

# On-Demand Fishing – A Status Report to the Ropeless Consortium

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## Overview

Entanglement in fishing lines, particularly those from static surface buoys to bottom gear is a major source of morbidity and mortality for large whales, especially the critically endangered North Atlantic right whale. On-Demand technology bypasses the need to mark bottom gear with static vertical lines, by using acoustic release systems. While the benefits of these systems have been touted by researchers and conservationists, the fishing industry has raised legitimate concerns with performance, reliability, safety and cost. We have been conducting an On-Demand gear fishing trial with the New England lobster fishery coordinated by CLF, WDC, NEFSC and IFAW. Through open and honest dialogue, a small group of conservationists, researchers, engineers, and lobstermen designed an experiment to trial acoustic release systems in the New England offshore lobster fishery in 2020 and 2021. This pilot study has demonstrated that trust and firm commitments to gaining a better scientific understanding of the feasibility of this gear in the offshore fishery can highlight common goals and bring diverse stakeholders together in unexpected ways. We have worked with seventeen captains and their crews in nearshore and offshore waters and 60 to 900 ft. Trawl lengths range from 10 to 45 traps per trawl. Fishermen's input has led to significant improvements in gear design as well as providing valuable data on gear effectiveness. The goal of On-Demand systems enabling fisheries to operate in areas closed to the use of vertical line for whale conservation is becoming a reality with lobster and snow crabs being sold that was caught with On-Demand retrieval.

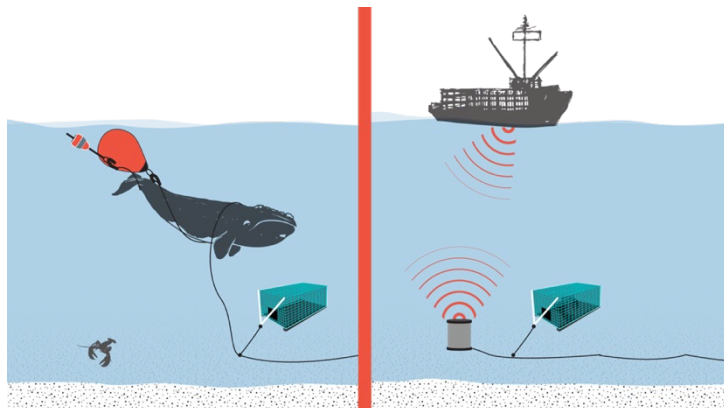
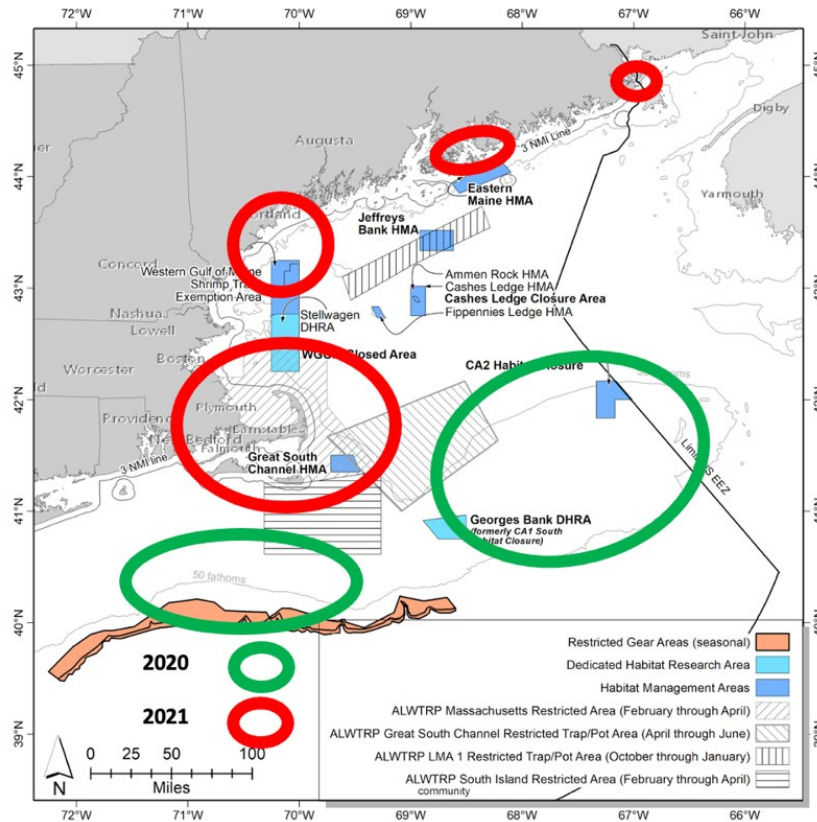
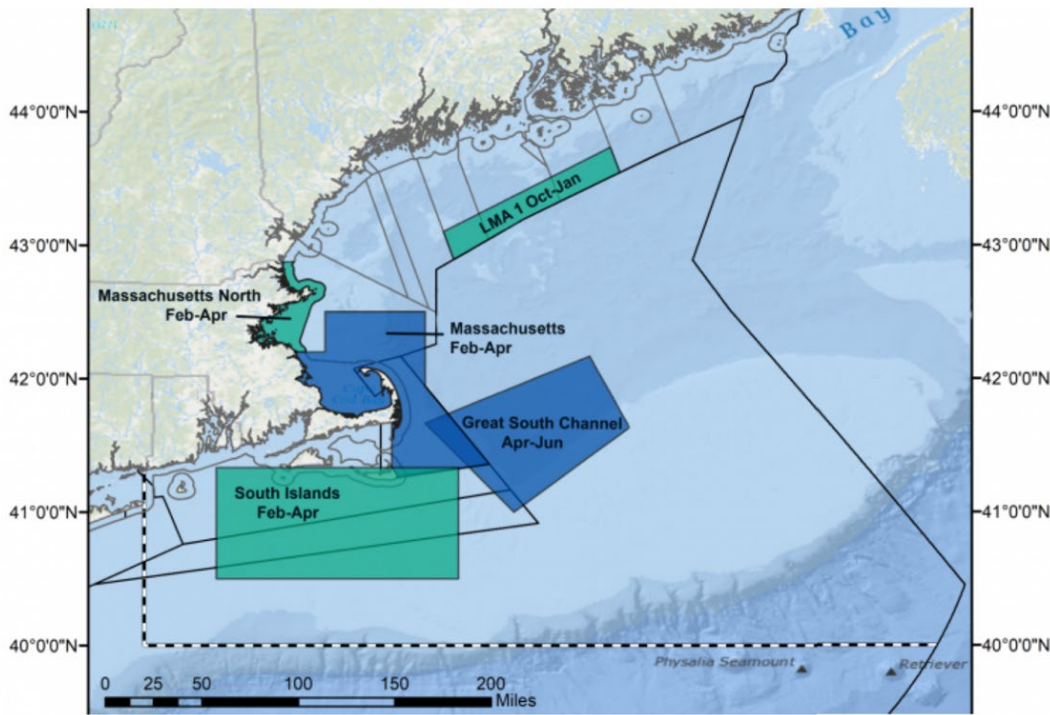


