Mitigation Strategies for Mysticete Gillnet Entanglements in the Western North Atlantic
Scott Landry¹ and Scott D. Kraus²
¹ Provincetown Center for Coastal Studies
² New England Aquarium, Boston, MA 02110

Worldwide Gillnet/Mysticete Entanglement Records

Right Whales *
Fin Whale *
Sei Whale
Brydes Whale
Minke Whale *
Humpback Whale *
Gray Whale
Pygmy Right Whale

* North Atlantic Records
Right and Humpback Gillnet Entanglements
Gulf of Maine 1999-2011

Recorded Mysticete Mortalities and Serious Injuries in Gillnets: 1977-2007

<table>
<thead>
<tr>
<th></th>
<th>minke</th>
<th>right</th>
<th>fin</th>
<th>hump</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977-007</td>
<td>US</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1990-2010</td>
<td>Canada</td>
<td>18</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
ALWTRT Nov 1997: fishermen can select 2 of 7 options –
• 1. All buoy lines are 7/16 inches in diameter or less.
• 2. All buoys are attached to the buoy line with a weak link having a maximum breaking strength of up to 1100 lbs. Weak links may include swivels, plastic weak links, rope of appropriate breaking strength, hog rings, or rope stapled to a buoy stick.
• 3. Gear is anchored with the holding power of a 22 lb danforth-style anchor at each end.
• 4. Gear is anchored with a 50 lb dead weight at each end.
• 5. Nets are attached to a lead line weighing 100 lbs or more per 300 feet.
• 6. Weak links with a breaking strength of up to 1100 lbs are installed in the float rope between net panels.
• 7. All buoy lines are composed entirely of sinking line.
WEAK LINKS FOR BUOY, FLOTATION OR WEIGHTED DEVICES
The intent of the weak link requirement is to allow the release of the buoy, flotation or weighted device from the line in a way that when they release, the remaining line (that was connected to these devices) will not have a knot on its end. An eye left on the line made by splicing, tucking or hog rings is acceptable. Splices are not considered to be knots. Note: Weak links must be placed as close as operationally feasible to each individual buoy, flotation or weighted device.

Hog Rings
Hog rings can be used to form an eye in the end of a line that will function as a weak link. Up to 7 may be used to create a 600 pound weak link and up to 5 for a 500 pound weak link. No significant variation was noted between wet and dry tests. Also, the length over which the hog rings were distributed (from 6" to 12") did not significantly affect the strength.

Modified Swivels
Some swivels can be modified to conform to the weak link requirement by compromising their strength where the line attaches. However, they must be tested by the NMFS Gear Research Team to ensure that they will release in the proper fashion and within the required limits. Lukian swivels with a 9/32" diameter hole and SeaSide swivels with a 3/16" diameter hole satisfy the 600 pound requirement.

Rope of Appropriate Breaking Strength
Another weak link technique utilizes Rope Of Appropriate Breaking Strength (ROABS). A jumper is selected based on breaking strength data from the manufacturer. A length of rope or jumper of appropriate breaking strength may be tied into the buoy, flotation, or weighted device, thus creating a weak link; as long as the failure results in a knotless bitter end on the line. Testing by the NMFS Gear Research Team can make this determination.

Off the Shelf Weak Links
Off-the-shelf weak links are available in a variety of styles and configurations to meet different strength requirements. The strong end of the weak link goes toward the buoy, flotation, or weighted device.

Stapling to a Buoy Stick
Another type of weak link can be created by stapling a rope to a wooden buoy stick to form an eye for the buoy line attachment. However, these must be tested by the NMFS Gear Research Team to ensure that they will release in the proper fashion and within the required limits. When using this method, the buoy line can only be attached by passing the end of it through the eye on the buoy stick once and bringing it back and splicing, tucking or hog ringing to form an eye.

Please note that this is not a substitute for the regulations. For more information, including a supplemental document with specific examples of the weak link techniques and the ALWTRP regulations, contact the NMFS Gear Research Team. John Higgins 307-577-2316, John Kenney 401-204-0443, or Glenn Salvador 757-414-0126 or go to http://www.nmfs.noaa.gov/whaletrp.


**Weak Links for Gillnet Floatline**

Shown at the right are several methods of incorporating weak links into a gillnet floatline. The first two methods create a weak link by utilizing Rope of Appropriate Breaking Strength (ROABS). The top picture shows a weak link jumper spliced into the floatline. The overhand knot in the jumper reduces its strength to about 60% of its original strength. For example, putting an overhand knot in a piece of 5/16" polypropylene that has an original tensile strength of 1710 pounds will make the rope fail with a load of about 1025 pounds. The second picture shows a weak link (ROABS) tied into the float rope with the fisherman’s knots. These knots also reduce the strength of the rope to about 60% of its original strength. Another alternative, illustrated in the bottom picture, shows an off the shelf weak link rigged into the floatline.

