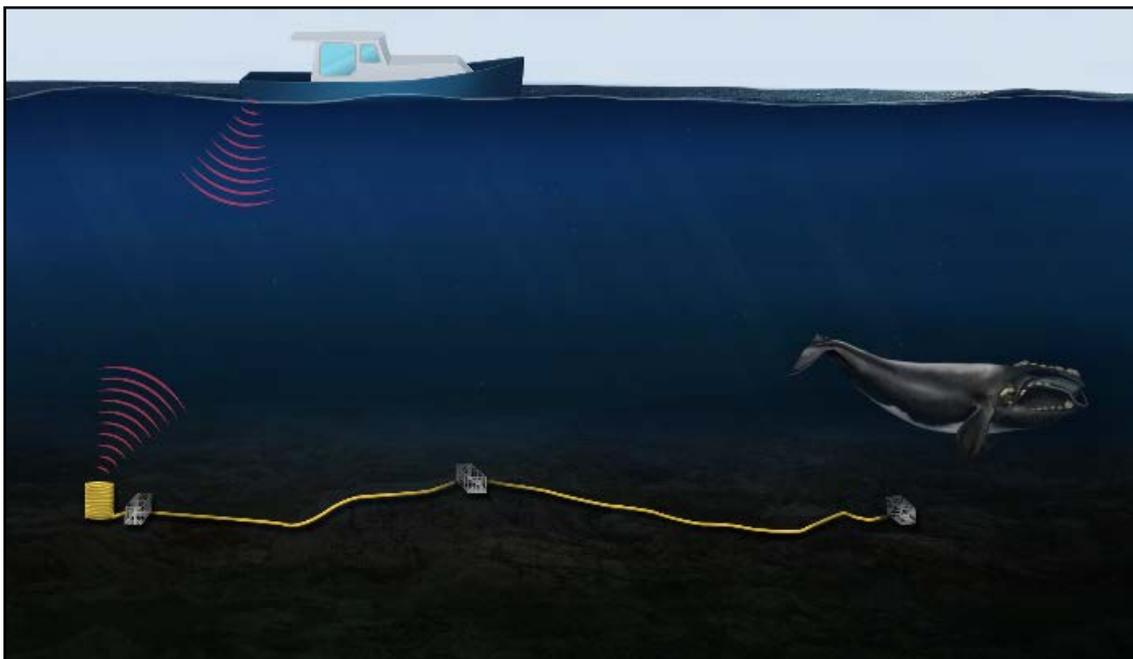


Ropeless Consortium Annual Meeting



19 October 2021
www.ropeless.org



Ropeless Consortium Annual Meeting 19 October 2021

The times list below indicate timing for the live Q&A sessions with those who have uploaded pre-recorded presentations to the meeting site. Meeting participants will receive a unique site login code and should view these presentations in advance of the meeting. Participants may submit questions/comments for presenters both in advance and during the meeting. The four-digit number preceding the presentation title corresponds to the video number on the meeting site.

Please Note: The materials contained (both static and live) within the meeting site are intended for registered participants only and may not be shared in any capacity. All meeting participants have agreed to the meeting Code of Conduct. There is no 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, breakout sessions) without explicit consent of the presenter, speaker, moderator, etc.

1000AM Keynote/Opening:

1015AM Session 1: Retrieval Systems and Testing

- 01.01: CSI on-demand fishing: Conservationists, scientists, and industry collaborate to trial gear**
 - *Erica Fuller – Conservation Law Foundation*
- 01.02: Using ropeless in closed fishing areas: Sea trials of snow crab fishing gear in the Gulf of St. Lawrence**
 - *Philippe Cormier, CORBO, Inc*
- 01.03: Developing and testing a ropeless fishing system designed to remove gillnet buoy lines to reduce entanglements of North Atlantic right whales and test gear tracking technology to reduce derelict fishing gear**
 - *Zach Klyver, Blue Planet Strategies*
- 01.04: EdgeTech underwater hardware and Trap Tracker Application improvements**
 - *Robert Morris, EdgeTech*
- 01.05: LobsterLift - Developing a low-cost ropeless gear for in-shore lobstermen**
 - *Cormac Hondros-McCarthy, Lobster Lift, LLC*
- 01.06: Implementing a co-developed experimental assessment of on-demand gear with commercial fish harvesters in Atlantic Canada**
 - *Elizabeth Baker, Canadian Wildlife Federation*
- 01.07: Development and preliminary testing of a low-cost time release for ropeless traps**
 - *Bart Chadwick, Sub Sea Sonics*
- 01.08: Pathway to pop-up gear authorization in California**
 - *Geoff Shester, Oceana*

*A unique email and passcode is required to access meeting materials and all live sessions.

