

**Atlantic Large Whale Take Reduction Team
Whale Release Rope and Gear Marking
April 3-4, 2018
Key Outcomes**

Overview

NOAA's National Marine Fisheries Service created two subgroups of the Atlantic Large Whale Take Reduction Team in 2018 to brainstorm the feasibility of (1) whale release rope and gear marking and (2) ropeless fishing in fixed gear fisheries. The subgroups' deliberations will inform the Atlantic Large Whale Take Reduction Team's efforts to produce a long-term framework for the further reduction of mortality and serious injury of large whales in US waters below their potential biological removal levels. These outcomes review the deliberations during an in-person meeting of the whale release rope and gear marking subgroup.

Participants at April meeting:

- Subgroup Participants: Terry Alexander, Cheri Patterson, Megan Ware, Amy Knowlton, Caroline Good, Bill McLellan, Beth Casoni, Patrice McCarron, Erin Summers, John Haviland, Grant Moore (for David Borden), Arthur Sawyer, Bob Glenn, Barb Zoodsma,
- NOAA staff: David Morin, Colleen Coogan, Mike Asaro, Ainsley Smith, Mark Minton, John Almeida, Chip Lynch, Peter Burns, Eric Thunberg, Christin Khan, Peter Kelliher, Nick Sisson
- Invited Guests: Dr. Ed Trippel (Canada DFO), Dr. Laurens Howle (NARWC and Duke), Brian Morrison (IEc, by phone for presentation), Myron Horzesky (Ketcham Supply Co., for brief period in the afternoon of day 1)
- CONCUR: Scott McCreary, Bennett Brooks
- OTHER: Sharon Young (TRT member), Pat Keliher (Commissioner, Maine DMR), Rene Cloutier (ME Marine Patrol), Erica Fuller (CLF)
- PRESS: Sarah Kaplan (Washington Post) attended part of day one

Meeting Materials

Background materials on whale release, or [weak rope](#), and [gear marking](#), and the in-person meeting [Agenda](#) reflected the discussion and [Key Outcomes](#) from a February 26, 2018 teleconference of this subgroup. Printed meeting materials can be obtained by contacting Colleen.Coogan@noaa.gov, or by phone at (978) 281-9181.

Summary:

Below is a brief summary of the main topics and issues discussed during the meeting. This summary is not intended to be a meeting transcript. Rather, it provides an overview of the main topics covered including action items.

DAY 1:

Welcome and Introductions

Mike Asaro opened the meeting by thanking participants for their effort and reminding them that the purpose of this subgroup meeting is to investigate the feasibility of weak rope and gear marking of fixed gear, and to create a report back to a full meeting of the ALWTRT in the fall of 2018.

Subgroup investigations, as a structure to support deliberations of the full TRT, will be restricted to investigating feasibility, with no decision-making or conclusive information toward a rulemaking track. Any consideration of changes to the take reduction plan will only occur in consultation with the full Take Reduction Team.

Scott McCreary and Bennett Brooks reviewed operating protocols, terms of reference, and the agenda. They also reminded subgroup members that participants are responsible for reporting out to their constituent groups and bringing information from their constituents back to the subgroup. Overview slides summarizing Agenda items can be found [here](#).

Gear Marking Presentations

Retrieved Gear Analysis

Dave Morin provided the gear team's analysis of the gear retrieved from large whale entanglements documented between 2007 (when sinking ground line was first required) and 2017. The presentation can be found [here](#), and included some key points that generated discussion and questions. The gear team's analysis of retrieved gear include the following notable observations:

- Weak links appear to be working for gillnets, with few gillnet panels involved in observed entanglements.
- Endlines are retrieved more often than groundlines.
- Although $\frac{3}{8}$ " rope has been reported as the most commonly documented rope diameter for retrieved line from all large whale species, more than half of the lines retrieved by or provided to NMFS from right whales since 2008 have involved lines of diameters greater than $\frac{3}{8}$ inch.¹
- Since gear marking requirements were amplified, about 40% of recovered gear can be identified by gear marking, roughly twice as often as prior to current marking requirements. Most recovered gear is unmarked.
- The gear team is interested in learning more about Canadian snow crab gear and will be working with Ed Trippel on that. Canadian lobster gear uses rope diameters of primarily $\frac{3}{8}$ to $\frac{1}{2}$ inch; snow crab uses primarily $\frac{5}{8}$ inch but up to $\frac{3}{4}$ inch.

