.[2]; Matzen, E.[1]; McIntosh, N.[1]; Milliken, H.O.[1]; Palombo, M.[2]; Rugo, J.[4]

[1]NOAA Fisheries, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, Massachusetts, 02536, USA (Eric.Matzen@noaa.gov)
[2]Azura Consulting, LLC in support of NOAA Fisheries Northeast Fisheries Science Center, Garland, TX 75043, USA
[3]Woods Hole Oceanographic Institution, Woods Hole, MA 02131, USA
[4]Teledyne Benthos, North Falmouth, MA 02556, USA

Reliable gear location marking is crucial for operational awareness on fishing grounds by individual vessels and among fleets, enforcement, and fishery management. This has become a focus as on-demand fishing systems are increasingly adopted in experimental fisheries, serving as an alternative to traditional buoy lines in areas with vertical line restrictions. Without surface markers, gear position must be electronically recorded and shared with digital mapping tools. The Northeast Fisheries Science Center (NEFSC) Gear Research Team and partners have worked to evaluate and refine methods for locating gear deployed without surface buoys to better understand the marking locations in relation to measured positions of gear on the seafloor. Recent field efforts incorporated vessel-mounted ultra-short baseline directional ranging systems, depth measurements, and slant range observations collected in surveys around deployed gear. Through these field measurements, diagnostics were developed to assess positional accuracy and error sources. These methods enabled comparisons between surface marked GPS gear locations, subsurface reported locations, and known surveyed positions, helping to inform position expectations for effective on-demand fishery use.

Comparing three years of experimental fishery data

Amico, M.[1]; Artigues, V.[2]; Galvez, B.[1]; Henninger, H.[2]; Khan, C.[1]; Martin, R.[2]; Matzen, E.[1]; McIntosh, N.[1]; Milliken, H.O.[1]; Palombo, M.[2]

[1]NOAA Fisheries, Northeast Fisheries Science Center, Woods Hole, MA 02543, USA (neal.mcintosh@noaa.gov)
[2]Azura Consulting, LLC in support of NOAA Fisheries Northeast Fisheries Science Center, Garland, TX 75043, USA

The Northeast Fisheries Science Center (NEFSC) Gear Research Team collaborates with fishermen, gear manufacturers, and environmental organizations to develop effective, commercially viable alternatives to static vertical lines in fixed-gear fisheries. On-demand ("ropeless") fishing systems use acoustic and timed-release technology to eliminate persistent surface lines, reducing whale entanglement risk and enabling access to closed areas. To date, NMFS has trialed over 14,000 hauls in partnership with more than 50 fishermen. This technology has rapidly advanced in the Northeast U.S. as a promising tool to balance conservation and fishery access. In the three years of the Northeast experimental fishery, participants have successfully fished lobster trap trawls without surface buoys in areas restricted under the Atlantic Large Whale Take Reduction Plan. Because gear is not visually marked at the surface, the risk of conflict with mobile and other fixed gear increases. To mitigate this, the NEFSC team collaborated with mobile fleets, fixed-gear fishermen, and law enforcement to test digital gear marking and vessel monitoring system (VMS)-based geofencing tools. These innovations allow ocean users to detect and avoid gear locations in real time, enhancing both safety and accountability. Results demonstrate the feasibility of using on-demand gear in closed areas while protecting endangered whales. Long-term goals include improving access to this technology, increasing reliability, ensuring safety, and providing managers with accurate spatial data to support adaptive decision-making. This work highlights how emerging technologies can transform protected species conservation by enabling dynamic management strategies that protect marine life while supporting sustainable fishing practices.

Integrating fishermen's perspectives into on-demand gear research: Insights from over 14,000 hauls across the Northeast U.S.

Amico, M[1]; Artigues, V[2]; Galvez, B.[1]; Henninger, H.[2]; Khan, C.[1]; Martin, R.[2]; Matzen, E.[1]; McIntosh, N.[1]; Milliken, H.O.[1]; Palombo, M.[2]

[1]NOAA Fisheries, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, Massachusetts, 02536, USA (robert.j.martin@noaa.gov)

[2]*Azura Consulting, LLC in support of NOAA Fisheries Northeast Fisheries Science Center, Garland, TX 75043, USA*

Gear Research Team, in collaboration with more than 50 commercial fishermen, has conducted extensive field testing of on-demand (ropeless) fishing systems to support efforts to reduce whale entanglements while maintaining access to fixed-gear fisheries. This collaborative work has resulted in over 14,000 hauls of on-demand gear, representing one of the most robust datasets of its kind, and includes gear tested from 10 different manufacturers across a wide range of fishing areas and conditions from years 2020-2025. To complement the operational data, a structured questionnaire captured fishermen's perspectives (n=19 as of August 1, 2025) on gear usability, performance, preferences, and region-specific challenges in 2025. The responses reflect a diversity of experiences and highlight both common themes and key differences among systems and fishing contexts. Findings reveal how fishermen evaluate gear beyond technical performance, identifying operational constraints, safety concerns, and workflow impacts that influence adoption potential. Their feedback also provides insight into how gear functionality interacts with local environmental and fishery characteristics. Incorporating these perspectives has proven critical for interpreting gear performance data and for informing the development and refinement of on-demand systems. This work demonstrates the importance of integrating stakeholder experience into gear research and development to ensure that conservation-driven innovations are grounded in real-world feasibility. Doing so enhances the effectiveness, scalability, and acceptance of on-demand technologies in active fisheries and supports more inclusive and adaptive approaches to sustainable management.

Management update of on-demand gear in the U.S. South Atlantic black sea bass pot fishery

Barrows, K.[1]; Shervanick, K.[2]

[1]*Spatial Front Inc., Bethesda, MD, 20817, USA (katline.barrows@noaa.gov)*
[2]*Southeast Regional Office, National Marine Fisheries Service, St. Petersburg, FL 33701, USA (kara.shervanick@noaa.gov)*

In 2017, under the Snapper-Grouper Fishery Management Plan (Regulatory Amendment 16), the South Atlantic Fishery Management Council (SAFMC) implemented seasonal closures for the black sea bass pot fishery to reduce entanglement risk to North Atlantic right whales. Multiple exempted fishing permits (EFP) have been issued since 2020 to test the use of on-demand gear for the black sea bass pot fishery and feedback from black sea bass fishermen regarding the use of on-demand gear has been positive. Since then, the SAMFC has been working on multiple amendments (Regulatory Amendment 36 and Amendment 56) to facilitate the use of on-demand gear in the closures within the commercial sector of the pot fishery. Development of on-demand fishing in the South Atlantic black sea bass commercial pot fishery generally faces fewer challenges than other fisheries given the nature of the small fishery, the low likelihood of gear conflict, depth of fishing, and no surface marking requirements for gear. However, several factors related to fishery management uniquely complicate operationalization of on-demand gear in this fishery. This talk will present updates since the last Ropeless Consortium meeting and discuss hurdles that will need to be addressed prior to commercialization of on-demand gear in this fishery.