*Time listed are EDT

1115AM Break

1130AM Session 2: Marking Systems

02.01: Choosing a buoyless gear location marking method to accelerate commercial development

- *Mark Baumgartner, Woods Hole Oceanographic Institution*

02.02: W-Pico: Real time information gathering and actuation via miniaturised underwater wireless Networks

- *Chiara Petrioli, WSense Srl*

02.03: Surface marking of ropeless gear

- *Kortney Opshaug, Blue Ocean Gear*

02.04: Status update of Ropeless RISER™: A ropeless fishing system with automated gear location and integral chart plotter display and control

- *Harold Vincent, Ropeless Systems, Inc.*
- *Dave Capotosto, Ropeless Systems, Inc.*

02.05: Design for an international virtual fishing gear marking system to reduce whale entanglements

- *Kim Sawicki, University of Massachusetts, Dartmouth*

1230PM Lunch

100PM Session 3: Market Interests, Management and Policy

03.01: Procurement options to support use of ropeless gear in U.S. lobster and Canadian snow crab and lobster fisheries

- *Hannah Myers, University of Alaska, Fairbanks*

03.02: Economic feasibility of ropeless fishing

- *Carolyn Alkire, Northeast Fisheries Science Center*

03.03: A progress update from the Mass. DMF on-call fishing gear scoping project

- *Noah Oppenheim, Homarus Strategies, LLC*

03.04: Gear innovations in California's commercial Dungeness crab fishery

- *Morgan Ivens-Duran, California Department of Fish and Wildlife*
- *Greg Wells, National Marine Sanctuary Foundation*

03.05: From experimental to commercial ropeless fishing in Atlantic Canada – Advances and remaining challenges

- *Ed Trippel, Fisheries and Oceans Canada*

200PM Break

215PM Panel Discussion – Fishermen's Perspectives

Moderated by Sean Brilliant

- *Adam Kennedy*
- *Martin Noel*
- *Richard Ogg*
- *Chris Roebuck*
- *Chris Stowell*

315PM Break

***A unique email and passcode is required to access meeting materials and all live sessions.**

***Time listed are EDT**

330PM Breakout Session Discussions

Participants will access this breakout session via zoom link on the main Ropeless Meeting landing page. Once in the zoom discussion, all participants will have the ability to be on or off video. All participants will be muted upon entry, and can turn their mute off when speaking. We will run moderated discussions during this time. Please utilize the hand-raise function to be acknowledged by a moderator to participate with a question/comment.

Buoyless fishing: Progress on the Remaining Challenges

Moderated by Mark Baumgartner, Sean Brilliant, Michael Moore

A discussion about progress and challenges towards ropeless gear as a viable tool for use by commercial fisheries, particularly in whale closures. Challenges to be discussed will include gear location marking, permitting and enforcement, economics, and reducing gear conflicts among fleets.

500-530PM Wrap Up

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Economic feasibility of ropeless fishing

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Several ropeless fishing systems have been developed and prototypes are currently being tested in U.S. waters; two are commercially available. While current prototypes cost up to \$10,270 for the deck unit and \$10,660 for one acoustic release, ropeless fishing component costs are expected to drop with a ramp-up in production. The correlation between declining production cost or labor hours per unit and cumulative production has been described as ‘experience curves’ or ‘learning curves.’ The learning model is the most common approach to projecting production costs in electronics as well as other high-tech industries, with the log-linear model based on the Wright learning curve the most frequently used modelling approach. Wright’s equation is used in this paper to estimate ropeless fishing adoption costs by permitted vessels operating in state and federal lobster management areas in the northeastern U.S. In addition to regulatory hurdles, the initial cost of ropeless fishing systems may be an obstacle to widespread adoption. Funding and loan programs are available from NOAA and other federal sources. Other financing sources include foundations and non-governmental organizations. Public-private partnerships and community funding programs—similar to those previously used to assist those affected by federal regulations to protect other marine species—could be initiated.

Implementing a co-developed experimental assessment of on-demand gear with commercial fish harvesters in Atlantic Canada

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⁴*Canadian Wildlife Federation, Halifax, NS, Canada B3H 4R2*

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(elizabethb@cwf-fcf.org)

On-demand or ‘ropeless’ gear has been used effectively for military and scientific applications, and for some fisheries. CWF has previously presented a framework co-developed with fish harvesters for conducting fisheries trials with on-demand gear. The central principle is that the most useful information will be gained where all components of a system (e.g., gear location marking tool, acoustic signaling technology, release mechanism, and rope containment or lift-bag component) can be used in concert by a fish harvester on their vessel and in realistic fishing conditions. In this presentation, we show how this is being implemented in practice and how the data collected during these trials are analyzed using an experimental approach. This experimental design required us to develop a standard process to identify successes versus failures, and a way to objectively categorize if each component functioned as intended or not. Our results avoid conclusive statements about specific on-demand systems as they and their components are continuing to evolve, but we do identify and discuss features of each system. The ultimate goal of this work is an unconfounded assessment of the conditions, both environmental and operational, under which various on-demand systems may be more, or less suitable for commercial fisheries. This will provide fish harvesters with the knowledge needed to select a system best suited for their fishing practice, and improve the willingness to use on-demand gear for fisheries throughout Atlantic Canada where and when it is needed.