Questions and points of discussion generated by the retrieved gear presentation:

- Request for analyses to consider probability and preponderance of evidence or describe level of possibility in some qualitative way even if we also keep "forensic" level conclusion. For example instead of "consistent with some trap/pot gear", make it "uncommon in US trap/pot gear so unlikely but cannot be entirely excluded" or "very similar to Canadian large fixed gear rope"

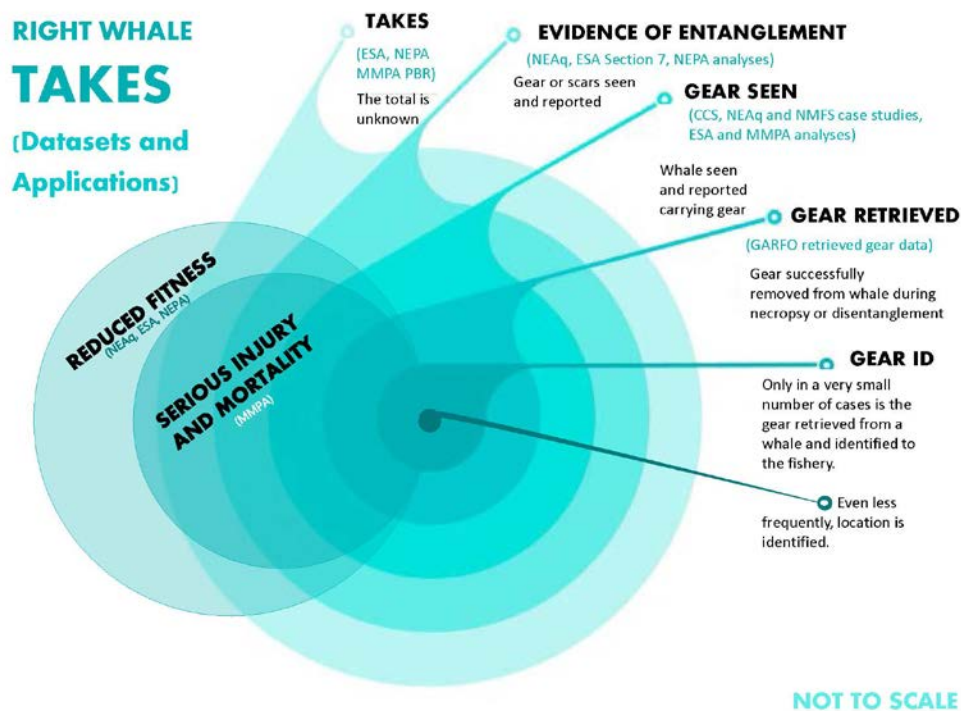
¹ There have been 20 right whale cases (out of 56) since 2008 in which line diameter was documented. Many of these cases had gear recovered that had more than one line diameter. Four cases had a line diameter of $\frac{5}{16}$ ", eight cases had $\frac{3}{8}$ " and seventeen cases had line diameter that was larger than $\frac{3}{8}$ " (up to $\frac{7}{8}$ "). $\frac{5}{8}$ " line diameter was the second most commonly identified size, with seven cases. Note that the estimate of line diameter size is likely skewed towards smaller line as we do not have the measurements for about half of the cases determined to be Canadian snow crab.

- Requests for new and retrospective analysis to include additional information on the portion of the rope retrieved to see if that would guide where markings should be.
- Consider benefits of greater buoy marking - with a chip for retrieved buoys, with a marking visible from air/vessel. Buoy end seems to be retrieved about ¼ of the time and could be an opportunity for more effective marking. OLE can track gear owners down through state and federal permit numbers on buoys but markings are sometimes unreadable.
- If gear analysis and disentanglement experts think retained buoys do not worsen or complicate the entanglement, consider whether weak link requirement can be removed, or if weak link should be moved down the rope to retain buoy but break above traps.
- Consider adding and analyzing frequency of rope diameter retrieved/document by species.
- Identify presence or absence of weak links or evidence of links back to first use (1997). May be limited since hog rings, if effective, break off so would not be attached; swivels are sometimes observed.
- Photo documentation: take photos of the gear twisted, and untwisted. May provide information on configuration of entanglement
- Request for an analysis of all entanglements, not just retrieved gear. Clarify how this retrieved gear analysis (includes only the subset of entanglements from which gear is collected) relates to:
 - Serious injury and mortality determinations (includes a different subset of entanglements - those that result in serious injuries or mortalities but may not result in retrieved gear), and
 - Aquarium analyses (includes all documented/observed entanglements and entanglement scars, and classifies serious injury differently than NOAA).