An open-source device to facilitate mobile fishers' real-time awareness of deployed on-demand fixed gear

Baumgartner, M.[1]

[1]*Biology department, Woods Hole Oceanographic Institution, Woods Hole, MA 02131, USA (mbaumgartner@whoi.edu)*

Mobile fishers need to know where on-demand fixed gear is deployed to avoid towing or dragging through the gear. A system was designed to sit in the wheelhouse of a mobile fishing vessel and display on-demand gear locations in real time within a fixed distance of the vessel on a software-based chart plotter. The system was dubbed "the blackbox" because it was designed to be a link between a cloud database and any vessel-based chart plotter that, in the future, is capable of receiving on-demand NMEA messages. Since these messages have not yet been standardized and codified by NMEA, the system currently passes NMEA-like messages to OpenCPN, an open-source software-based chart plotter. The blackbox consists of a python program that queries the EarthRanger cloud database on a regular interval for gear nearby the mobile fishing vessel using an at-sea real-time internet connection and an attached global positioning system (GPS) receiver. Nearby on-

demand singles and trawls are passed to OpenCPN for display using an OpenCPN plug-in originally developed and shared by Ropeless Systems, Inc. and modified slightly for the blackbox application. The python program and OpenCPN can be run simultaneously on any Linux/Unix-based systems, and are currently implemented on a Raspberry Pi with an attached ruggedized touchscreen display. The bill of materials for this blackbox is $271 (including Raspberry Pi, touchscreen, ruggedized case, GPS and power supply) and it can be easily assembled by anyone. The python code is open source, and it and the OpenCPN plug-in are freely available for anyone to use. Three units were supplied to NOAA's Northeast Fisheries Science Center's Gear Research Team for demonstration and evaluation by mobile fishers participating in on-demand trials.

Continued development of Fontus for gear location marking, gear retrieval, lost gear recovery and enforcement

Baumgartner, M.[1]

[1]*Biology Department, Woods Hole Oceanographic Institution, Woods Hole, MA 02131, USA (mbaumgartner@whoi.edu)*

Fontus is a comprehensive system that relies on open standards to enable gear location marking, lost gear recovery, gear retrieval and enforcement operations. It proposes functional hardware design and messaging protocols between three critical subsystems: (1) a shore-side cloud database and processing system, (2) a "central command unit" (CCU) on fishing vessels and (3) acoustic devices attached to the terminal ends of trawls on the sea floor. This presentation will describe progress on the development of Fontus since the last Ropeless Consortium meeting, including the finalization of the acoustic communication standard by the Fontus Working Group, the development of an open-source CCU to implement vessel-based Fontus functionality, and a prototype shore-side server and application programming interface (API) to implement Fontus cloud functionality. The server was developed in a manner that allows its constituent modules to be integrated into other cloud services, such as EarthRanger. These developments will enable in-water testing and evaluation of Fontus in the coming year.

Standardizing methods to evaluate the accuracy of localizing on-demand gear

Baumgartner, M.[1]

[1]*Biology Department, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA (mbaumgartner@whoi.edu)*

Knowing the location of on-demand gear is important for fishers wishing to retrieve their gear, other fishers hoping to avoid gear conflict, and enforcement who may wish to retrieve and inspect the gear. There are various approaches to estimating where on-demand gear is located, including surface GPS marking, acoustic ranging, and acoustic directional ranging. Each approach and even different implementations of the same approach will have different accuracies, and several groups are working to assess those accuracies to help understand how well any one approach can meet the needs of fishers and enforcement, particularly for minimizing gear conflict. This presentation proposes a standard well-known methodology for evaluating the accuracy of these localization approaches, and briefly describes a software tool that facilitates the application of this methodology. By standardizing these evaluations, results can be compared across the wide variety of environmental and operational conditions encountered in the various ongoing studies, and the pros and cons of any one approach can be more fully understood.

NEFMC Update on the On-Demand Working Group and progress on revising fishery management plans and regulatory requirements

Bodell, E.[1]

[1]*New England Fishery Management Council, 50 Water Street, Mill 2, Newburyport, MA 01950, USA (ebodell@nefmc.org)*

The New England Fishery Management Council (NEFMC, or Council) formed the On-Demand Fishing Gear Conflict Working Group (ODWG) in Spring 2023 to address concerns regarding gear conflict between on-demand fishing gear and other gears used in Council-managed fisheries. The ODWG has six terms of reference approved by the Council, with the overall goal of identifying strategies for reducing gear interactions between on-demand gear and other fisheries, including mobile, fixed-gear, and recreational fleets. Working group

membership includes New England and Mid-Atlantic Council members, representatives from the mobile, fixed (including trap/pot and gillnet), and recreational/charter fleets, and an NGO representative, along with staff from the Greater Atlantic Regional Fisheries Office (GARFO), Northeast Fisheries Science Center, and Atlantic States Marine Fisheries Commission. In December 2024, the Council prioritized the development of a joint action with the Mid-Atlantic Fishery Management Council and GARFO to consider allowing alternative surface gear-marking provisions for fixed gear fisheries in the Greater Atlantic Region. If approved, this action would allow for Council-managed fixed gear fisheries to use fixed gear without a persistent buoy line, and the National Marine Fisheries Service would consider extending regulatory changes to the Federal American lobster regulations through any resulting rulemaking. Council staff will provide an overview of ODWG work to date and an update on the alternative gear-marking framework.

