

Piloting Underwater Video to Improve Ghost Gear Removal

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Final Report

11th Hour Racing

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N. David Bethoney, PhD, Commercial Fisheries Research Foundation

Susan Inglis, PhD, Commercial Fisheries Research Foundation



Discarded or lost fishing gear, ghost gear, is a threat to ocean health and coastal communities. This gear indiscriminately continues to catch and kill animals and the negative ecological effects, as it accumulates on the seafloor, are well documented. Fishermen anecdotally report thousands of abandoned traps and piles of ghost gear near Rhode Island (RI) fishing ports and coastal waters. Removing ghost gear traditionally involves dragging grapples through a general area causing ecological risks, or by SCUBA diving which requires specialized training and increased cost and safety concerns. This project successfully tested and confirmed the use of underwater video technology as a potential method to refine ghost gear locations for a more ecologically sound and targeted removal. We initially produced a map of ghost gear hot spots in Narragansett Bay based on fishers' knowledge, then evaluated two cameras in selected areas identified in the maps during two at sea surveys. Throughout the project we developed outreach materials and engaged the public and other stakeholders raising awareness to ghost gear problems. Results from this project assisted us in securing funding to develop a planning document for a RI ghost gear removal program.

Mapping Ghost Gear Hotspots in Narragansett Bay:

A map of ghost gear locations was generated for Narragansett Bay using nautical charts and interviews with eight commercial fishers that harvest using lobster traps, fish pots and trawlers. Our proposal planned to set up a Steering Committee of fishers working together to generate the map, but COVID 19 protocols made this method logistically prohibitive. This challenge was addressed by individually interviewing fishermen at their vessel or the Commercial Fisheries Research Foundation. Though this required more work than expected, the individual interviews produced a more robust mapping method of eight independent map locations. The fishers were presented with nautical charts of Narragansett Bay and asked to outline areas where they observed ghost gear, estimate (if possible) the amount of gear, and when they observed the ghost gear (Figure 1). The charts were scanned and digitized using georeferencing tools in ArcGIS software. The final product was a map that outlines ghost gear locations from each fisher interviewed, highlighting overlapping locations (Figure2).