See graphic below.

- A simple presentation on number and severity of entanglements by year would be helpful towards determining what is changing for whales, how existing measures are working and what we need to change.
- Request for an analysis that identifies the last known location of right whales before they have scars compared to where they are first documented with scars or attached gear to see if location emerges.
- Request for an update of related information - a chart with the plotted last known locations of marked gear retrieved from right whales. Noting that recovered gear and entanglement report location and frequency reflects observer effort to a large extent and does not tell the entire entanglement story. For example, the high number of monofilament reports for humpback whales likely reflects the large number of recreational fishermen sharing Stellwagen bank with whale watchers during summer months, resulting in high incidents and high observations.
- Request for a summary of entanglement gear information. NMFS gear team is finalizing a spreadsheet summarizing retrieved gear data, anticipated completion summer 2018.
- Request to look for trends in severity of entanglements. Have they increased in severity since 2010?

Infographic showing relationship and use of various sources of “take” data:



Fixed gear effort distribution model updates

Brian Morrison, of Industrial Economics (IEc) provided a [webinar](#) to show the new queryable features of the “co-occurrence model.” The goal is for the TRT to be able to use the query features to evaluate options in real time during TRT meetings. The infrastructure of the database has been updated and quality control and data updates are underway. Brian identified the data that have been updated so far, and provided a demonstration of how the model will work and the kinds of queries that will be possible, once the model and database are completed. Some details/concerns were discussed during the subsequent conversation that largely reflect the continued limitations of the data available for input into the model:

- Whale sightings data from Canadian waters that have been shared with the Consortium have been added to the database. May be able to get additional Canadian sightings data. At this time there are no data on Canadian fishing effort. TRT members requested prioritization of adding Canadian effort data before the October full TRT meeting.
- The model displays effort data in 10-minute cells but the actual effort data collected are reported at various spatial resolutions; the lobster fishery has historically reported via NOAA stat areas and state-specific inshore regions. As a result, the model implies finer spatial resolution than the data supports and information about effort levels in specific regions might be interpreted inaccurately
- Effort and location data are reported differently in Maine (only 10% of permit holders are required to report) than in other states. This is not apparent in graphics.
- Concern was expressed that using the same map and scale to represent sightings/distribution data collected from many sources could result in a biased view of whale occurrence. Massachusetts has high surveillance so the high abundance of whales

might not be directly comparable to areas with only opportunistic surveillance. Even with right whale shifting distribution, however, Cape Cod Bay, Great South Channel, and other Massachusetts waters such as offshore of the islands continue to be used by a large portion of the right whale population in some months.

- To prevent the appearance of confidence, and equality of resolution, in effort distribution across the region, there was a suggestion to somehow illustrate the varying levels of resolution.
- There are constraints due to the lobster data available under current reporting requirements. Data limitations going into the model continue to limit the usefulness of the output. NOAA and IEC worked with the ALWTRT's monitoring subgroup to identify needed improvements in reporting. The resulting survey will go through Paperwork Reduction Act Clearance and will be included in the annual Marine Mammal Authorization Program Mailing to fixed gear state and federal permit holders in December 2018 or January 2019.
- TRT members have been asked for input on the model in the past and can continue to provide input directly to IEC.

Summary of subgroup suggestions about the model:

- Closures should be reflected in effort layer. As demonstrated at the meeting, the Massachusetts Restricted Area closure was not apparent in the monthly fishing distribution data. The model showed trap/pot gear during months and in years where the closure was in effect.
- Add any known bathymetry limits, such as assuming that all lobster gear is set within the 600m line per a recent NEFMC habitat analysis.
- Incorporate past QA/QC comments from peer review into model.
- Somehow, illustrate differences in resolution of sighting and reporting effort and data.
- Add Canadian effort data.
- If this is going to be used to illustrate whale distribution, there are larger data sets not in here and other models exist that should also be considered.
- Limited use for right whale distribution data due to great variability between years and variable sighting effort.