Choosing a buoyless gear location marking method to accelerate commercial development

Baumgartner, M.¹, Baumwell, L.², Brillant, S.^{3,4}

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(mbaumgartner@whoi.edu)

Buoyless (or ropeless) fishing requires the removal of buoys and end lines from trap/pot fishing gear, but the role that buoys currently play in marking the location of gear is still crucially necessary to prevent conflict between different fishers using buoyless systems, and between different fisheries (e.g., mobile- and fixed-gear). The greatest obstacle to developing a commercially viable gear location marking system has been the universal adoption of a single method to locate gear on the sea floor that multiple manufacturers can implement. There have been several methods proposed, including GPS marking of the deployment location, acoustic ranging, directional acoustic ranging, and acoustic self-localization. Between August 2020 and March 2021, we conducted 17 interviews with 75 stakeholders from the U.S. and Canada representing fishers, enforcement agencies, regulators, conservationists, scientists and commercial manufacturers to develop a preliminary list of requirements for gear location marking. We created a publicly accessible report in August 2021 to document these preliminary requirements as well as provide an initial assessment of the four methods of gear location marking with respect to the preliminary requirements. The report was used as the starting point for discussion during the Workshop on Buoyless Fishing Gear Location Methods, held on September 21, 2021. The workshop was designed to collect final requirements for a gear location marking system from stakeholders, evaluate each of the proposed gear location marking methods with respect to those final requirements, and choose a single method that best met the requirements. We intend that this information will be used by commercial manufacturers to ensure that they are developing devices for gear location marking that will meet the needs of all stakeholders.

Development and preliminary testing of a low cost time release for ropeless traps

Chadwick, B.¹, Sybrandy, A.²

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This project focused on addressing challenges associated with the development of innovative, low-cost technology to reduce recreational and commercial fishing gear entanglements. The inherent challenge in the development of a viable ropeless fishing system is to minimize entanglement risk to whales without significantly impacting the viability of the fishery due to excessive cost, complexity and operational impacts. Most current systems have focused on offshore fisheries where deeper water and multi-trap trawls can justify the investment in a more expensive and complex system. Our goal for this project was to develop a low-cost timed release for ropeless traps that was effective in significantly reducing entanglement risk, while remaining affordable to a broad range of inshore trap fisheries, and integrating closely within the current gear and operational methods used in those fisheries. We successfully developed and demonstrated a low-cost, timer release system (the TR4RT) that is geared toward single trap fishing in inshore waters. The system works with existing traps, lines and floats by securing the normal trap line and float to the top of the trap with a bungee and release loop that is secured to a cam on the timer. When the time setting is reached, the line and float are released. The time is set by turning the cam so there are no other complicated controls, deck units or rope packing systems. To date, the system has been tested successfully with lobster traps, black sea bass traps, and crab traps to depths of about 90 meters in a variety of ocean conditions. Testing has shown the gear to be highly reliable with minimal impact to existing fishing operations. The system is now in commercial production and being tested for potential certification by the State of California.

Using ropeless in closed fishing areas: Sea trials of snow crab fishing gear in the Gulf of St. Lawrence

Cormier, P.¹, Gionet, J.², Haché, R.², Morissette, L.³, Noël, M.⁴

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Over the past four years, we have witnessed a positive transformation of the fishers' perception towards ropeless gear as commercial fishers become increasingly aware of the need to coexist with the North Atlantic Right Whales (NARW). In collaboration with scientists and engineers, fishers from Association des crabiers acadiens (ACA) and Association des Pêcheurs Professionnels Crabiers Acadiens (APPCA) tested different ropeless snow crab gear systems during the 2018, 2019 and 2020 fishing seasons, and even prosecuted a “real life” experimental fishery under a special fishing license in 2020. This allowed them to investigate new ways of harvesting snow crab safely without requiring the presence of ropes in the water column. ACA was issued an experimental fishing licence that allowed 10 snow crab professional fishers to access fishing areas that were closed to commercial fishing due to the observed presence of NARW. Each fisher was allowed 10 additional experimental ropeless traps to prosecute this “real life” experimental fishery. The key findings of this Atlantic Fisheries Fund project are presented, along with the new project it allowed to create. This new 3-year project (2021 – 2023) aims to build on the knowledge gained during the last 3 years on how to coexist with NARW and developing the best working solutions for ropeless fishing gear. Starting in 2021, 21 crabbers will use the ropeless system on 1000 traps in closed fishing area in the Gulf of St. Lawrence. They will address issues raised by the 10 fish harvesters who experienced the EdgeTech technology during the previous project, adapt the technology to be even more efficient, and even train fisheries officers for the establishment of a permanent commercial fisheries structure in closed areas. If well adapted and implemented, this technology could allow the full commercial fishery in closed areas in the near future.

Developing and testing a ropeless fishing system designed to remove gillnet buoy Lines to reduce entanglements of North Atlantic right whales and test gear tracking technology to reduce derelict fishing gear

Fleming, R.,¹ Klyver, R. Z.,¹ Riels, R.,² Martens, B.³

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²Sea Mammal Education Learning Technology Society (SMELTS), 1003 Iowa Heights Road, Sedro Whooley, WA 98284

³Maine Coast Fishermen's Association, 93 Pleasant Street, Brunswick, ME 04011

(rflamingme7@gmail.com)