Implementation of an on-demand gear grant program in Massachusetts

Burke, E.[1]; Chosid, D.[1]; Reilly B.[1]

[1]Massachusetts Division of Marine Fisheries, New Bedford, MA 02744, USA (Erin.Burke@state.ma.us)

The successful commercial implementation of on-demand fishing will require both fixed and mobile gear fishers to have equipment needed to use and/or visualize on-demand gear at sea. Trialing and experimental fishing with on-demand gear in New England has primarily relied on gear lending libraries, operated by government, research, or industry support organizations, to provide fishers access to this alternative technology. However, it requires significant resources to build and administer gear lending libraries, including ample funding, staffing, and storage space, which is not sustainable long-term. Implementation of on-demand fishing on a broader scale will likely require private ownership of on-demand gear by fishers who wish to access seasonal restricted areas closed to persistent vertical lines. The Massachusetts Division of Marine Fisheries has initiated an on-demand gear grant program for fixed and mobile gear fishers in Massachusetts using Consolidated Appropriations Act funding. The program provides reimbursements for equipment and services related to on-demand fishing, including direct purchase of on-demand gear, as well as equipment and services needed to interact with on-demand gear and visualize it on the seafloor. The goal of the program is to assist fishers in investing in on-demand fishing related equipment and to reduce the risks of gear conflicts when on-demand gear and mobile gear are operating in the same areas. This grant effort provides a next step for the industry to move towards strategic commercial usage of on-demand gear without on-going assistance from outside organizations.

2025 EFP testing of Sub Sea Sonics/Guardian ropeless gear – On-demand fishing goes wide-scale in a California trawl fishery

Chadwick, B.[1]; Halonen, R.[1]; Mullins, R.[2].; Sawicki, K.[3]

[1]Sub Sea Sonics, San Diego, CA 92107, USA (Bart.Chadwick@subseasonics.com) (Ryan.Halonen@subseasonics.com)
[2]Guardian Ropeless Systems, Guardian Ropeless Systems, Bellingham, WA 98248, USA (Russ@guardianropeless.com)
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This abstract summarizes the 2025 results from Experimental Fishing Permit EFPT2-001, which evaluated the Sub Sea Sonics/Guardian Ropeless on-demand fishing system in the California Dungeness crab fishery.

The system integrates Sub Sea Sonics AR4RT/AR4RT+ acoustic release units, ARI-U deck units with transducer, and Guardian Ropeless line handling systems, including Inshore Sleds, West Coast Sleds, and Trap-Top Retrofits. Interoperable gear marking was managed via the Trap Timer virtual gear marking app and the Ropeless Regulatory Portal. Backup recovery methods included second-end popups and grappling. Traps were deployed in strings of 10–50 traps each. Fishers purchased all of the gear themselves without government subsidy.

Twelve vessels from multiple California ports made 1,163 trawl sets between April 20 and July 13, 2025, with 25,721 total trap deployments. Deployment depths ranged from 24 to 392 feet, under wave heights of 1.4–12.7 feet and wind speed up to 27.2 knots.

The AR4RT/AR4RT+ units achieved a 98.7% success rate, and Guardian line handling systems achieved 99.7%. Overall, the on-demand system demonstrated a 98.4% success rate when used by

professional fishers in a full-scale fishery. Including the second-end backup recovery methods, reliability reached 100%. No strings were lost and only seven traps were lost, for a very low total gear loss rate of 0.2%.

Approximately 234,500 pounds of Dungeness crab were landed by the 12 participants with an estimated market value of $1.43 million. These results confirm that the Sub Sea Sonics/Guardian Ropeless system is a commercially viable, reliable, and effective whale-safe alternative to traditional vertical line gear.

The rmwHUB on-demand fishing interoperability system: Updates, integrations, enforcement portals and EFP trials

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On-demand fishing gear presents a challenge for interoperability and enforcement due to the lack of a persistent surface buoy. In the absence of surface buoys, so called "virtual gear marking" has been developed to allow for fishers, and other ocean users avoid gear conflicts and for enforcement to carry out their regulatory requirements. In 2021, the Ropeless Manufacturers Workgroup (RMW) initiated the development of an interoperability system called the rmwHUB. The rmwHUB is a shared cloud service that allows RMW member manufacturers to share data that is structured specifically for on-demand fishing gear. Each on-demand fishing gear manufacturer provides their own gear marking system to track their gear with an associated data store. Rules established for the rmwHUB determine which data (required and optional) the manufacturer shares with the rmwHUB. In return, they receive rule-specified data from other manufacturers to help eliminate gear interactions. Data sharing occurs through simple API calls and synchronization is managed through a "when updated" scheme. In its first phase, the system allowed for the sharing of anonymous position data across manufactures to avoid gear conflicts. This phase one system has been operational since 2022 and used in gear trials around the world. In follow-on phases starting in 2024, we have (1) developed a Hub-to-Hub integration with the Earth Ranger interoperability system, expanded the data fields in the rmwHUB to support enforcement requirements, initiated an initial enforcement integrations with the California Dungeness Crab enforcement portal and the multi-manufacturer deck box project, and successfully exercised the system in an intensive EFP with multiple manufacturers, fisheries, and mobile gear users on the West Coast of the US. In this presentation, we will describe the unique structure of the system, the updates that have been completed to support integrations, and the application of the system during a recent intensive full-scale fishing EFP.

Discussing market challenges for seafood caught with on-demand gear

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Due to the risk of entanglement that traditional trap/pot fishing gear poses to marine wildlife, particularly the critically endangered North Atlantic right whale (NARW), lobster and crab fisheries are currently vulnerable to reduced market access or growth. Many companies that buy and sell seafood have sustainability commitments and because of the NARW's U.S. Potential Biological Removal rate of less than one animal and Canada's Species at Risk Act, these fisheries do not meet these sustainability commitments. However, fishers using ropeless or on-demand gear borrowed from gear lending facilities, or that they have purchased on their own, have successfully harvested lobster and crab with this gear for the last few years. Despite these efforts, there has been no differentiation in the marketplace from products caught with traditional gear due, in part, to the inability to trace the product through the supply chain, grading of lobster for different markets, and the low volume of product. To begin to scope possible solutions to these challenges and other concerns, individuals from the seafood supply chain participated in a workshop in September 2025. They heard from scientists and fishers about the latest NARW information available, the use of innovative gear, and participated in an open discussion regarding challenges faced by the supply chain. Roundtable discussions included support for sustainability efforts, the significance of NARW bycatch, and

bringing product caught with on-demand gear and other gear modifications to market. Additionally, the workshop provided an opportunity for seafood suppliers to connect with experts working to implement solutions-based incentives and included a tour of the Northeast Fisheries Science Center (NEFSC) Gear Lending Library in Woods Hole, MA as well as a vessel-based demonstration of on-demand fishing technology. Potential future outcomes from the workshop may include a publicly available online tool to help stakeholders make informed decisions about where to fish, or where and when to target wholesale seafood purchasing.