Retrieved Gear Examination

Mark Minton assembled and displayed gear retrieved from right whale entanglements that occurred between 2010 (after the sinking ground line rule went into effect) and 2017. In small groups, Subgroup members examined the totes of gear and made the following observations:

- Very few ropes were recognizably marked with Take Reduction Plan marks. Of the 13 entanglement cases with gear in the room, only two were identifiable from markings, both from US lobster fisheries. Other gear retrieved from right whales were either from non-compliant gear or from fisheries or areas that are not under the TRP gear marking requirements.
- Most of the ropes and lines appeared to be relatively heavy, large, diameter

- Observed characteristics for a few cases were considered to be uncommon in US fisheries including: unfamiliar splices, larger diameter rope, manufactured tracers (not TRP markings) integrated into ropes.²
- Gear is only retrieved from a small percentage of observed entanglements. Consider identifying characteristics that could be recorded from sightings where gear is not retrieved. Perhaps qualitative, but patterns may emerge from the larger data set.

Gear Marking Discussion

The gear observations led to a discussion about gear marking. As documented in Dave Morin's retrieved gear analysis, the last revision to the TRP gear marking requirements doubled the amount of marking and the result was a doubling in the percentage of identifiable retrieved gear. There was general acknowledgement that gear marking in itself does not reduce threat to right whales but provides valuable documentation about where interactions occur and is therefore valuable.

The discussion led to identification of the following categories to explore feasibility of changes to the Plan's gear marking requirements:

- **Geographic changes**
 - All US Atlantic fixed gear? Coordinate with Canada and encourage consideration of gear marking for all fixed gear in Canadian waters.
 - More colors to differentiate geographic areas, target species, depth or distance from shore fished
 - More combinations to create greater differentiation? An observation was made that gillnet currently has little differentiation, although the gear team indicated they were able to identify the source of gillnet gear retrieved.
- **Placement and frequency on end lines:**
 - Current regulations do not identify how close to top or bottom of line marks need to be. Consider requiring them closer to buoy.
 - Add marks at closer intervals. According to a retrieved gear review by John Kenney, reported in 2009, if rope was marked every 12 feet, 95% of the retrieved rope would be identifiable. If marked every 40 feet, potential retrieved gear identification would occur up to 90% of the time.
 - Use more colors to differentiate areas, target species, depth fished or distance from shore (preferred over depth fished?)
 - Consider changing or being more specific regarding the placement of the gear marks along the rope; particularly consider requiring marks close to the buoy and perhaps close to the traps if these are the parts of gear more commonly retrieved.
- **Technological changes - no new clearly available and perfected technological advances**

² Note that the gear team, along with Dr. Trippel, conducted an intensive gear review in June 2018 and identified Canadian snow crab gear in three of these cases:

- A disentangled right whale first spotted off of Amelia City Florida in February 2014 (right whale #4057);
 - A deceased right whale #3694; first spotted on September 23, 2016 off Seguin Island, ME
 - A disentangled right whale #3530, "Ruffian"; first spotted on January 5, 2017 off Cumberland Island, GA
- A 2018 case not represented at the meeting: deceased right whale #3893' first spotted on January 22, 2018 off Virginia Beach, VA, was also attributed to Canadian snow crab by gear team in June.

- Some snow crabbers are voluntarily using plastic tape incorporated into rope with information about source of the gear
- Consider safety - cannot have anything sharp protruding from the rope.
- Operation - must be able to withstand commercial conditions, easily pass through haulers
- Scaling new technology, such as a chip implanted into the rope, across all gear/ropes would be a challenge.
- Consider using technology to better mark buoys. Pit tags are readily available; could identify a fisherman and allow invaluable interview opportunity.
- Simple modifications such as weaving in Tyvek labels might be a low-tech way to add information without causing lines to wear faster (zip ties, bird clips), or falling out or becoming unreadable (coded wire, metal tags). Tyvek strips woven into rope are currently being casually tested by commercial fishermen working with John Higgins. Need to determine whether they will cut hands or fall out.

General observability was discussed under all themes.

- Consider changes to make gear visible on entangled whales from vessels and aircraft even if NOT retrieved. Consider visible buoy markings to identify area (or country) fished. Current state buoy marking requirements do not include a color component. Consider requiring longer marks on line so they can be seen from vessel/low airplane height.
- Caution that gear that can be seen on the whales from a vessel is not all the gear; some whales carry gear from multiple entanglement events.
- Consider developing standard terminology, even if qualitative, to describe gear observed from platforms: light line, heavy line, etc. to see if patterns emerged.