Figure 1 – Left: Traditional gear entanglement risk. Right: On-Demand system, with substantial risk reduction.



**Figure 2 – Trial locations**  
 Year 1 trials (green) were limited to offshore on Georges Bank and to the south near the shelf break. Year 2 (red) expanded substantially to also include inshore areas in Maine and Massachusetts waters.



**Figure 3 – Areas closed to trap fishing with buoyed endlines, but open for permitted On-Demand fishing for the dates shown.**

New (green) and Existing (blue) Restricted Areas. Credit: NOAA Fisheries

**Gear Library**– A gear borrowing library is curated by the Northeast Fisheries Science Center (NEFSC) through which gear can be loaned to industry members participating in permitted on-demand fishing trials. Available gear is loaned on a first come first served basis in areas of highest research value. In exchange for the temporary use of gear, industry members provide data on its performance under variable conditions, evaluate potential impacts on catch rates, and agree to work with engineers to improve performance. Federal and private sector funding continues to be secured to obtain additional gear. To date, no requests which meet the research and permit criteria have been denied.

**Gear Trials** - These were divided into two phases. In Phase 1, fishermen were trained to be comfortable with system rigging and performance before they progress to fishing with the On-Demand units and data collection (Phase 2). A successful deployment is defined as an ability to electronically mark and relocate gear, deploy units off the seafloor, and safely and efficiently retrieve units using conventional hauling methods. In cases where the gear was not deployed and retrieved as intended, an evaluation of the cause of the variation in performance was determined. Causes of performance variations were categorized as acoustical, mechanical, operational, or gear breakage.

**Key points:**

- ~ 500 On-Demand fishing hauls accomplished.
- 17 Boats Collaborating in Trials.
- No premature releases reported.
- Early indications are that the absence of vertical line drag during deployment reduces risk of gear movement in storms.
- Gear that has moved can be more readily located, given acoustic relocation capacity.
- Nearshore and offshore fishing accomplished in depths from 60 to 900 feet.
- Trawl lengths from 10 to 45 traps.
- Fishermen input has improved gear design and function. Acoustic recovery is practical.
- Data from fishermen are being used to evaluate effectiveness of on-demand units in commercial operation.
- The first fully on-demand trawls have now been commercially operated in the lobster fishery.

In August 2021, NEFSC published a Ropeless Fishing [Factsheet](#) helping to inform the industry about the On-Demand options.

On September 17<sup>th</sup> 2021, NOAA Fisheries [announced](#) new regulations for lobster and Jonah crab fisheries in the Gulf of Maine which included areas seasonally restricted to the use of static vertical lines. At this time, fishing with on-demand gear in these restricted areas is allowed providing an Exempted Fishing Permit is obtained from NOAA. The areas and seasons are shown in Figure 3.

A short [animation](#) of how On Demand systems work is available - made by Natalie Renier, WHOI Creative.