Functional trawl densities using on-demand gear

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Gear conflicts are a major concern in the implementation of on-demand fishing scenarios. Both fixed and mobile gear fishers currently minimize gear conflicts using visual cues from surface buoys attached to standard, fixed-gear. On-demand gear relies on virtual marking in place of buoys and these marking locations are usually derived from surface global position systems. The accuracy of virtual surface markings compared to the actual gears' locations on the seafloor depends on depth, tides, currents, and operator practices, and is not aided by the information from surface buoys. For this reason, on-demand gear trawls may require greater distances between neighboring trawls to avoid gear conflicts than standard trawls. In 2024 and 2025, the Massachusetts Division of Marine Fisheries conducted a study to identify the minimum functional distance to fish on-demand trawls without gear conflicts in order to assess the impacts to industry with regards to gear density and proximity. We worked with three lobster vessels to conduct trials in Buzzards Bay, MA, setting five parallel on-demand trawls using Edgetech 5112 on-demand gear at 100, 50, and 35 ft spacings. The site selected provided protection from high winds, flat and featureless bottom, relatively shallow depths, low chances of gear conflicts from other fishing industry members, and ease of access. Each vessel repeated trials per nominal trawl spacing. Preliminary results show that the most gear conflict events occurred for the 35 ft spacing trials. Vessels also demonstrated quick improvements setting and retrieving on-demand trawls, minimizing conflicts over time. Analyses are on-going, along with qualitative assessments of gear and vessels' performances. Future work may investigate more complex bottom and/or deeper depths to coincide with fishing conditions and areas more similar to those used by fishers.

An open source and affordable wideband Acoustic communication modem for on-demand fishing

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The high cost and technical complexity of acoustic modems have limited the adoption of wideband on-demand fishing systems. Some existing solutions use tone-based signaling approaches; however, these systems often face constraints in security, interference rejection, and flexibility. As efforts grow to reduce entanglements of the endangered North Atlantic Right Whale, the need for effective on-demand communications is critical. The solution must meet both conservation goals and the practical needs of lobster fishermen.

In response, delResearch LLC presents an open source trap-side acoustic communication modem designed to address these constraints, while maintaining an accessible cost structure. Named WhisperTrack, this modem supports wideband signaling with built-in forward error correction, error detection, and message authentication. These capabilities enable reliable and secure trap-vessel communication, even in acoustically challenging or high-traffic environments.

WhisperTrack modems support the emerging FONTUS open standard for on-demand fishing communication. FONTUS defines a shared protocol for trap retrieval, gear location marking, and cloud integration. Power consumption is minimized to enable long-duration deployments using compact battery packs. The trap-side modem satisfies these capabilities with a bill of materials under $200, ensuring economic viability. Furthermore, all trap-side hardware schematics, firmware, and documentation are open source. The software build process is containerized to facilitate testing, integration, and deployment in varied development environments.

Our hope is that this open source, comprehensive design for an on-demand fishing modem will accelerate the adoption of wideband acoustic signaling in the commercial fishing industry. By offering a fully documented and interoperable modem, we aim to support a broader shift towards on-demand systems that are effective, scalable, and accessible, ultimately contributing to sustainable fisheries and long-term marine conservation.

Insights from the Maine Innovative Gear Library

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The Maine Innovative Gear Library (MIGL), led by the Maine Department of Marine Resources is an initiative supporting the collaborative data-collection of on-demand gear performance with Maine fixed gear fishermen. The MIGL provides Maine fixed-gear fishermen with hands-on access to a range of on-demand technologies. Now in its second year of data collection, the MIGL has collected data from 27 lobster fishermen across Maine's coast, with over 1,500 hauls conducted using various on-demand acoustic systems including Sub Sea Sonics/Guardian, Edgetech, Ashored, SMELTS (Edgetech and Teledyne), Ropeless Systems and the recently acquired Devocean gear.

This presentation will provide an update on MIGL's operations and outcomes over the past year, highlighting participation trends, gear performance, training effectiveness, and regional variability in engagement. Key points will include differences in system preferences, participation of inshore and offshore users, the importance of real-time support and follow-up training, and testing challenges such as gear conflict avoidance.
The update will also explore the program's outreach successes and challenges under the NFWF grant, including public demonstration days, small dock sessions, and educational partnerships. These engagement strategies have helped build trust, expand understanding, and foster dialogue among stakeholders, but hurdles still exist. Lessons learned, such as the need for tailored gear configurations and consistent data collection will be discussed alongside feedback from participants that continues to shape future iterations of the program.

Looking ahead, MIGL plans to expand to 50 fishers by 2026 with a focus on the offshore fishery and hopes to incorporate additional gear testing with Maine gillnet fishermen.

Evaluating the localization accuracy of gear location marking strategies for high density fisheries in Atlantic Canada

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As of 2025, robust strategies for gear location marking of high density fixed-gear fisheries remains an obstacle to the widespread adoption of on-demand fishing gear. In areas where GPS surface marking may be a suitable option, measuring the difference between the surface marked position and true on bottom position will inform gear density limitations when fishing with this marking strategy. In areas where GPS surface marking does not provide suitable real-time, on-bottom accuracy to minimize gear overlay, acoustic localization may be required. To assess the performance and suitability of emerging acoustic localization technologies, the Canadian Wildlife Federation has piloted a method for trialing these systems on commercial fishing vessels with harvester partners. In 2024 and 2025, CWF assessed underwater gear drift in several lobster fishing areas (LFA 23, 33, 34, and 36) and CFA 19. Preliminary trials were also conducted in 2024 and 2025 to assess the accuracy of alternative gear location marking strategies including two directional acoustic ranging systems (Teledyne's TrackIt system and Ropeless System's Single Ping Positioning) and EdgeTech's CAPRI. Trials assessed the accuracy of GPS surface

marking and subsurface positioning by comparing reported on-demand gear location to the results of an acoustic ranging survey. Environmental factors affecting gear drift including current, tide, and set direction, were recorded and considered during data analysis. Objectives included improving methods to validate on-bottom position, improving GPS accuracy, and establishing a consistent methodology across groups testing this technology.