Myron Horzesky from Ketcham Supply was able to participate briefly in a discussion of rope production and distribution. Currently most production occurs out of the country, fishermen buy from distributors and from each other, not usually directly from producers. Reuse of gear is an industry standard - with certain care characteristics, rope can last in commercially usable condition for up to 10 years.

Some brands use tracers for some rope normally as a branding technique, not structural. Fishermen could order rope with specific tracers, but to create specific kinds of line, a minimum initial run of 40k lbs for 7 or 8 diameters of rope would be needed. The manufacturer's sale of rope cannot be regulated so any extra rope created from a special order for a certain fleet could be purchased by other mariners. Purchasers want the best deal on rope that is strong enough to be appropriate for the job they are doing - whether fishing or cutting down trees.

Fishermen use seasonal down time to mark rope, generally about once a year when gear is hauled and stored; so any changes to gear marking should consider seasons.

Breakout group gear marking discussions

The subgroup was divided into four small groups to discuss feasibility of modifying gear marking under the four themes that emerged from our initial discussion and retrieved gear review:

geographic, technology, frequency, and placement. Each group included at least one fixed gear fisherman but was otherwise randomly assigned based on seating arrangements. The breakout groups were asked to “discuss ways to articulate these feasibility concerns and identify further research need. Consider selecting a “rating” such as whether the feasibility consideration represents a big, medium, or small challenge”. Their notations can be found [here](#). Some summary observations:

- Geographic: general observation that expanding current gear marking geographically and perhaps providing more marking regimes to improve area resolution could provide valuable data.
- Technological: no new breakthrough was identified that was safe, affordable, and hardy enough to withstand commercial fishing conditions. Further discussion of using coded wire tags to mark buoys suggested.
- Frequency of marks: increasing the required number of marks was considered likely to improve our ability to identify retrieved gear. If the same practice (paint, tape tracers) were required, it could be done without too much difficulty but hopefully could retain elements of the current color scheme. Longer/larger marks that could be seen from vessels and surveys is worth discussion.
- Placement change: A specific placement requirement particularly for the top and bottom mark - close to the buoy and close to the trap, was suggested, as it appears that retrieved end line tends to be from a break close to the buoy. Requiring precision between marks could make it difficult for fishermen that move offshore and splice in line. Buoy marking would be easiest.

Overall take: We need to sharpen the problem definition for gear marking to define more precisely the problem that gear marking changes should fix. Feasibility issues primarily related to cost and cost of time. Expanding gear marking, however, was acknowledged as valuable if it can provide further data to illustrate where gear is not involved in entanglements.

Whale Release (Weak) Rope Presentations

Entanglement severity, breaking strength relationship

Amy Knowlton reviewed an [overview of right whale entanglement impacts](#). New England Aquarium’s assessment shows greatest frequency of serious injury and mortality of right whales in lines with breaking strength greater than 1700 lbs. Amy reviewed evidence supporting a number of reasons the effects of right whale entanglements need to be reduced, including:

- Increase in severe entanglements in recent years.
- Increase in the percentage of the right whale population with entanglement scars.
- Drop in right whale fitness, as evidenced by body condition.
- Disproportionate impact on reproductive-aged females relative to other demographics.
- Drop in fecundity/ increase in calving intervals.

These right whale population trends pre-date 2017, but were exacerbated by the 2017 extreme mortality event. Assessment of causes of declining right whale conditions and trends is complicated by environmental and associated right whale /distribution changes; however, it appears that entanglement is contributing to reduced fitness causing reduced reproductive rates in female right whales. Recent low calving rates have resulted in a population with fewer juveniles

than expected, further depressing the potential rate of future recovery. Prey and right whale distribution changes have decoupled whale protection measures from whale distribution.

Given the difficulty determining the potential effects of changes in prey distribution and abundance and other ecosystem changes documented since 2010 on right whale distribution and fitness, Amy was asked to review the right whale catalogue to see if health trends in non-entangled whales could be compared to entangled whales to try to tease out the relative contribution of apparent ecosystem changes on right whale fitness.

There was some discussion on the possibility that the infrequency of serious injury and mortality of right whales in ropes with breaking strength of 1700 lbs or less might reflect the relative low abundance of rope of this strength in fixed gear fisheries.