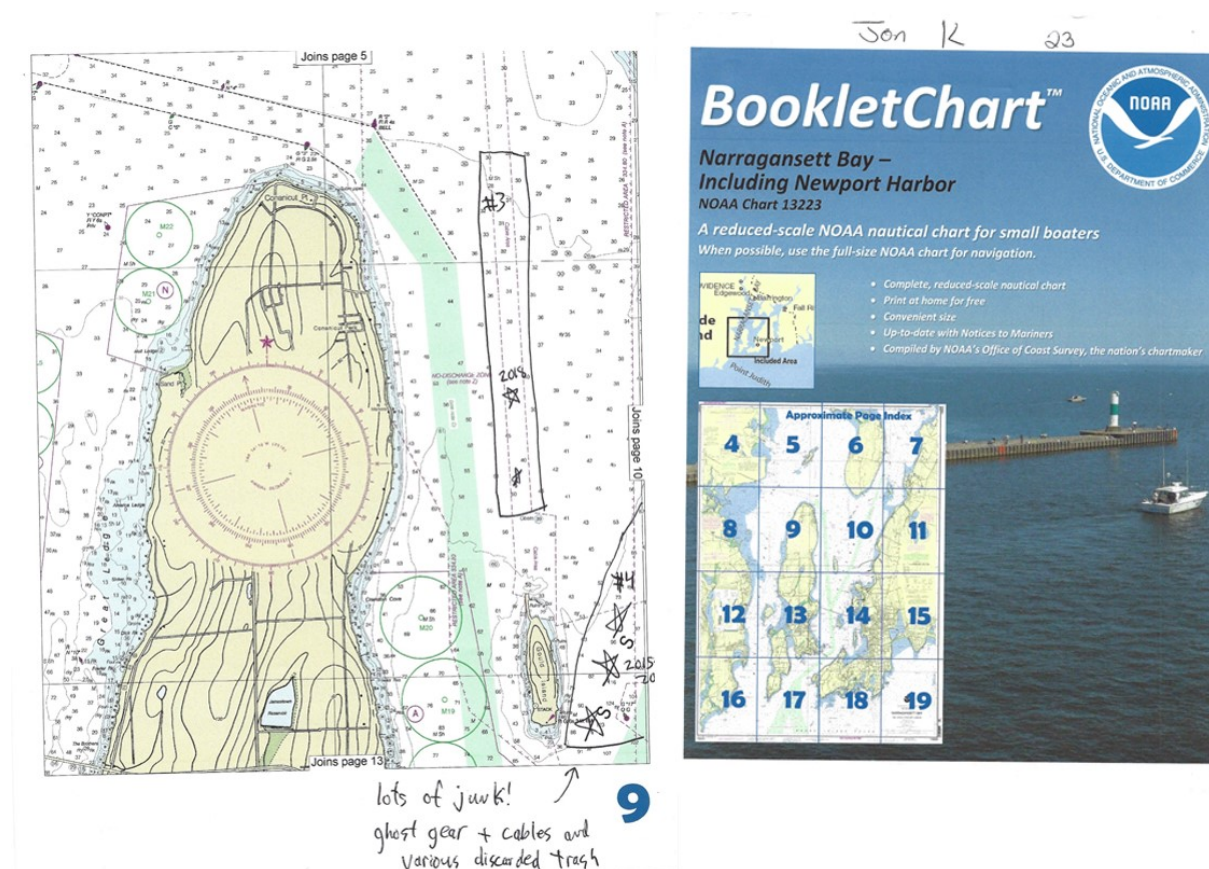


Figure 1. Example of ghost gear location maps from fisher knowledge used to generate the ghost gear hot spot map.

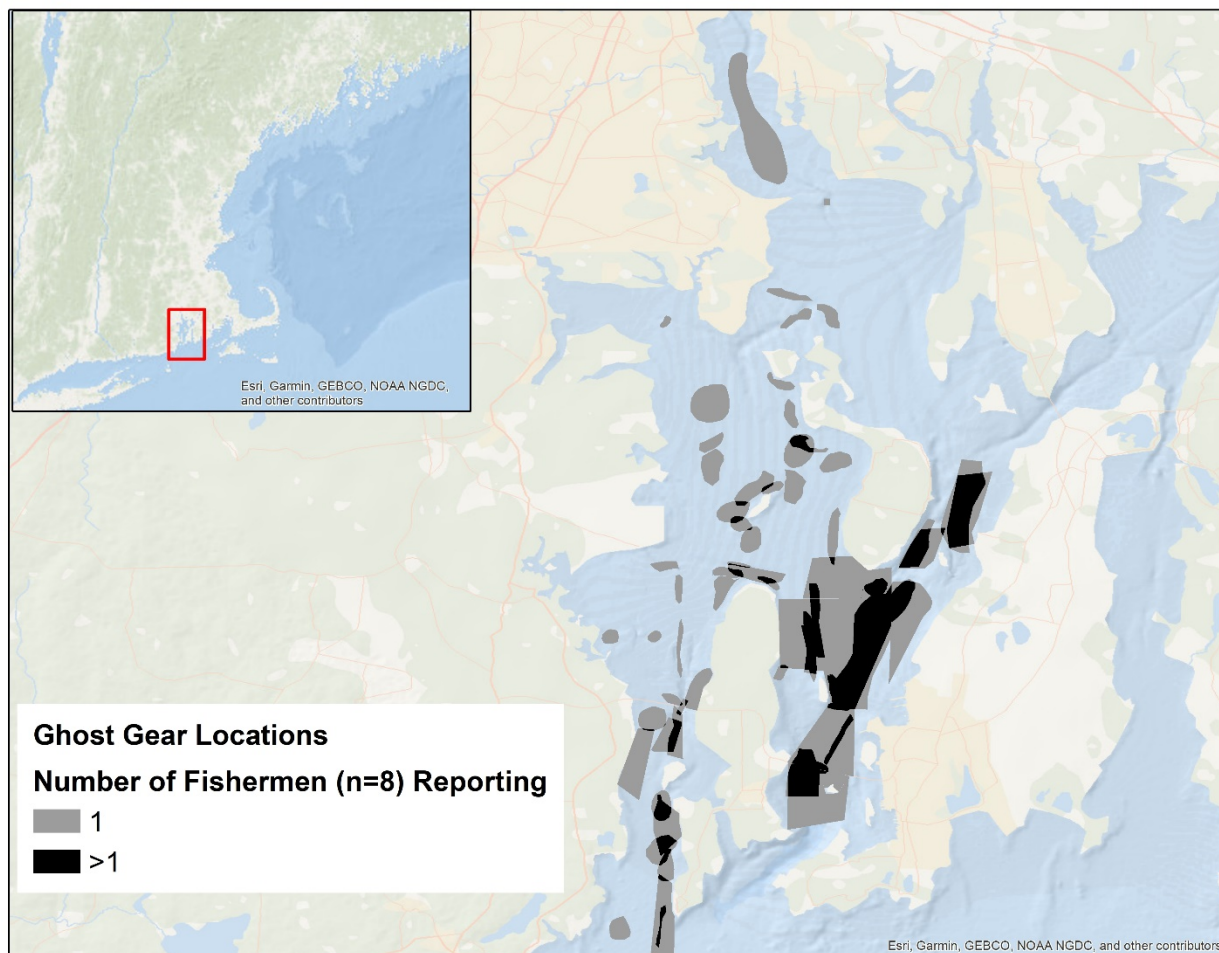


Figure 2. The ghost gear hot spot map using fishers' knowledge. This map was used to direct the camera survey to locations where more than 1 fisher observed ghost gear.