One-way acoustics for grapple-based ropeless fishing

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An increasingly urgent need in light of lobster fishery closures is a lower-cost, easy to deploy solution to lobster fishing without vertical lines in the ocean. One potential method to significantly reduce cost and complexity in shallow-water environments is to use one-way acoustics to provide the fisherman with an accurate location for grappling gear. Acbotics Research, working with the Lobster Foundation of Massachusetts as a part of a National Fish and Wildlife Foundation (NFWF) project "Grappling with Technology", has developed a one-way travel ultra-short baseline (USBL) approach to providing own gear localization solution while reducing gear conflict in the absence of surface expression in coastal waters. In this Grappling approach, 2 or more low-cost, programmable pingers are attached to each lobster trap line. The pingers transmit every 5-10 s with a locating ping plus an encoded message that includes fishing and pinger id. A pole-mount and deckbox system on the fishing boat detects, localizes, and decodes the pinger signal at ranges up to 250-500 m depending on water depth. The fishing id lets fishermen re-locate their own gear for accurate grappling; other fishing ids provide information to reduce gear conflict. An initial prototype was developed in spring to summer of 2025, targeting low-cost pinger design and reliable over-the-side localization technology with promising results. The prototype and results from initial field trials will be presented, along with plans for additional 2025-2026 engineering trials and for demonstrating the technology on additional vessels [Work Funded by NFWF].

Data governance for on-demand fishing

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After the 2024 Ropeless Consortium meeting, a working group was formed to consider issues around governance for on-demand data. The working group was comprised of people from non-governmental organizations who have been working to advance, develop, test and evaluate on-demand fishing methods since 2017, and the group consulted with subject matter experts to explore potential models of data governance. The resulting report contemplates how on-demand data could be delivered, stored, accessed and shared for the purposes of minimizing gear conflict and enabling enforcement, and who could provide these services (e.g., government or private entities) given a variety of legal, technical and security challenges and constraints. The working group produced recommendations that offer a path forward for regulatory authorities, such as NOAA Fisheries, Fisheries and Oceans Canada, and U.S. states, to manage fishers' data and data access procedures for permitted on-demand fishing in their jurisdictions. These recommendations are summarized as follows:

- On-demand fishing data should be housed outside of government by an independent cloud service provider
- A single centralized cloud database should be used to accept, store and disseminate gear location data for all of North America
- On-demand data collected at sea should be transmitted directly from the vessel to the centralized cloud database, and it should be available for access by enforcement and other nearby fishers in real time
- Data sharing should be mandatory and a condition of the permit to fish on-demand gear

- Rules for data access by fishers and enforcement should be determined by appropriate regulatory authorities for their jurisdictions
- Each regulatory authority should have an administrator who is responsible for verifying and registering fishers in the system
- Regulatory authorities should be responsible for bearing the costs of the cloud service

Advancing on-demand fishing gear: chart plotter integration, automatic gear marking, and data standardization

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Following over five years of dedicated research and development, the Northeast Fisheries Science Center (NEFSC) Gear Research Team has collaborated with New England fishermen to rigorously test on-demand fishing gear. Our comprehensive data collection, encompassing more than 14,000 hauls, reveals a success rate nearing 90%. This evidence underscores the increasing reliability of this technology throughout its developmental trajectory (years 2019-2025).

Nevertheless, the advancement of associated on-demand technologies remains imperative to facilitate successful commercialization. Key areas requiring improvement include the chart plotter integration of data, automatic gear marking, and data standardization. To address these needs, we are proactively engaging with prominent software-based chart plotting companies to enable the seamless display of on-demand location data on their platforms. Furthermore, we are working in conjunction with marine technology companies to evaluate the feasibility of employing Bluetooth technology for the automatic marking of gear during setting and hauling operations. Concurrently, we are fostering collaboration with the on-demand fishing community to establish standardized data protocols, a critical prerequisite for commercialization. Through these strategic partnerships and continuous testing with the fishing industry, we are advancing this technology to emerge as a viable solution in the Northeast region and beyond.

National Fish and Wildlife Foundation project update: Adaptive, economically viable on-Demand fishing systems as an alternative to time-area closures in New England trap fisheries

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Sub Sea Sonics, Guardian Ropeless Systems and Sustainable Seas Technology are approaching the halfway point of a three-year project aimed to develop and refine acoustic on-demand fishing systems and their implementation to allow an economically viable alternative to time-area closures. Working with early adopter fishing partners and alongside collaborators from the Northeast Fisheries Science Center, Massachusetts Department of Marine Fisheries, and Maine Department of Marine Resources, we have made significant progress toward project milestones in gear refinement, virtual gear marking, enforcement capabilities, training, outreach, and scalability.

A major technical highlight was the redesign of the AR4RT unit, now released as the AR4RT+, featuring two-way underwater communication, enhanced battery life, and improved durability. Other acoustic gear innovations include the DAR4RT deepwater units and a multifunction deck box.
Guardian Ropeless Systems refined the inshore sled and line handling systems with user feedback following thousands of gear cycles. Other developments include trap integrated line handling and improved deepwater system designs

Virtual gear marking systems were improved through app enhancements, launching of public and regulator roles, ping response verification, and development toward a chart plotter integration. Interoperability was advanced with a regulatory portal and contributions toward the rmwHub and Earth Ranger integration.

Field testing expanded, with over 40 fishers across New England actively using on-demand fishing systems, and more than 2,000 gear deployments. New England fishers have begun purchasing on-demand gear with support from DMF grant funds. Ownership and fisher driven adoption has led toward hardware and operational adaptations to further demonstrate economic viability.
Community feedback was gathered via surveys, partner collaborations and on-site knowledge exchanges. That feedback, along with targeted outreach strategy in Maine and Massachusetts, has increased fisher exposure, focused gear refinements, and led to increased uptake and engagement in those waterfronts.

Research to reality: Steps towards providing fishermen an option to use on-demand fishing systems in Greater Atlantic Region federal fisheries

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NOAA Fisheries Greater Atlantic Region is working concurrently in six task areas to make on-demand gear a reality for fishermen who want to pursue fishing opportunities when and where persistent buoy line usage is restricted. We are working with interested partners to explore these focus areas: expanding gear research; modifying regulations; establishing gear performance standards; developing governance, data sharing, and privacy policies; developing enforcement practices, and approving on-demand systems. In 2025, an On-Demand Gear Guide and website was published that detailed these efforts and built on the foundation established by the Ropeless Roadmap. Here we will provide status updates on current work to address the technology, data management, and regulatory tasks outlined in the Gear Guide, including, but not limited to, a proposal for functional data specifications for on-demand systems and a gear marking regulatory action that could establish alternative surface marking provisions for fixed-gear fisheries in the Greater Atlantic Region. Data specifications are crucial for ensuring interoperability and reliable communication between different on-demand systems. The New England and Mid-Atlantic Fishery Management Councils, in coordination with the Atlantic States Marine Fisheries Commission, are considering a proposed regulatory modification that would allow fixed gear without persistent buoy lines if functionally equivalent gear marking options are later approved.