Impacts of zika virus and the Deepwater Horizon accident on the North Atlantic right whale population were determined to be unlikely based on the lack of any clear life history linkages, necropsy results, or credible scientific evidence. Other threats that may affect the health of the right whale population, including environmental noise that may be exacerbated by seismic testing and wind energy development in the Atlantic, were acknowledged. NMFS and the federal agencies involved in those activities conduct consultations to evaluate impacts and identify measures to reduce effects; the TRT's efforts should focus on fishery effects. However, NMFS will look into presenting an acoustic webinar for the Large Whale TRT in the Fall so TRT members can understand other challenges to right whales.

Whale entanglement model

Lars Howle presented the model he has been working on to attempt to illustrate how whales may be reacting to line in the water column in a way that results in the configurations observed in entanglements. The model illustrates points of tension on the rope where breaks can be expected to occur if whales are doing what the model shows. Essentially, it illustrates the constant forces on stationary gear as the whale impacts the gear; tension is greatest near the area of interaction. The model suggests that entanglements that occur deeper in the water column are likely to stay on the whale longer. If entanglement analyses could identify where the whales tend to encounter the line that could inform placement of sleeves, weak links or other breakaway technology. Model had not yet looked at changes in entanglement risk caused by varying whale activities - such as feeding whales encountering rope in mouth first. The model cannot yet consider varying rope strengths above 1,000 lb breaking strength.

DAY TWO:

Recap of Day One:

Industry subgroup members expressed concerns about the reliance of current measures on the co-occurrence model and the past whale distribution data in the existing co-occurrence model. Existing measures include large seasonal area closures that affect Massachusetts fishermen but, if whales are not there, do not provide any conservation benefit. Now that it is clear distribution is shifting, there is less confidence about the effectiveness of some existing measures and difficult to accept making further changes without some assurance of effectiveness. Additionally, industry expressed concerns that Canada's measures are not as comprehensive as US measures; U.S. fishermen have already done a lot to reduce takes, existing US measures haven't yet been evaluated, they believe there is little proof of entanglement in U.S. gear and are reluctant to add more measures. However, they were reminded that even with the current redistribution of right whales, they still spend the majority of the year in US waters for calving, transit, and feeding. With so few whales and such challenging threats, further work needs to be done soon to reverse the decline in the whale population. While annual entanglements attributed to a specific U.S. fishery may be low, many entanglements are not observed, very few are observed at the actual site of the entanglement, and gear can usually not be identified to fishery.

Whale Release (Weak) Rope Presentations (continued)

Maine Load Cell Testing Update (testing breaking strength of rope commonly used in Maine fixed gear fisheries): Erin Summers of the Maine Department of Marine Resources discussed her [work to characterize existing hauling forces in Maine](#) commercial fisheries. She has logged 139 trawls on 16 trips out to 75 fathoms and under many weather conditions and captured gear conflict sets (gear hauled up after other gear was set over the trawls). Erin is collecting data on diameters of line fished, types of surface systems and other configurations. Her goal, extended to other New England states (Maine through Connecticut) through a recent grant from NMFS, is to create a baseline for the region. Results so far have measured most hauls at between 500 and 1200 lbs; however, maximum cell loads of 1889 lbs were recorded, particularly when traps were laid across one another. The Department of Marine Resources (DMR) three-year NMFS Species Recovery Grant will allow them to work with fishermen in Maine, New Hampshire, Massachusetts, Rhode Island and Connecticut: documenting how commercial fishermen use gear and measuring the functional breaking strength of rope being fished under various conditions and gear characteristics. Preliminary results are anticipated in 1.5 years.

Some comments and discussion specific to the presentation:

- Ensure groundfish longline and gillnet gear area also tested.
- Add red crab, offshore lobster, jonah crab, slime eel.
- Consider testing south shore sleeves;
- Consider testing configurations with ground line extensions, anchored tow rope or extensions between traps.

- Testing southern fisheries should be considered.
- The load cell testing gear costs approximately \$1,800.

Time tension line cutters were also discussed. John Higgins described how parameters can be dialed in to set the cutter; for example if tension on the line meets 1,000 lbs, it can be set to pull about ½ inch over 15 minutes, after which a knife cuts the line off. Currently the system is the size of a ketchup bottle and made of plastic. He considers it not fully operational, particularly concerned about safety when hauled over pot hauler. Patrice agreed. Maine lobstermen tested 10 of them. They ran into some engineering kinks; found them dangerous to haul, worked better with a jumpline that warned the fisherman that the line cutter was coming up soon. Not ready for primetime but interesting in concept.