Blue Planet Strategies (BPS), SMELTS and the Maine Coast Fishermen's Association (MCFA) will report on a project funded through a National Fish and Wildlife Foundation Fishing for Energy 2020 grant to develop and test fixed gear systems designed to reduce entanglement of marine mammals and derelict fishing gear. BPS and SMELTS are working with commercial fishermen from the MCFA to develop the world's first “ropeless” gillnet fishing system, which replaces the endlines and surface buoys on gillnet systems with acoustic release systems and subsurface marking and gear tracking technologies. Studies show that the vertical lines connecting sink gillnets to surface buoys pose the greatest threat to large whales when gillnet fishing. BPS and SMELTS met with MCFA partner fishermen in October 2020 and with them designed a gillnet system that eliminates vertical lines and buoys. The SMELTS ropeless gillnet raft replaces gillnet anchors with a raft housing an acoustic release, compressed air tanks, and air bag that lifts the gillnet(s) on demand. One fisherman's preferred design uses a raft small enough to pass through the vessel's hauler, while another is hauled over the rail. Six ropeless gillnet rafts will test two on-demand systems, one Teledyne modem system and the Edgetech acoustic release trigger. The rafts are outfitted with Blue Ocean Gear Farallon Smart Buoys to mark their location via satellite when at the surface and track the gear for recovery should it be dragged by a vessel or cetacean. Tests of the rafts (no gillnets) were conducted successfully in May 2021. After approval of the required exempted fishing permit, testing will begin in federal waters in August using

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one ropeless raft and one compliant buoy line. The project includes a minimum of 50 deployments. We will report our initial results from testing in August and September.

CSI on-demand fishing: Conservationists, scientists, and industry collaborate to trial gear

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For the second year in a row, a group of fishermen, scientists, engineers, and conservationists partnered to improve the functionality of on-demand systems used by vessels operating in the Northeast US commercial lobster fishery. Progress in year two includes expansion of trial participants (from 3 offshore vessels to an additional 7 nearshore vessels), standardization of terminology and training, and gear improvements resulting from industry recommendations. We defined a successful deployment as the ability to mark and relocate gear, deploy off the seafloor, and safely and efficiently retrieve from the surface using conventional hauling methods without interruption. Interruptions are categorized based on whether they are acoustic, mechanical, or operational. Recommendations from the industry significantly reduced mechanical interruptions including line snarls and surface detection and retrieval. Data were collected on efficiency of use, effect of different conditions including depth and tides, and potential gear loss reduction. Preliminary data indicate that variations in training and oceanographic conditions both contribute to different rates of uninterrupted retrievals. Stipends have subsidized potential loss of revenue while testing gear and collecting data. While data collection is ongoing and comprehensive

analyses will be conducted at the completions of this fishing year, the results demonstrate that the systems can be successfully deployed in a commercial fishery even those operating in deep waters with high currents. With funding obtained by NOAA Fisheries, Woods Hole Oceanographic Institute, International Fund for Animal Welfare, Conservation Law Foundation, and Whale and Dolphin Conservation we are trialing EdgeTech systems, SMELT's lift bag systems, WHOI spools, Ashored, Fiomarine, Desert Star and DBV systems. Locating the gear on the bottom to reduce gear conflicts between both mobile and fixed gear fishermen as well as affordability remain issues that are critical to advancing on-demand gear in the future.

LobsterLift - Developing a low-cost ropeless gear for in-shore lobstermen

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Ropeless fishing looks to be an attractive solution for mitigating the effects of the Lobster fishing industry working in the same areas as the migration paths of the North Atlantic right whale. Although it is in its beginning stages of uptake, it needs to hit on the demanding work of lobstermen. LobsterLift has been working for the last couple years to develop a ropeless gear for the inshore fishers at a price point they can afford. We will provide an overview on where we are at today, what we have accomplished, and where we are headed in the future.

Gear innovations in California's commercial Dungeness crab fishery

Ivens-Duran, M.¹, Wells, G.²

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Beginning in 2016, the California Department of Fish and Wildlife (CDFW), California Ocean Protection Council, and NOAA Fisheries have been working

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with a cross-interest stakeholder group to advance development and testing of new and innovative fishing gear to reduce marine life entanglements in California's commercial Dungeness crab fishery. While there are key differences in gear configuration and fishing practices between the West Coast Dungeness crab and East Coast lobster fisheries, there are also substantial parallels which provide opportunities to leverage lessons learned and collaborate on solutions to address issues in both fisheries. Recognizing the need for continued testing and development, CDFW has established a criteria-based process for certifying innovative or modified gear types, including pop-up gear, as Alternative Gear. The certified Alternative Gear can be used during certain periods when the fishery is otherwise closed due to increased risk of entanglements. Certification relies heavily on results from on-the-water testing, which must either conform to existing fishery regulations or receive specific authorization from CDFW (e.g., a Scientific Collecting Permit) or the California Fish and Game Commission (e.g., an Experimental Fishing Permit). We will provide an overview of state-supported gear testing efforts to date, the process for requesting Alternative Gear certification, and potential avenues for testing in the California commercial Dungeness crab fishery. We will also describe a collaborative project led by the National Marine Sanctuary Foundation, in partnership with Dungeness crab fishermen, to trial a variety of gear innovations and modifications under real world fishing conditions.

EdgeTech underwater hardware and trap tracker application improvements

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This paper will describe new features and additions to the Trap Tracker application. EdgeTech has made many improvements to the Trap Tracker application by collaborating with lobster fishers, regulators and conservationist. In this paper I will detail the improvements we have made over the past year to both the underwater equipment and the Trap Tracker application. Describe the extensive testing of Real-time updates both inshore using cell phone boosters

and offshore using Satcoms for Wi-Fi connection for real-time updates. This paper will also describe how we have been collaborating with other manufacturers to allow interoperability with the EdgeTech equipment.