Advancing reliability and longevity of buoyancy-based ropeless gear through field-driven redesign

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Over the past year, the LiftLabs team has focused on improving the durability and long-term performance of its buoyancy-based ropeless fishing system, the EchoLift. Supported by NOAA's 2024 BREP program, this effort centers on redesigning components to better withstand repeated use in harsh ocean conditions, with a goal of achieving a 10-year service life. The project also includes refining the user experience to reduce reset time and increase confidence in gear performance.

Fifteen updated Lift units are currently being tested in collaboration with fishers and research partners including the Northeast Fisheries Science Center. These ocean trials are evaluating hardware improvements, ease of use, and long-term reliability under real-world fishing conditions. Lessons learned from these trials are feeding directly into ongoing design iterations.

As with all LiftLabs work, this effort is grounded in direct collaboration with fishermen and informed by their operational needs. By focusing on reliability and longevity, the project aims to reduce maintenance burden, improve usability, and accelerate adoption of ropeless gear in fixed-gear fisheries.

Deployment of a low-cost, Iridium-based solution for interoperability of on-demand gear

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A key factor of interoperability for on-demand gear use is the need for gear location awareness, requiring knowledge of gear positions within a certain range of a vessel that is nearby. Gear awareness can also help in the avoidance of gear conflict, which can damage gear and result in significant losses. While cloud database systems offer access to gear positions for vessels with internet connectivity, many boats lack reliable, affordable onboard internet service or don't need it for their standard fishing operations. In addition, many fishers want to use their existing GPS chart plotters to display gear positions.
The PlotterLink (PL) has been developed as a low-cost, versatile means of displaying on-demand gear locations on a wide range of navigation systems without the need for acoustics or internet connectivity. The PL is a vessel-mounted transceiver that accesses cloud-based Earth Ranger data of on-demand gear positions within 5nm of the boat via an Iridium link. Data transmissions are optimized to cost significantly less than internet providers. Gear positions are displayed on onboard navigation systems, including TIMEZERO, Olex, P-Sea WindPlot, Garmin, and Raymarine. While a user's own gear is identifiable on their display, all other gear is anonymized. This past year, PL systems have been deployed on 6 lobster vessels and 2 mobile gear vessels operating off the coast of MA, enabling viewing of on-demand gear on their preferred chart plotter, with additional harvesters scheduled to participate. Results from the first year of deployment are presented, providing insight into the number of times vessels have fished within proximity to submerged on-demand gear and the amount and cost of data transmitted per vessel. Chart plotter screenshots indicate the harvesters' perspectives of gear awareness on the water, demonstrating the ability of the PL to provide an affordable and effective means of on-demand gear interoperability.

Embedding scientific protocols in commercial fishing operations: Lessons from fisher-led trials of on-demand gear in the Gulf of St. Lawrence

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Effective mitigation of North Atlantic right whale entanglement in fixed-gear fisheries requires operationally viable ropeless solutions, supported by rigorous field validation. In the Gulf of St. Lawrence, a standardized experimental protocol is being implemented to assess four on-demand buoy systems (Ashored, EdgeTech, LBB7, DevOcean) under real commercial snow crab fishing conditions (100–250 m depth, variable substrate, dynamic weather), in one of Canada's most intensive snow crab fisheries (Crab Fishing Area 12). The protocol was co-developed with harvesters to embed structured testing within regular operations, while minimizing disruption to workflow and safety. It includes standardized metrics on system deployment and retrieval, failure modes, gear compatibility, and soak duration, combined with environmental metadata. A mobile application is used to facilitate onboard data entry, enabling rapid reporting of technical issues directly to developers. In 2025, testing capacity was expanded to include additional units of LBB7 and DevOcean, with trials occurring across multiple vessels. A central objective is to capture fisher-driven feedback in near real time, creating a structured, iterative loop between end-users and technology providers. This approach aims to accelerate system improvements and increase user confidence in on-demand technologies.
Methodologically, this work raises critical questions about data fidelity, inter-operator consistency, and the granularity of reporting that can be sustained in commercial contexts. Yet preliminary implementation demonstrates that such a model is feasible, scalable, and capable of generating rich operational insights. Positioning fishers as active evaluators—not just adopters—strengthens the technical relevance of performance data and fosters shared ownership of entanglement mitigation strategies. Ultimately, this protocol aims to support the emergence of efficient, trusted, and rapidly deployable ropeless solutions that are compatible with both commercial viability and whale conservation goals.

Where is "there"? Assessing geolocation performance between surface buoys, GPS marks, and acoustic positioning systems from the perspective of a fisherman

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The removal of vertical lines associated with traditional lobster fishing gear from the water column is one approach to reducing entanglement risk for the endangered North Atlantic right whale. Replacing persistent vertical lines with on-demand retrieval systems requires alternative gear marking methods to communicate gear location for retrieval, mitigate gear conflicts, and enforce regulations. In place of a surface buoy, acoustic geolocation technology calculates the location by using sound to communicate between a vessel at the surface and gear on the seafloor, while GPS marking relies on the operator or an automated system to identify surface deployment locations. Both types of calculated positions are projected onto a digital map or chart display for navigational reference. Through funding from Sea Grant's American Lobster Program, the Maine Department of Marine Resources (DMR) is conducting trials aboard commercial fishing vessels to compare geolocation performance between traditional surface buoys, GPS plotter marks, and acoustic positioning methods. Vessel operators created GPS marks on their chart displays when they deployed gear equipped with both a surface tracking unit on its buoy and an acoustic tag on the gear itself. Operators then conducted directed search patterns around the target locations, using bidirectional ranging systems for acoustic positioning: Advanced Navigation's SubSonus & Teledyne Benthos' DAT/TrackIt. Data collected are used to assess the accuracy and precision of each marking method. This presentation will describe the methodology used to collect gear location data and summarize initial findings through visual and descriptive analyses. Defining key functional differences between gear marking methods will help inform both future implementation approaches by management and integration decisions by industry members.

