Functional Breaking Strength of Vertical Lines in the Gulf of Maine

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The population of endangered North Atlantic right whales, *Eubalaena glacialis*, is in decline and new federal regulatory measures for fixed gear fisheries aim to reduce the rate of serious injuries and mortalities due to entanglement. In 2018, the Maine Department of Maine Resources (DMR) was awarded funding through the Section 6 Species Recovery Grants to State program to develop a baseline of information for vertical line distribution, functional breaking strength, and hauling strain. To assess the functional breaking strength of ropes used in the Gulf of Maine, project partners collected and broke over 200 vertical line samples from fishermen throughout the Maine, New Hampshire, Massachusetts, Rhode Island, and offshore lobster fisheries. The manufacturers and types of rope varied and the average age of the rope ranged from three to six seasons. Preliminary findings show that rope diameter, age, and modifications (presence of knots and splices) significantly affect rope breaking strength. Project partners also hosted a rope breaking workshop in summer 2019, where lobster license holders tested the functional breaking strength of more than 20 vertical line modifications that might meet 1700lb breaking strength requirements. After the workshop, DMR identified seven rope modifications for further development and tested 10 samples of each. We will present the findings of the functional breaking strength of new and used rope in the Gulf of Maine and how these data, along with the outputs of the rope workshop, can be integrated into the regulatory measures to reduce vertical line entanglements.
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Project collaborators

NOAA’s Section 6 Grants to States Program

- State agency partners: RI, MA, NH, ME
- Industry partners:
  - Maine Lobstermen’s Association
  - Massachusetts Lobstermen’s Association
  - Atlantic Offshore Lobstermen’s Association
- Other:
  - FB Environmental Associates
  - University of Maine
The Why

- “Weak” or 1700lb breaking strength line gained traction with some members of the Atlantic Large Whale Take Reduction Team as a gear modification
- What is the fishery currently using in their gear?
- How can this be implemented safely into the fishery while keeping costs low?
- Gear modification an integral component to Maine DMR’s pending risk reduction proposal to NMFS
- Provides a level of risk reduction for all ropes remaining in water after any vertical line reductions are put in place
Methods: Vertical line breaking strength

- Collecting vertical line samples from fishermen throughout New England

- Data collected:
  - Location fished
  - Average traps per trawl
  - Rope type
  - Rope diameter
  - Seasons fished
Methods: Vertical line breaking strength

- 215 tests
  - 115 lengths of line
  - 73 knots
  - 27 splices

- Age of rope generally ranged from 3–6 seasons

- Samples included a variety of manufacturers and types of rope
* When 2 different diameters were used, knots and spliced stayed with larger diameter rope 100% of the time.
Preliminary Results – Rope breaking

- There is a relationship between diameter and the breaking strength of the line

- Knots and splices weaken the line and breaks will occur at these points

- Where 2 different diameters of rope are knotted or spliced together the rope will break on the smaller diameter side
* The majority of rope being fished is modified with both knots and splices.
* Most donated rope was between 1 – 6 years old.
* Rope breaking strength decreases with age
Weak Point Workshop
## Weak Point Workshop

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<th>trial 1</th>
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Next Steps

- Continue work with weak points working with industry
- Work with manufacturers to create new in-line weak links that would go through the hauler more easily
- Use load cell data to ensure that the weak point gear modification can be implemented into the fishery safely
  - University of Maine work
  - Load cells integrated into the vertical line
- Outreach
Acknowledgements

Thank you to staff at Maine DMR, FB Environmental, and partners
Hundreds of fishermen from Maine to Rhode Island and offshore Area 3 for participating in the project, donating vertical lines and filling out surveys

NOAA’s Section 6 Recovery Grants to States Program
NA18NMF4720084