**Techniques for Marking Lines**

The 4" colored mark required by the ALWTRP can be accomplished in a variety of ways. Shown are three simple methods that were tested and found to work satisfactorily under normal conditions. At the top, colored twine is seized around the line and woven between the strands. In the center, the line was spray-painted; this method requires that the rope be dry. At the bottom, colored electrical tape was wrapped in one direction and then back over itself to form two layers. See the ALWTRP for information on appropriate color codes and placement of marks.

**Gillnet Anchoring Techniques**

At the right is an example of a burying anchor (designed to hold to the ocean bottom through the use of a fluke, spade, plow or pick) that meets the requirement of the holding power of a 22-pound Danforth-style anchor. Note, dead weights do not meet the requirements for burying anchors.

**Requirements for Marking Surface Buoys**

When marking is not already required by state or federal regulations as described in the ALWTRP, surface buoys should be marked to identify the vessel or fishery with one of the following: the owner’s motorboat registration number, or U.S. vessel documentation number, the federal commercial fishing permit number, or whatever positive identification marking is required by the vessel’s home-port state. The letters and numbers used to mark the gear must be at least 1 inch (2.5cm) in height, block letters or Arabic numbers, and in a color that contrasts with the color of the buoy.

---

Please note that this is not a substitute for the regulations. For more information, including a supplemental document with specific examples of the weak link techniques and the ALWTRP regulations, contact the NMFS Gear Research Team: John Higgins 207-677-2316, John Kenney 401-294-0443, or Glenn Salvador 757-414-0128 or go to http://www.nrl.noaa.gov/wahaetrp/.
• Feb 11 2002: 1 weak link every 25 fms in the head rope, plus a weak link at the endline surface bouys

• July 2007: ban of gillnets in coastal waters of Florida during calving season

• April 2008: increase the number of weaklinks in gillnets to 5 per panel - three on the headrope (one at each end, one in the middle) and one at each end at the middle of the vertical line (bridles) connecting two gillnet panels. Retains the weaklink at the surface bouys. Retains 22lb Danforth Anchoring Requirements. Arrows indicate weak links.
GILLNET OPTIONS FOR NET PANEL WEAK LINKS (NORTHEAST REGION)

Configuration 1:
For all variations in panel size:
- One weak link must be placed in the center of each of the up and down lines at both ends of the net panel, and
- One weak link must be placed as close as possible to each end of the net panels on the floatline.

For net panels 50 fathoms or less in length:
- One weak link must be placed in the center of the floatline.

For net panels greater than 50 fathoms:
- One weak link must be placed at least every 25 fathoms along the float line.

**NOTE:** Individual weak links are not required in locations where rope of appropriate breaking strength is used. Additionally, if no up and down line is present, then weak links are not required at that location.

This graphic depicts a general anchored gillnet gear configuration, which may vary. Also, only the buoy line, groundline, anchor, and weak link configuration are displayed here; please see individual ALWTRP Management Areas for information regarding gear marking and/or any other additional ALWTRP requirements.

Configuration 2:
For all variations in panel size:
- One weak link must be placed in the center of each of the up and down lines at both ends of the net panel, and
- One weak link must be placed between floatline tie-loops between net panels; and
- One weak link must be placed where the floatline tie-loops attach to the bridle, buoy line, or groundline at each end of a net string.

For net panels 50 fathoms or less in length:
- One weak link must be placed in the center of the floatline.

For net panels greater than 50 fathoms:
- One weak link must be placed at least every 25 fathoms along the float line.

This document is intended as a guide to measures required under the Atlantic Large Whale Take Reduction Plan. This document is not the legal document detailing the regulations. Interested and affected parties can find the regulations at 50FR229.32 or at the whale plan website www.naco.noaa.gov/whaletp.
Right Whale Sightings

- Opportunistic Sightings
- Sat. Tagged Tracklines
- 100 m contours

Sightings per unit effort (SPUE)

0  >0  0.06  0.12  0.28  1.69
Acknowledgements

• Bycatch Consortium and NMFS NERO
• NMFS gear team (J. Kenney, K. Higgins, G. Salvadore)
• R. Reeves, K. McClellan, and T. Werner (worldwide data)
• van der Hoop et al. (mortality and SI data)
• PCCS disentanglement teams
• NMFS disentanglement teams
• The U.S ALWTRT for decades of suffering and hard work...