Procurement options to support use of ropeless gear in U.S. lobster and Canadian snow crab and lobster fisheries

Myers, H.¹

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North Atlantic right whales are the world's most critically endangered large whale species, with only an estimated 356 animals alive today. Entanglement in fixed fishing gear, predominantly trap/pot fishing gear from the Canadian snow crab and lobster and U.S. lobster fisheries, is one of the leading causes of diagnosed mortality for this species. Entanglements also have important sublethal impacts that hinder their ability to recover.

Ropeless fishing technologies offer a solution to the whale entanglement problem by removing buoy lines from the water column except when gear is actively retrieved. To date, nine companies and organizations are involved in the development of ropeless fishing systems designed for use in the Canadian snow crab and lobster and U.S. lobster fisheries. Ropeless fishing systems were successfully used during the normal commercial fishing season in North America for the first time in the summer of 2020, when snow crab fishers in the Gulf of St. Lawrence fished ropeless in an area that was otherwise closed to protect right whales.

With strategic regulatory changes and ongoing technological development, a substantial portion of snow crab and lobster could be caught using ropeless fishing systems within the next five years. Seafood retailers can play an important role in the advancement of ropeless fishing by (1) indicating interest and providing financial support for ropeless fishing trials and development, (2) preferentially purchasing ropeless-caught product, and

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(3) setting procurement standards for the proportion of snow crab and lobster that should be caught using ropeless systems.

A progress update from the Mass. DMF on-call fishing gear scoping project

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Earlier this year, the Massachusetts Division of Marine Fisheries in partnership with Homarus Strategies launched a one-year project funded by the National Fish and Wildlife Foundation in partnership with the National Oceanic and Atmospheric Administration to comprehensively characterize the issues and challenges associated with the integration of on-call fishing gear technology into New England fisheries. Our project conducted a series of semi-structured interviews with experts in the field in order to synthesize perspectives across diverse sectors including those of fixed and mobile gear fisheries stakeholders, scientists/economists, law enforcement officials, and conservation organization staff. The analysis is focusing on four discrete issue areas: utility, technology, legal & regulatory affairs, and socioeconomics. We will develop a synthesis report on these issues and produce a set of recommendations for further policy development work. Here we present a summary of the work completed to date including emerging and synthesis topics that members of the Ropeless Consortium and the public may find interesting and useful.

Surface Marking of Ropeless Gear

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Geolocation of ropeless gear while deployed is critical to many aspects of operations, including

enforcement as well as gear conflict avoidance. As a first step in that direction, SMELTS and Blue Ocean Gear have collaborated to mark gear location upon surfacing, as well as marking of hybrid trawl surface buoy locations. As ropeless gear can surface in different locations than where it was set, the ability to receive a signal with GPS coordinates from the gear when it reaches the surface allows fishers to locate and haul their gear more efficiently, as search time is decreased particularly in fog or inclement weather. Fishers have run trials using the SMELTS lobster raft lift bag systems combined with Blue Ocean Gear's Smart Buoy during active fishing seasons in MA, ME, and WA pot fisheries in hybrid trawl configurations with one end of the trawl having a line to a surface buoy and the other end equipped with ropeless gear. Buoy positions for both were captured and transmitted to the Cloud, indicating number of times gear was resurfaced, hauled, and reset. Results indicate that this methodology can be useful in providing tracking information that can be accessed only by the user and those selected for data sharing.

W-Pico: Real time information gathering and actuation via miniaturised underwater wireless networks

Petrioli, C.¹

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(chiara.petrioli@wsense.it)

The presentation will describe the possible use of W-Pico, Wsense's miniaturized modem to actuate the Ropeless Gear and to gather information in real time from them. W-Pico is an industrial solution, the smallest existing full modem, designed to be low power and low cost for large scale monitoring of the oceans. The W-Pico is a cylinder of 1cm by 6cm including batteries and has a 500m transmission range, transmits at 640bps. It embeds some sensing, logging and processing capability and a networking stack which allows to transmit data over underwater wireless multi-hop acoustic networks covering large areas. Developed by WSense, a company pioneer of Internet of Underwater Things, within the European project SEASTAR, the W-Pico is now a commercial product, available to the market. The presentation will describe the features of the W-Pico and will present its performance evaluation showing the results of its use in the Mediterranean and in the

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North Sea off the coast of Norway. Open APIs and interfacing with external devices is provided, enabling integration with third party equipment. This capability will be discussed. Objective of the presentation is to stimulate discussion on possible synergies with scientists and other technology providers.