The interviews also provided us with important information on the dynamics of ghost gear in the bay. For example, abandoned traps and pots are regularly caught and dragged along in trawl nets. At the end of the trawl line these traps are removed from the net and put overboard generating piles of ghost gear at the end of trawler towlines. All the fishers interviewed also recommended that ghost gear removal operations should be conducted during winter months when visibility is best for camera work and to reduce conflict with active fishing gear during the summer months.

Testing Underwater Video Technology for Improving Ghost Gear Removal:

Using the ghost gear map, at sea surveys were conducted to evaluate the live feed underwater video technology for ghost gear identification removal efforts. Two live-feed camera systems were used, a Delta Vision underwater camera, and a less expensive Spot-X underwater housing for a GoPro Hero 8 (Figure 3). Prior to the planned surveys, a lobster fisher

volunteered his vessel to test the cameras at sea. During this trial a ghost gear trap rope was identified with a camera and grappled (Figure 3).



Figure 3. The Spot X (left) and Delta Vision (right) used for identifying ghost gear in Narragansett Bay, RI. The monitor (orange case) was used for both systems.

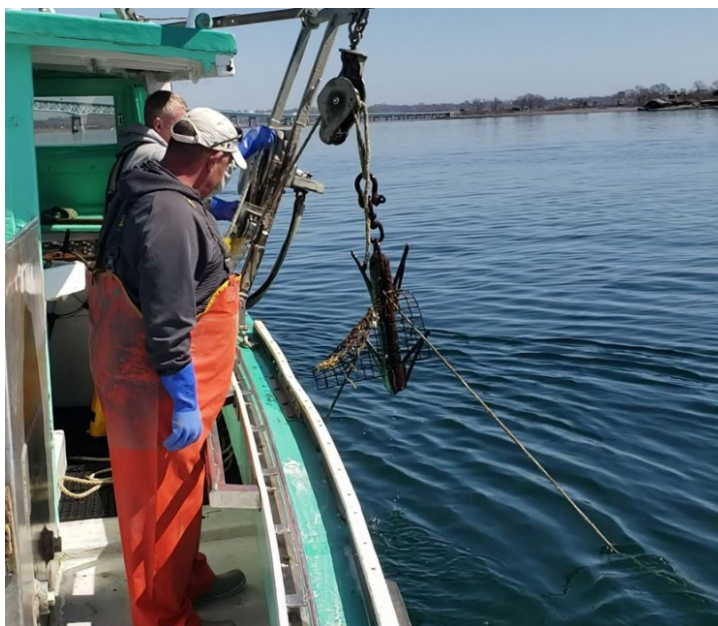


Figure 4. A ghost gear trawl rope identified using the GoPro camera and then grappled, supporting this project's proposed camera-grapple system for ghost gear removal.

The surveys were conducted in June (trawler) and August (lobster vessel). The vessels used the ghost gear map to navigate to locations to test the video systems. The camera was hand deployed with the video feed observed on the monitor and recorded (Figure 3). When ghost gear was observed the video timestamp was recorded and the location marked (waypoint) using a handheld Garmin GPS. On shore, all video was viewed to confirm ghost gear identification and collect an image (Figure 5). We collected 8 ghost gear images during the June survey and 10 during the August survey and were clearly able to identify the type of ghost gear.

Ghost gear was viewed in approximately half the camera drops. This underrepresents efficiency as many of the drops without ghost gear were short and terminated for logistical reasons, while longer drops yielded multiple ghost gear sightings. The recorder timestamp and GPS waypoint mark were used to produce an interactive map of survey ghost gear images for our project website. This information was also submitted to the Global Ghost Gear Initiative reporting portal.



Figure 5. Image of ghost gear from August survey of Narragansett Bay, RI.

During the August survey, we used a waypoint mark from the June survey to see if we could relocate a ghost gear rope. We were successfully able to renavigate to the location, confirming the methodology for identifying ghost gear and targeting the locations for removal. The less expensive GoPro camera system performed the best during the surveys. As of now, it appears location and gear type is the information that can be extracted from images.