Challenges in platform integration of a cloud based integrated web and mobile platform for tracking on-demand fishing gear

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As on-demand (ropeless) fishing gains traction as a solution to reduce whale entanglements, the need for integrated platforms that connect gear manufacturers, fishermen, and regulators has become increasingly urgent. With partnership from RMWHub, EdgeTech, SMELTS, Blue Ocean Gear and other manufacturers, the EarthRanger team has developed and deployed a cloud-based web and mobile platform to support tracking and coordination of on-demand gear. Through ongoing integration efforts, we have encountered a range of challenges that highlight the complexity of connecting diverse systems and user workflows. Key issues include edge cases in how different manufacturers define gear deployment and retrieval, discrepancies in data formats and timestamp conventions, and differences in how gear IDs and device metadata are managed. With many different and valid reasons behind the differences, these gaps show the need for shared rules and validation logic to ensure accurate, reliable data across platforms. This presentation will share lessons learned from these real-world integration efforts. We will also provide an update on the current capabilities of the EarthRanger platform and discuss possible ideas around standardization, and broader ecosystem collaboration.

SMELTS Development of Interoperable Multi Function Display and Automatic Gear Marking

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On-Demand fishing in commercial use continues to grow around the world with the intention to reduce vertical lines and surface buoys. Entanglement in persistent endlines continues to be one of the largest

threats to the critically endangered North Atlantic right whale and other marine species.
SMELTS has invented a lineless on-demand technology that uses a wire cage trap that houses a compressed air cylinder that is capped by an acoustic valve. An acoustic signal is sent to the seafloor and opens a valve to release compressed air into a buoyancy bladder that raises fishing gear to surface without the use of a line.

Removing the surface buoy which marks fishing gear has presented a challenging problem to the development of lineless/on-demand fishing. SMELTS and Teledyne have developed automatic acoustic gear marking that provides location of gear on seafloor and marks are populated on Raymarine Multi Function Display. SMELTS packages multiple acoustic platforms and currently the Raymarine Multi Function Display can mark and recover Teledyne and EdgeTech acoustics.

SMELTS working with Samsara and Teems Fish have developed an automatic GPS surface marking technology that uses powered Bluetooth tags or passive Radio Frequency Identification Tags (RFID) that are installed in fishing gear. When the Bluetooth tag enters water it loses connection and automatically marks location of connection loss.
RFID tags pass over a scanner at the stern of the vessel automatically marking set location and when gear returns to vessel gear passes over scanner at hauling station removing gear from the fishery.
SMELTS will present on its ongoing development of its seafloor lifting engines and marking of on-demand gear with new technology for shipboard control.

Update on an interoperable chart plotter and deckbox for on-demand gear marking

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The chart plotter is an integral part of the bridge on any fishing vessel. An interoperable, clean interface for on-demand gear is essential for its adoption. Over the past two years, Teledyne Benthos with partners Raymarine, Sea Mammal Education Learning Technology Society (SMELTS), and EdgeTech, have been developing and testing an interoperable chart plotter based shipboard system. The system consists of a Raymarine chart plotter, deck box, and in-hull or pole mounted transducer. For accurate gear marking on the seafloor the system measures both range and bearing to the trap using the Teledyne DAT (Directional Acoustic Transponder) coupled with a GPS and heading sensor.

Since the last Ropeless Consortium meeting both the deck box and the in-hull transducer have been designed, assembled, and installed on the Ocean Researcher and the F/V Resolve. The deck box, affectionately named the blue lobster box, wires directly to the 12 V battery system on a fishing vessel. It includes the electronics to acoustically interrogate through the in-hull transducer to traps and receive messages back measuring the range and bearing to gear. A speaker is also included for the fishermen to listen to communication.

The chart plotter is now able to set and haul both Teledyne and EdgeTech acoustic traps. The EdgeTech acoustic protocol was implemented in the DAT including the status and release commands. A detector was added on one of the EdgeTech tones to measure bearing allowing the chart plotter to better define the resting position on the seafloor. Operationally the chart plotter trap database can now associate two traps at the ends of a trawl and is connected to the cloud. Weekly testing by SMELTS has led to many improvements including naming conventions and simplified commanding with the goal of easy, intuitive operation.

Successful testing of on-demand gear in a California deep-water trap fishery

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[5]Marine Innovations Gear Alliance, https://www.migalliance.org/.

The experimental brown box crab and California king crab fishery in southern California is unique in that it is required by the state of California to use entirely

on-demand (or "pop-up") gear to prevent introducing additional entanglement risk to endangered and threatened populations of whales. During the 2024-2025 testing period, three participating vessels tested the feasibility of on-demand gear for the commercial harvest of brown box crab (*Lopholithodes foraminatus*) and California king crab (*Paralithodes californienis*), marking the first structured evaluation of such gear in deep-water trap fisheries along the California coast. The performance of different gear configurations was tested over a total of 360 gear deployments completed across 57 trips. Performance was assessed based on retrieval success, gear loss, and operability under diverse at-sea conditions. Gear designs were iteratively improved throughout the season in collaboration with technology developers and fishers. At the end of the testing period, the acoustic retrieval rate was 98 percent, and the gear loss rate was 1.52 percent. The project also incorporated a multi-platform electronic monitoring system, including ZebraTech data loggers, SPOT Trace satellite tracking, and the Sub Sea Sonics Trap Timer application. While each tool exhibited strength, their combined use helped improve compliance visibility, gear tracking, and recovery support. Background platforms such as rmwHUB and GearVault ensured cross-platform interoperability and supported long-term regulatory integration. Insights were also gained into the realities of onboarding new and emerging fishers, the challenges and potential of succession planning in the fishery, and the importance of the meaningful participation of both seasoned and new operators. Overall, the project successfully demonstrated that on-demand gear can operate safely, effectively, and economically in California's deep-water trap fisheries. The knowledge and infrastructure established during the testing period lays the groundwork for expanded participation, improved enforcement integration, and long-term conservation gains.