Design for an international virtual fishing gear marking system to reduce whale entanglements

Sawicki, K.^{1,2}

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²*Sustainable Seas Technology, Ocala, FL, 34481 (ksawicki@umassd.edu)*

Marine animal entanglement in pot fishing gear has been a global concern for several decades, with the “removal of end lines” being identified as a promising mitigation measure that would substantially lower risk for cetaceans, turtles, and sharks. Research on the adaptation of subsea buoy retrieval devices for use within pot and trap fisheries over the last two decades has identified that this innovative gear, coupled with regulatory measures, will likely reduce fishing gear loss *and* entanglement-based mortality of marine life. Research and feedback from global fishing communities have identified the use of devices and methods currently in practice that already remove endlines and visible marker buoys from the water column. Therefore, a critical need exists to provide a low or no-cost system for these fishers to mark the position of their gear on the seafloor for the benefit of both enforcement and other fixed and mobile gear fishers. Virtual gear marking and the interoperability of systems to share location information are the primary foci of the Ropeless Manufacturer’s Workgroup (RMW), comprised of 10 SBRS manufacturers. Eight members of the (RMW) are currently in the process of developing a standardized gear-marking backend database that will allow unified access and sharing of gear marking data from all types of ropeless fishing gear, including galvanic-timed releases, electronic/timed releases, and acoustic release products. Our project coordinates collaborative

activities for gear manufacturers, gear marking developers, and regional, state, federal, and international fisheries management personnel and enforcement to create a comprehensive plan for data management, requirements, and integration parameters.

Progress toward authorizing pop-up fishing gear in the California Dungeness crab fishery

Shester, G.¹, Cooper, K.², Sawicki, K.³, Toriumi, D.⁴, Chadwick, B.⁵

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² *Middlebury Institute of International Studies at Monterey. Monterey, CA 93940*

³ *University of Massachusetts-Dartmouth. New Bedford, MA 02744.*

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⁵ *Sub Sea Sonics. 4741 Orchard Avenue, San Diego, CA 92107*

Authorization of pop-up gear as alternative gear under California’s new Risk Assessment and Mitigation Program regulations offers a means to continue Dungeness crab fishing when whale and/or sea turtle entanglement risk is elevated. Regulatory criteria for pop-up gear authorization include reliability, detectability, enforceability, and reduction in entanglement risk. Based on input from California fishery managers, enforcement officers, fishers, and gear manufacturers, we outline a stepwise incremental approach to authorizing pop-up gear beginning with timed-release gear and GPS-based virtual gear marking to facilitate acceptance by fishers and regulators. Once timed-release pop-up gear is successfully authorized and fished, next steps would include scaling up its use and pursuing authorization of on-demand acoustic-release technology. To pursue authorization of pop-up gear, in July-August 2021, we conducted gear demonstrations, outreach events in Central California fishing ports, and at-sea trials of five pop-up systems (Desert Star, Longsoaker, EdgeTech, Fiomarine, and Sub Sea Sonics TR4RT). In September 2021, we conducted 50 trials of Sub Sea Sonics TR4RT timed release pop-up gear set up on Dungeness crab fishing traps in Monterey Bay crabbings grounds. On these trials, TR4RT release mechanisms demonstrated a 100% success rate and rope management systems had

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a 96% success rate. We identify improvements to increase reliability and efficiency. We also tested a surface GPS virtual gear marking system that may allow enforcement and other fishermen to view the set location of all currently deployed units. Authorization of pop-up gear provides a means to extend the Dungeness crab season when conventional fishing is closed due to elevated entanglement risk, for those fishers who voluntarily choose to use it. Successful authorization of pop-up gear in the California Dungeness crab fishery for both commercial and recreational use can also provide a template for broader adaptation and testing in other pot fisheries along the West Coast and globally.

From experimental to commercial ropeless fishing in Atlantic Canada – advances and remaining challenges

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Ropeless, or rope-on-demand fishing practices, are supported by Fisheries and Oceans Canada (DFO) under its management measures to prevent entanglements of large whales in commercial, non-tended fixed gear fisheries, including lobster and crab. Beginning in 2018, a variety of acoustic releases and ropeless systems have been explored in selected Atlantic trap fisheries. Ropeless commercial fishing of snow crab has been tested in 2020 and 2021 in the southern Gulf of St. Lawrence, which permitted experimental licence holders to become familiar with the gear and sell their catches. Snow crab trawls, as opposed to single traps, are currently being piloted to allow for an increase in the number of deployed traps per acoustic release, thereby reducing a harvester's financial investment in this technology. Significant federal funding has been provided to support Canadian manufacturing of a ropeless system, which is being tested and refined in a number of trap fisheries over different fishing areas. In 2021, Canadian Fisheries Officers participated in educational workshops regarding the functionality of ropeless fishing systems including training in gear location tracking. The deployment of ropeless fishing systems to confirm access to fishing grounds

inhabited by North Atlantic right whales is a key motivator to industry participation and future expansion of this whalesafe fishing practice. In August 2021, the federal government announced the new Whalesafe Gear Adoption Fund to support the adoption of requirements that are being phased in for whalesafe fishing gear.