The camera evaluation also identified several logistical challenges to the system. To use a camera system for a systematic location and removal procedure on a larger scale, a vessel deployment (to replace hand deployment) method should be developed. A camera mounted sled was suggested by the captains conducting the surveys, and this type of apparatus has been used before for underwater video collection. However, there are constraints associated with this device as well due to bottom substrate and bathymetry. A vessel system that combines the camera and grapple was also suggested. However, in these trials when the camera and grapple were deployed simultaneously the grapple caused reduced water clarity, the vessel speed to effectively grapple was faster than the speed needed to keep the camera facing down, and the camera became entangled in ghost gear. Based on observations during these summer surveys, we recommend that future surveys should be conducted during winter months when water visibility is better and during slack tide so the camera is not displaced in the water column by currents.

Public and Stakeholder Engagement:

A project page for this project was developed and maintained on the CFRF Website. The ghost gear hot spot map, interactive ghost gear image map and video, and other project results are all available to the public at: <http://www.cfrfoundation.org/ghost-gear>. CFRF featured this project in the March 2021 newsletter, and it was updated in the July 2021 release. These newsletters reach 1,550 individuals. We also posted project information on our Facebook page and reached 2,236 with 69 active engagements.

The 11th Hour Racing Team, Charlie Enright and Amory Ross, participated in the June 28th survey collecting video content of the survey procedures and interviews as part of a project video for distribution. A Webstory for the project was also developed by 11th Hour Racing.

The results from this project were presented at a GGGI webinar in Maine entitled “Best Practices to Prevent and Reduce ALDFG” and a CFRF hosted a webinar September 21 (Figure 6). The CFRF hosted webinar brought together local ghost gear removal programs in Maine (Gulf of Maine Lobster Foundation) and Cape Cod (Center for Coastal Studies). The goals of this workshop were to:

- build awareness of ghost gear impacts, causes, and solutions in the fishing sector
- provide a platform where fishers can share best practices and learn from each other
- present case studies on removal efforts by organizations in the broader New England region

The workshop was attended by 25 people, both in person and online, with 20% of participants from the commercial fishing industry.

YOU'RE INVITED

GLOBAL GHOST GEAR INITIATIVE

CFRF COMMERCIAL FISHERIES RESEARCH FOUNDATION

THE GLOBAL GHOST GEAR INITIATIVE INVITES YOU TO A LIVE WEBINAR ON

MANAGING END OF LIFE FISHING GEAR

BEST PRACTICES
REGIONAL CASE STUDIES
ONGOING PROJECTS
AT-SEA GEAR REMOVAL

Ocean Conservancy

JOIN US
SEPTEMBER 21
4:00 - 5:30 PM
REGISTER NOW
bit.ly/3BPynA0

SUPPORTED BY:
11TH HOUR RACING

CFRF would like to invite you to participate in a live webinar with the Global Ghost Gear Initiative on **Tuesday, September 21 from 4:00-5:30**. The workshop will showcase our work with fishermen to map ghost gear in Narragansett Bay as well as other projects with fishermen to remove ghost gear. Information on best practices for managing end of life fishing gear will also be presented.

To attend, please [register here](#). You will receive a follow up email with a link to join, and instructions for logging onto the meeting. Alternatively, come to CFRF and call in with us!

Figure 6. CFRF-GGGI Webinar announcement. Presentations from this Webinar can be viewed at https://www.youtube.com/watch?v=pQO-OjpkCEI&ab_channel=GlobalGhostGearInitiative.

A goal of this project was to establish strategic partnerships that could catalyze ghost gear removal in Narragansett Bay. We developed partnerships during this project with the Global Ghost Gear Initiative (GGGI), Narragansett Bay Estuary Program, Rhode Island Department of Marine Fisheries, University of Rhode Island, Save the Bay, and the Gulf of Maine Lobster Foundation (Gear Grab). We hosted the Director of GGGI, Ingrid Giskes in October to discuss the project and plan for future work. Project results were shared with the other stakeholder organizations listed through direct communication or their attendance of the CFRF-GGGI webinar. Through these partnerships, and the results from this project, we were able to secure funding from the 2021 Southeast New England Program Watershed Grant to develop a planning document for the development of a ghost gear removal program in RI. Local fishermen, through the Commercial Fisheries Center of Rhode Island, GGGI, Narragansett Bay Estuary Program, Net Your Problem (ghost gear recycling), Rhode Island Department of Marine Fisheries, University of Rhode Island, and the Gulf of Maine Lobster Foundation all agreed to be project partners in developing the plan. A public event, officially announcing the grant awards was held September 9 where CFRF presented a poster of the proposed work and results from this 11th Hour Racing project. Connections to more stakeholders, including presentation of project results to Clean Ocean Access and Keep Blackstone Valley Beautiful were made.