What strength rope do fishermen need? Amy Knowlton [presented](#) load cell testing conducted with Mike Lane essentially to document operational loads on rope as well as conditions that affect the loads on the rope. Using software created to understand strains placed on ropes, they evaluate various static and dynamic characteristics of strain on ropes used under commercial conditions. A few of their findings:

- Maximum strain was measured right before the first pot was brought on board especially when multiple pots were suspended in the water column. Gear size/weight (line and pot dimensions) influence strain.
- Tension increases with speed of hauler, water velocity, wave height.
- Operational changes can reduce strain: reduce hauler speed, extend the groundline between the first two pots and to reduce the number of pots in the water column, keep vessel over the top of the gear.

Tim Werner's weak rope trials, which tested ropes of 600 and 1200 lb breaking strength rope during 2006-2008, were reviewed. Although fishable in many places, these lines were not considered ideal for rocky bottom or areas with strong currents.

South Shore Lobstermen's Association weak sleeve research was also described. Brightly colored sleeves (cost of sleeve not including installation is about \$2.00) were spliced into end lines at 40-foot intervals. Made by Novabraid, which may be able to produce larger sized sleeves for offshore vessels. The cost is approximately \$2.00 per sleeve (not including installation).

The discussion that followed these presentations noted that while both Maine and Massachusetts load cell results suggested most hauls did not reach 1700 pounds. However those hauls with greater strain caused by snags, overlays, etc., would pose serious safety concerns and risks. Offshore, much stronger rope would be needed for fishing trawls of 25-50 pots at 250 fathoms. Cordage Institute guidelines (precautionary standard, not currently followed in commercial fisheries) would suggest that if the load is anticipated at 1,000 lbs, rope with a 5,000 lb breaking strength should be used. In areas such as offshore, if reconfiguration to reduce severity of entanglements is not feasible, reduction in the number of end lines was suggested.

Four potential end line reconfiguration options were identified for further feasibility characterization and discussion in small groups:

- Light tagline attaching buoy to an anchor, trap, or stronger hauling line on the bottom, with an extended groundline ahead of the full trawl so that the tagline does not have to lift multiple traps.
- South Shore weak sleeves
- 1700 pound breaking strength
- 3/8ths diameter rope

Small group discussions re feasibility of weak rope configuration alternatives:

The subgroups were split up into four breakout groups to further discuss the feasibility of the four reconfiguration alternatives identified, and to consider whether there were feasibility differences inshore vs. offshore waters (for the purpose of this exercise, inside or outside of the 300 ft bathymetric curve). Each group had at least one fisherman, but other breakout group members were randomly assigned.

Tagline to extended groundline: Tagline to bottom, connected to stronger haul rope that is extended the depth of the water column or more so that the stronger line hauls the trap trawl. Alternative configurations would have the tagline connected to an anchor or a weighted trap that pulls up an extended groundline prior to reaching the trawl (so no more than one anchor or trap is in the water column at a time while tagline is hauling).

The tagline breakout group indicated that inshore, the tagline would have to be twice as long as the depth fished; in Downeast or other areas with strong currents, it would have to be 3 times the length of depth fished. Depending on the tide on hauling, the towing line would not be perfectly straight over the trawl.

Offshore, two configurations were identified. One would have the tagline connecting to and acting as a release for a stronger tow/hauling rope, which they suggested had to be float rope to prevent abrasion on bottom. The other configuration would have the tagline reaching down to an anchor (could be weighted trap) with an extended (floating) groundline 2 to 3 times the depth being fished that would be used to haul the full trawl.

Feasibility characteristics or questions:

- How would 300 fathoms of tow rope be stored on the bottom?
- In-season reconfiguration impractical if not impossible.
- Hauler may have to be reconfigured to receive lines of varying diameters.
- Floating line on bottom, either stowed or as the groundline extension that will be used to haul the trawl, hazardous to whales if it floats high into the water column.

- At what depth is this not possible? When does the bottom extension/hauling/towing line connecting tagline to tow rope, or tagline to anchor or first pot, get too long? For example, if 100 fathoms of line is needed between the anchor and the first pot, how high does that rope float in the water column?
- Boat storage/deck space would be needed for extra line.