Status update of Ropeless RISER-: A ropeless fishing system with automated gear location and integral chart plotter display and control

Vincent, H. T.¹, Capotosto, D. A.¹

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The Ropeless RISER™ is an acoustically-actuated, airbag retrieval system. This highly configurable system can be attached to existing traps or act as standalone “anchors” for trawls. Airbags are the preferred retrieval mechanism due to lift capacity and simplicity of operation, providing the most lifting force in the smallest possible volume. Aside from the handling of buoys and lines, trawl recovery and deck operations remain essentially the same as they are now. In fact, the Ropeless RISER™ system can make the gear setting and retrieval process safer and more efficient. Unlike other ropeless solutions, the Ropeless RISER™ system provides real-time, seafloor location of traps with a technique called Single Ping Positioning™. This patent pending technology consists of acoustic transponders on each of the submerged systems and a hull-mounted transceiver on each vessel which allows “virtual buoys” to be seen on a chart plotter without special ship maneuvers. Each seafloor transponder has a unique ID that allows the chart plotter to distinguish and display ownership, as well as identify single traps and multi-trap trawls allowing only vessels in close proximity to “see” the locations of the seafloor gear. In this way, setting gear remains much like it is done now, in which visual observations and radar displays are used to locate gear and prevent conflicts. This method resolves gear conflict, the last remaining impediment to making ropeless a reality. And it does so in an automated manner - without tablets, phones, apps, cell or satellite services, or the need for central reporting and management of gear positions. The presentation will include a summary of recent gear

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testing and images of real-time, gear location chart
plotter displays.

2021 Ropeless Consortium Annual Meeting Participant List

Last Name	First Name	Affiliation
Adam	Kennedy	Fisherman
Albert	Julie	Marine Resources Council
Alkire	Carolyn	NOAA Affiliate
Allen	Dee	Marine Mammal Commission
Amaral	Jennifer	Marine Acoustics, Inc
Arsenault	Ross	Ashored Inc.
Asaro	Michael	NEFSC
Asmutis-Silvia	Regina	Whale and Dolphin Conservation
Baker	Elizabeth	Canadian Wildlife Federation
Barnhill	Bill	NOAA/GARFO/PRD
Baumgartner	Mark	Woods Hole Oceanographic Institution
Baumwell	Leah	The Pew Charitable Trusts
Bennett-Nickerson	Purcie	Bennett Nickerson Environmental Consulti
Berg	Tone	Ocean Space Acoustics AS
Bivol	Gene	DiveNET Subsea Wireless
Blome	Richard	Smithsonian Museum of Natural History
Bogomolni	Andrea	Island Foundation
Boness	Daryl	Marine Mammal Commission
Borggaard	Diane	NOAA/GARFO/PRD
Boulay	Régine	Pêches et Océans Canada
Bowden	Matthew	NOAA/NMFS
Boyd	Catherine	Clearwater Seafoods
Breunig	Kevin	Conservation Law Foundation
Brillant	Sean	Canadian Wildlife Federation
Brogan	Gilbert	Oceana
Brooks	Priscilla	Conservation Law Foundation
Brown	Moirra	Campobello Whale Rescue Team/CWI
Bujold	Lisa	Department of Fisheries and Oceans
Burke	Erin	MA Division of Marine Fisheries
Burrola	Nathaniel	Maine Lobstermen's Association
Burton (Giffin)	Melanie	PEI Fishermen's Association
Cabana	Nicole	NOAA Northeast Fisheries Science Center
Campion	Kevin	Save the North Pacific Right Whale
Capotosto	David	Ropeless Systems, Inc.
Carome	William	University of Otago
Carr	Meg	Dalhousie University
Casoni	Beth	Massachusetts Lobstermen's Association
Chadwick	Bart	Sub Sea Sonics
Childerhouse	Simon	Cawthron Institute,
Cho	Michelle	New England Aquarium
Cholewiak	Danielle	NEFSC
Chris	Stowell	Fisherman
Chris	Roebuck	Fisherman
Cohen	Joel	Joel Likes To Photo LLC.
Cole	Alex	Canadian Wildlife Federation
Comfort	Emilie	Fisheries and Oceans
Compton	Karen	Fisheries and Oceans Canada, Maritimes
Conti	Walt	Edge Innovations
Coogan	Colleen	NOAA/GARFO/PRD
Coolen	Lesley	Fisheries and Oceans Canada
Cooper	Kacy	Oceana
Corbett	Kelly	Oregon Dept of Fish and Wildlife

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Davenport	Jane	Defenders of Wildlife
Davis	Genevieve	NEFSC
Dean	Nicholas	
Deuel	Katharine	The Pew Charitable Trusts
Dickson	Jessica	Fisheries and Oceans
DiMonti	Anne	Audubon Society of Rhode Island
Dion	Danielle	Quoddy Link Marine
Dobbin-Vincent	Connie	Fisheries and Oceans Canada
Downing	Nicole	The Blue Ocean Society for Marine Conser
Driscoll	Sonya	Fisheries and Oceans Canada
Duley	Peter	NEFSC
Dupuis	Pierre	Homarus Inc
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Engleby	Laura	SERO, National Marine Fisheries Service
Enticknap	Ben	Oceana
Fagan	Connor	Oceana
Fahy	Christina	DOC/NOAA/NMFS/West Coast Region
Farrell	Summer	Teledyne Benthos
Faubel	Holly	Enlightened Design
Fauquier	Deborah	National Marine Fisheries Service
Ferron	Stephane	Équipe de désempêtrement du Golfe
Fink	Sheryl	IFAW
Fleming	Roger	Blue Planet Strategies
FRANCO	CRYSTAL	NOAA NMFS
Frith	Rhyl	Canadian Wildlife Federation
Fuller	Erica	Conservation Law Foundation
Gahm	Meghan	Ocean Associates Associates
Gatzke	Jennifer	NOAA NMFS WCR
Gauthier	Francois	Devocean
Gearhart	Jeffrey	NMFS, SEFSC, Harvesting and Engineering
George	Clay	GADNR
Gillett	Roxanne	Fisheries and Oceans Canada
Gingras	Mireille	Pêches et Océans Canada
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Goebel	Jen	NOAA/GARFO/PRD
Gomez	Andrea	DOC/NOAA/NMFS
Good	Caroline	National Marine Fisheries Service
Gray	Laura	NMFS OPR
Greenberg	Daniel	
Greene	Mackie	Canadian Whale Institute
Greenman	Justin	DOC/NOAA/NMFS/West Coast Region
Grewal	Corie	NMFS
Grimmer	Karen	NOAAs Monterey Bay Natl.Marine Sanctuary
Guenther	Carla	Maine Center for Coastal Fisheries
Guerra	Olivia	International Fund for Animal Welfare
Hache	Robert	Acadian Crabbers' Associatioon
Hager	Mark	New England Marine Monitoring
Hain	Jim	Associated Scientists at Woods Hole
Hamilton	Philip	Anderson Cabot Center for Ocean Life at the New England Aquarium