Advancing ropeless fishing gear in the California coonstripe shrimp fishery

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The California commercial coonstripe shrimp (*Pandalus danae*) fishery uses strings of traps with a vertical line connected to a surface buoy at each end. In the context of more frequent fishery closures in other economically important ocean fisheries such as Dungeness crab and salmon, there is now an increase in coonstripe shrimp fishery participants. Yet the fishery remains relatively small, with 96,000 to 140,000 lbs of landings to California ports from 2020 to 2024. It is generally considered sustainable for the target species and has minimal bycatch mortality. The fishery, however, overlaps with foraging grounds for threatened and endangered humpback whale populations and was involved in three confirmed humpback whale entanglements in the last two years. As a result, California fishery managers are now considering new regulations to limit the use of vertical lines and prevent whale entanglements in this fishery. Given the similarity to ropeless gear configurations being tested in the California Dungeness crab fishery, some coonstripe shrimp fishermen are exploring the use of ropeless gear as a profitable means for harvesting shrimp while avoiding whale entanglements. Current regulations require the use of a surface buoy and vertical line at one end of the string but do not prohibit fishers from using ropeless gear at the other end. In 2024 and 2025, fishermen deployed Sub Sea Sonics / Guardian Ropeless Systems gear at one end of their string, gathered reliability data, and began using interoperable virtual gear marking applications. Concurrently, conservation organizations and fishermen are working with fishery managers to revise regulations to allow for the voluntary use of ropeless gear in the coonstripe shrimp fishery alongside conventional gear. If successful, this effort could result in the first U.S. West Coast fishery to allow for fully ropeless gear throughout the entire fishing season beginning in 2026.

2025 Updates to CanFISH Program

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From 2019 through 2025, the Canadian Wildlife Federation (CWF) has followed an evidence-based framework to evaluate on-demand gear (ODG) through at-sea trials in partnership with lobster and snow crab harvesters across the Maritimes. These trials are conducted outside of commercial fishing seasons and over 1,700 deployments have been done with 22 commercial harvester partners. The results of

these trials determine the suitability of ODG for the CanFish Gear Lending Program. Since 2022, this program has supported harvesters affected by fishery closures during their seasons in Atlantic Canada when North Atlantic Right whales are present. This year, CWF has taken steps to support harvester use of ODG in-season and in open areas, with over 2,500 lbs of lobster being caught with ODG. CWF has also expanded the Marine Team Programs to the Western coast of Canada, partnering with Fisheries and Oceans Canada, commercial prawn and crab harvesters, and the Tla'amin Nation Guardian Watchmen Team, where a total of 116 deployments were done.

EdgeTech Ropeless 5112 On Demand Fishing System, Trap Tracker updates for 2025

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This paper will describe new features and additions to the Trap Tracker application, focusing on four new features: community localization (CAPRI), man overboard button, proximity alarm, and the addition of two trap trawl configurations.

Community localization (CAPRI), enhances underwater trap location accuracy in densely fished areas. Whenever a deployed unit is within range of a vessel running community localization it will respond with its unique ID and range, updating trap locations in real time. When three valid data sets are received, positions are updated in the cloud. Owners of the underwater unit will be notified via e-mail if their unit moved more than 1 mile. The man overboard button was developed to improve crew safety in the case of an emergency. When activated, Trap Tracker will send the release command to the last set trap, causing the 5112 On Demand System to release its float cover to the surface. Serving as a recovery point for a potential man overboard situation. The proximity alarm is designed to alert lobster and mobile fishers when they are approaching on demand fishing gear within a certain radius. This feature helps prevent gear entanglement and promotes safe navigation in areas where multiple fisheries operate in close proximity. By providing timely warnings, it enables mobile fishers to avoid conflicts with on-demand gear efficiently and safely. Trap Tracker now supports two trap trawl configurations, allowing users to set a 5112 On Demand System at both the start and end of their trawl. This provides fishers with a clear view of their gear layout and allows for the retrieval of the trawl at either end. This development adds a layer of redundancy, if one on-demand system fails or can't be safely retrieved due to sea conditions, the opposite end provides a backup for trawl recovery. The new features enhance crew safety, reduce gear conflict, and improve efficiency in using on-demand fishing gear.

NMEA committee for on-demand message standards, progress report

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Control and, more importantly, location marking for fishing gear on Chart Plotters (CPs) and Multi-Function Displays (MFDs) have been identified as needs for fishers who own/operate on-demand equipment. Location marking is also critical for other types of fishers, operating within the same areas, to address gear conflict. Most CP and MFD manufacturers adhere to standard bus architectures and protocols developed and defined by the National Marine Electronics Association (NMEA). Creating a technological path for CPs and MFDs to support integration with on-demand gear and mark gear locations can be done by establishing standard messages for the buses (NMEA 2000, 0183...) that are already adopted by industry. Following the 2024 Ropeless Consortium meeting, a committee was formed to develop NMEA standard messages in support of the needs particular to on-demand gear. Initial efforts focused on on-vessel communications. Three NMEA 2000 message proposals, or Parameter Group Numbers(PGNs), were developed to capture the sets of data relevant to this application. These include: enabling command and control, detailed status reporting of on-demand releases, and the marking of surface gear, sub-surface gear, trawls, and other hazards. The three proposed PGNs will be presented, along with a discussion of their capabilities and the rationale behind the formation of each.

Operational and economic assessment of Ropeless RISER™ use in the box crab fishery in California

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Commercial fishing operations conducted from May 2024 through April 2025 targeting brown box crab (*Lopholithodes foraminatus*) and California king crab (*Paralithodes Californienis*) utilizing the Ropeless RISER™ MTA airbag recovery, on-demand fishing system will be summarized. Details of activity (locations, number of trips, number of gear deployments and recoveries) and an operational assessment of system performance (utility, reliability, efficacy, and efficiency) will be provided. Additionally, an overview of the unique manufacturer-fisherman financial structure employed to allow gear utilization within the commercial fishing operations will be presented and its opportunity for duplication in other fisheries discussed.

Advancing pop-up gear testing in California fixed gear fisheries: Progress and insights from collaborative trials

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In response to an increase in whale entanglements in fishing gear along the U.S. West Coast, the National Marine Sanctuary Foundation has partnered with commercial fishermen to test and advance the development of innovative pop-up gear technologies aimed at reducing entanglement risk in California fixed gear fisheries. Through collaboration with fishermen, gear manufacturers, and resource management agencies, the project supports hands-on training and real-world trials to assess the performance, reliability, and usability of a range of pop-up systems. To date, participating fishermen have completed over 870 trials using five different systems.

Since the last Ropeless Consortium meeting in 2024, the project has continued to grow and expand its reach, including the launch of a gear lending library to lower financial barriers and broaden access to testing opportunities for fishermen. This presentation will provide an update on recent progress and share preliminary results from experimental fishing permit trials, including system performance, retrieval success rates, and fishermen feedback. Insights from this ongoing work are helping to demonstrate the benefits of pop-up gear, support voluntary adoption, and inform regulatory efforts to reduce the impacts of fishery closures.