Weak sleeves - Early testing suggests that in the limited areas and fishery tested, the sleeves are operationally feasible in commercial lobster gear. Given concerns about time, cost and possible increased potential of gear loss, if sleeves were considered equivalent to other management options, fishermen fishing in some areas might choose the sleeves (over closures, or more expensive or less tested options). Uncertain about feasibility of use at all depths and conditions throughout range of fixed gear fisheries.

As indicated by load cell testing observations, there is usually not much strain on the top 40 feet of the buoy line during normal commercial operations, so rather than requiring a sleeve every 40 feet, the inshore industry preferred one sleeve within 40 feet of the buoy. Offshore industry was concerned about the labor and time that would be required to install a sleeve every 40 feet at depth, as well as the ability of a line with inserted sleeve to haul heavier offshore gear.

If multiple sleeves would be required, consider allowing sleeves to replace current marking protocols (paint, tracers, tape). Can rope manufacturers create sleeves in multiple colors at a reasonable cost?

Feasibility challenges: potential cost of lost gear, cost of installation labor, uncertainty about feasibility across all conditions and depths. All of these exacerbated offshore.

Testing needs:

- Suggest pilot program in high risk areas, with endline sleeves every 40 feet in the nearshore (within 300 feet). Recognize that it would need TRT and NMFS approval if used in areas that are currently closed.
- Suggest further testing in dense gear areas (where there may be more frequent tangles or overlays) and over a broad range of habitats.
- Offshore, test to determine placement frequency needed. Test sleeves with greater breaking strength. Concerned about the feasibility of using 1,700 lb breaking strength line AND sleeves to haul gear set in deep water.

1700 lb maximum breaking strength - This breakout group acknowledged that 1700 lb breaking strength rope is feasible and already used in some inshore commercial fisheries:

- Skiffs fishing single or double lobster pots
- Blue crab pots
- Whelk pots
- Inshore lobster trawls with aged rope

- Some South Shore Cape Cod Bay fishermen

Feasibility offshore was a great concern. May be possible to halve the number of heavy lines while accommodating tides, currents, depths, hauling requirements offshore with a buoy endline of 1700 lbs or less breaking strength to mark one end of each offshore trawl, with the heavier buoy line at the other end.

300 ft bathymetric curve not considered useful for an inshore/offshore distinction: suggest using existing lobster management areas, or use distance from shore (inside 3 mile, between 6 and 12, beyond 12). When testing gear and developing best practices guidance, however, depth is likely to be an important element.

3/8" line - Amy Knowlton's overview of right whale entanglements showed that most adult and large-juvenile right whales from which gear has been removed have been entangled in line greater than 3/8ths inch, (although calves and small juveniles have been in 3/8 inch rope diameter). Three eighths inch is a standard rope diameter used in the inshore and nearshore Maine lobster fisheries. Therefore, for inshore pot gear at least, using 3/8 inch diameter line is feasible. Brand new, [3/8 inch polypropylene line has a breaking strength](#) of approximately 2,200 - 2,400 lbs. Some 3/8" ropes (Polysteel, Esterpro) have breaking strengths of 3,700 lbs. Knots and splices could reduce breaking strength to create a 1,700 lb breaking strength equivalency.

Feasibility concerns:

- Offshore use.
- Potential for knots to be caught in baleen.
- Variability in material so that all 3/8 inch would not have equal benefits

Research needs:

- Actual breaking strength of 3/8 inch rope with knots
- Past observations of effects of knots on entanglements (strandings and disentanglements)
- Effects of 1700 lbs of force in comparison to sleeves

Wrap Up Discussion:

The conversation will benefit from having a more specific conservation goal. Other TRTs have the benefit of higher Potential Biological Removal numbers that allow for multiple mitigation paths to reach goals. The low right whale population, reduced fitness and reproductive rates, ship strike and entanglements in Canada illustrate challenges across right whales' range that amplify the impact of every entanglement.

Industry expressed concerns about wholesale changes across the industry that may not be deemed effective or sufficient, as has happened in the past. Emphasis on ensuring fishermen buy-in to any package of solutions developed which should include regionally tailored measures.

The breakout groups would benefit from a more deliberate team makeup, including facilitators.

Next Steps:

- Finalize and distribute Key Outcomes document - Colleen will draft with input from subgroup.
- Colleen will use Key Outcomes to draft a detailed outline of the feasibility report for early subgroup input and may request a report drafting team to participate in drafting a report in July.
- NMFS will prepare a document characterizing the extent of US fishery interactions with right whales to inform the discussion at the October TRT meeting.