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Hayes	Sean	NEFSC
Heinemann	Dennis	Marine Mammal Commission
Henninger	Heidi	Atlantic Offshore Lobstermen's Assn
Henry	Leigh	WWF
Higgins	Jean	NOAA/GARFO/PRD
Hondros-McCarthy	Cormac	LobsterLift LLC
Hopkins	Nick	NMFS, SEFSC, Harvesting and Engineering
Howe	Kelsey	Anderson Cabot Center for Ocean Life at the New England Aquarium
Hruby	Kate	Save the North Pacific Right Whale
Hudson	Melanie	IFAW
Ingulsrud	Laura	Knauss Marine Policy Fellowship
Isnor	Holly	Ecology Action Centre
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JACKSON	JOANNE	HitPlay Productions
Jackson	Katie	FLORIDA FISH & WILDLIFE
Jakush	Jen	Florida Fish & Wildlife (FWC)
Jeans	Meghan	Broad Reach Fund
Jewett	Libby	NOAA
Johnson	Andy	Defenders of Wildlife
Johnson	Chris	WWF
Johnson	Hansen	Dalhousie University
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Keane	Ellen	NOAA/GARFO/PRD
Keats	Adam	Law Office of Adam Keats
Kelley	Kevin	Maine Lobstermen's Association
Kennedy	Jennifer	Blue Ocean Society for Marine Conservati
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Landry	Samuel	Fisheries and Oceans
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Lang	Jon	Maritime Whale
Langlois	Annie	Canadian Wildlife Federation
Laurent	Jérôme	Merinov
Lawson	Dan	DOC/NOAA/NMFS/West Coast Region
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Leblanc	Venyse	DFO

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London	Evelyn	
Long	Kristy	National Marine Fisheries Service
Lucas	Charles	BROAD REACH FUND
Lysiak	Nadine	Suffolk University
MacDonald	Jason	
MacDougall	Jordan	
Manley	Stephen	National Marine Fisheries Service
Marrone	Dan	NOAA/GARFO/PRD
Martin	Rob	NOAA
Martin	Noel	Fisherman
Matzen	Eric	NEFSC
McCarron	Patrice	Maine Lobstermen's Association
Mclellan	Cole	Canadian Wildlife Federation
Mcleod	Elizabeth	New England Biolabs
McPherson	Kate	Anderson Cabot Center for Ocean Life at the New England Aquarium
McWeeny	Bill	The Calvin Project
Melvin	Bob	Teledyne Benthos
Mercer	Theresa	
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Mihalik	Katie	Sustainable Fisheries Partnership
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Millar Lapointe	Geneviève	Fisheries and Oceans Canada
Miller	Carolyn	Woods Hole Oceanographic Institution
Miller	Jacqueline	Royal Ontario Museum
Milliken	Henry	NMFS/NEFSC
Minasian	Stan	Private Citizen
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Monsell	Kristen	Center for Biological Diversity
Montaldo	Ernesto	WSENSE SRL
Montello	Maxine	New York Marine Rescue Center
Moore	Katie	United States Coast Guard
Moore	Michael	Woods Hole Oceanographic Inst.
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Morris	Rob	EdgeTech
Morse	Laura	Orsted US Offshore Wind
Morton	Will	Blue Ocean Gear
Myers	Hannah	University of Alaska Fairbanks
Noel	Martin	APPCA
Noel	Mathieu	The Maritime Fishermen's Union
OConnell	Kate	Animal Welfare Institute
Oppenheim	Noah	Homarus Strategies, LLC
Opshaug	Kortney	Blue Ocean Gear
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Patterson	Eric	National Marine Fisheries Service
Pellerin	Mathieu	Pêches et Océans Canada

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Pierre	Johanna	Johanna Pierre Environmental Consulting
Pigeon-Dubeau	Catherine	Marine Stewardship Council
Pitchford	Tom	Florida Fish & Wildlife (FWC)
Quirion	Jean	Innovasea
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Smith	Maxime	Groupe MDMP
Smith	Tim	Canadian Whale Institute
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