In October 2021, University of Chicago Press published a book by Dr. Michael Moore, '[We Are All Whalers](#)'. In one review: 'Moore writes that our choices about the food and other products we buy can make a difference in what happens to whales. The extension of that argument is that society as a whole could—and should—provide more support for fishers to move to ropeless gear.' — Monga Bay

### **The state of On-Demand fishing gear development**

*Recovery and Deployment* – On-Demand systems have evolved and improved substantially in the past two years. The cooperative, collaborative nature of the project has enabled iterative development of these systems to better serve the needs of different sectors of the US lobster fishery in various habitats, depths, bottom types and tide/ current conditions. Currently, experienced, trained operators can use these systems reliably. They have been shown to be functional, have less risk of moving in heavy weather, and more easily relocated if displaced by mobile gear.

*Gear Conflict* – The major challenge in moving from status quo to full commercial viability is the broader development and adoption of systems that can communicate the location of On-Demand systems to the owner, other trap fishermen, bottom trawl fishermen and scallopers, and law enforcement agencies in the area.

Currently there are two options for virtual gear marking. In both cases, the gear can only be retrieved and identified by the owner and/or law enforcement.

1. *GPS position record of surface position.* Similar to dropping a location pin on your phone, the Track Trapper App drops a pin at the location where each On-Demand system was released. Using cellular or satellite systems, the latitude and longitude of gear release position is uploaded to a cloud database. That information is then immediately available to be downloaded by other local operators using a suitable charting system, so that, instead of avoiding fixed bottom gear by looking for a surface mark on the water, the mark is shown on a plotter in relation to the vessel position.
  - a. Pros: Using the Cloud as a data repository enables multiple data streams of surface positions to be shared real time – assuming good air-data connectivity. This allows manufacturers to tailor their products to local needs. Relatively inexpensive and only requires an app subscription for a tablet and/or smart phone.
  - b. Cons: Users must be able to connect to the cloud which can limit updates to when the vessel is within cell phone range. Does not integrate with PC or chart plotter at this time. Accuracy is likely insufficient in areas where fishing density is high. Gear that moves beyond the detection range of the acoustic release system will be permanently lost.
2. *Acoustic record of current bottom position.* This concept remains in development but provides more accurate location of the gear on the bottom, even if the gear has been moved by a storm or interaction with mobile gear. It would be available to vessels in the vicinity equipped with a location device receiver. Cost implications are unclear.

Pros: Acoustic reporting of actual bottom position is more accurate, enables positioning in dense gear areas, update the position of the gear if it moves with current, is dragged by a mobile fishing boat, or storm event, and can share in-water data between local users. The same acoustic equipment that is used to trigger retrieval can be used to do the acoustic gear location task,

Cons: There needs to be R&D investment in an interoperability standard similar to those which enable cell phones from different service providers to connect. Location receivers are required.

## Summary

This is a highly ambitious project with the long-term goal of saving a critically endangered species from extinction without significantly impacting economically and culturally important fisheries. The steps taken to date show promise and are only possible as the result of the collaboration between the engineers, fishermen, conservation representatives and researchers to improve the technology and ensure it can be used safely and effectively in a commercial setting.

While this trial was not designed to address affordability, we still acknowledge that the gear must be cost effective to use long term and parallel efforts by conservation partners are addressing this issue. We were encouraged by presentations at the virtual [Ropeless Consortium](#) meeting held October 19<sup>th</sup> 2021, where the potential for cost reduction was apparent.

## Key Research Questions

- Can on-demand systems meet the efficiency of current fishing operations?
- Can electronic gear marking be used to avoid gear conflicts within and between fisheries?
- Can on-demand systems meet and/or exceed safety of current practicesCan scalability result in affordability?
- Can on-demand systems reduce gear loss?
- Can through-hull transducers improve the time of retrieval?

**Images of On Demand gear tests in Cape Cod Bay, December 11 2021**



Left: EdgeTech inshore rope release cage. The cage contains an acoustic release, that unscrews a puck attached to the lid and coiled endline. Once the puck is free, the buoyant lid pulls the endline to the surface so that traps attached to the release cage can be serviced: bait replaced and catch harvested.

Center and Right: SMELTS lobster rafts. These systems have compressed air tanks and an acoustically triggered valve that inflates a lift bag, to bring the cage to the surface for trap servicing.



EdgeTech inshore cage, with lid removed. Acoustic release on left, coiled endline on right.



Detail of the acoustic release in an EdgeTech unit. The threaded spindle is acoustically triggered to rotate until the threaded coupling in the black puck above is released, allowing the buoyant lid to ascend. This unit has been deployed multiple times and has evidence of fouling.





Buoyant lid of EdgeTech system showing puck installed on acoustic release (see arrow). Once triggered, the acoustic release turns a spindle to disconnect from the puck. The elastic cord stops the puck from rotating, allowing the lid to release and float to the surface.



Side view of two SMELTS units



SMELTS  
– Detail  
of the  
two air  
tanks,  
and  
acoustic  
triggered  
release  
valve.



Preparing to retrieve a surfaced SMELTS lift bag