

Gear Marking Discussion Paper

**For Distribution to the ALWTRT
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This discussion paper serves as a summary of the existing marking requirements, including the benefits and limitations, of the current gear markings scheme. This paper also provides a list of available and future marking technologies, including their benefits and limitations. The paper is not intended to be a comprehensive list of possible scenarios or technologies, but rather a general summary meant to facilitate discussion among the Atlantic Large Whale Take Reduction Team (ALWTRT). ALWTRT members are encouraged to combine, alter, add, accept, or decline the options presented within this paper. Ultimately, any vertical line marking scheme formally proposed by NMFS will be drawn from the deliberations of the ALWTRT.

Background

At the 2003 ALWTRT meeting, by consensus the ALWTRT agreed to two overarching principles associated with reducing large whale entanglement risks:

1. Reducing entanglement risks associated with groundlines in commercial trap/pot gear; and
2. Reducing entanglement risks associated with vertical lines (endlines or buoy lines) in commercial trap/pot and gillnet gear.

At that time, the ALWTRT agreed to focus primarily on addressing the groundline entanglement risk in part due to the available data. NMFS began the rulemaking process that ultimately led to the implementation of a sinking groundline requirement for all trap/pot fisheries throughout the entire east coast.

Beginning in April 2009, all trap/pot fishermen were required to use sinking groundline (line between trap/pot gear) throughout all east coast trap/pot fisheries. NMFS believes that the elimination of floating groundline in all trap/pot fisheries along the Atlantic coast will lead to a reduction of serious injury and fatal entanglements. As part of the rules development, NMFS also proposed to expand the Atlantic Large Whale Take Reduction Plan's (ALWTRP) marking scheme for all vertical lines on all fixed gear along the east coast. However, the vertical line marking requirement proposed by NMFS was rejected in the final rule due to a variety of reasons including the economic burden it would have imposed on fishermen¹. Although the proposed expansion of the vertical line gear marking was not approved, the existing marking strategy remains in effect.

¹ See pages 23-24 of the "Issues and Options for Modifying the Atlantic Large Whale Take Reduction Plan Scoping Document" for a list of options received on gear marking from the ALWTRT. See pages 3A-19 through 3A-21 of Chapter 3 of the Draft Environmental Impact Statement for a summary of the public comments on gear marking related to recent revisions to the ALWTRP.

NMFS and the ALWTRT are now working toward reducing entanglement risks associated with vertical lines in commercial trap/pot and gillnet gear. It has been well documented that in most cases it is difficult to identify gear when it is recovered from a whale or sighted on a whale. Exemption areas, Canadian fishing, recreational fishing, and some ghost and illegal gear are currently not marked with the existing vertical line scheme. This leads to the conclusion that if gear continues to be recovered without marking schemes, either the current gear marking scheme is insufficient for vertical lines, the gear is sinking groundline, the gear is illegal/ghost, or the gear is from exempted or non-U.S. waters.

NMFS recognizes the expense of modifications fitting a one size fits all model. However, a lack of entangling gear identification leads to the assumption that similar fisheries in known whale habitats all have the potential to cause a serious entanglement. The question to be asked is whether an efficient marking scheme could be designed and implemented which would allow analysis on a shorter time scale, easier enforcement and promote efficient gear modifications to the ALWTRP. Seasonal marking does not appear to benefit whales (undiscovered whale habitats) or fishermen (expense from changing marked to unmarked gear).

Task

At its April 2009 meeting, the ALWTRT requested that NMFS produce a document discussing the pros and cons of the current gear marking scheme and identify more extensive gear marking schemes for the ALWTRT to consider at its next meeting. Before any decisions are made about gear marking schemes the ALWTRT should consider the following guiding questions:

- What is the goal or purpose of marking gear (i.e., what questions are we trying to answer)?
 - Management related questions:
 - In which fishery did the entanglement occur?
 - When do entanglements occur?
 - Where do entanglements occur?
 - How did the entanglement occur?
 - Do we mark gear coast-wide or just in areas with the highest co-occurrence?
 - Biological and/or behavioral related questions:
 - Where is the entangling point on the whale?
 - What did the whale do when it encountered the gear (i.e., pitch roll, etc)?
 - Can gear marking answer biological or behavioral questions?
 - Enforcement related questions:

See pages 62-66 of “1.0 Response to Comments on DEIS and Proposed Rule” of Volume II of the Final Environmental Impact Statement for NMFS’ rationale on the final gear marking scheme under the ALWTRP which considered implementation and technology available.

- Was the gear involved in the entanglement compliant with the ALWTRP regulations?
 - Who owns the gear?
 - When and where was the gear set?
 - Do we want gear marked so that it is visible from the surface?
 - Monitoring related questions:
 - How effective is the vertical line and/or groundline requirement itself?
 - How effective is the ALWTRP as a whole?
- What is the most important information to obtain – gear component, fishery, location at which gear is set, etc.?
- Do we want to mark vertical lines only or also groundlines?
- Do we mark only a portion of the endline or groundline or entire length of gear?
- At what cost do we want to pursue gear marking?
 - Are we willing to pay more for a higher quality marking scheme?
 - Are we focusing on the lowest cost marking scheme that provides the most information?

A list of current and potential vertical line marking schemes is provided below, including potential benefits and limitations.

Current Gear Marking Scheme (Status Quo)

Trap/Pot Buoy Line Marking:

The gear marking scheme requires one 4-inch (10.2 cm) colored mark midway along the buoy line. Each color code must be permanently affixed on or along the line and each color code must be clearly visible when the gear is hauled or removed from the water.

Trap/Pot gear marking colors:

- RED: Cape Cod Bay Restricted Area; Northern Nearshore Trap/Pot Waters; Northern Inshore State Trap/Pot Waters; Stellwagen Bank/Jeffreys Ledge Restricted Area; Great South Channel Restricted Area overlapping with Lobster Management Area (LMA) 2 and/or the Outer Cape LMA.
- ORANGE: Southern Nearshore Trap/Pot Waters.
- BLACK: Offshore Trap/Pot Waters; Great South Channel Restricted Area overlapping with the LMA 2/3 Overlap and/or LMA 3.

If the color of the rope is the same as or similar to a color code listed above, a white mark may be substituted for that color code.

Gillnet Buoy Line Marking:

The gear marking scheme requires one 4-inch (10.2 cm) colored mark midway along the buoy line. Each color code must be permanently affixed on or along the line and each color code must be clearly visible when the gear is hauled or removed from the water.

Gear marking colors (gillnet, excluding shark gillnet):

- GREEN: Cape Cod Bay Restricted Area; Stellwagen Bank/Jeffreys Ledge Restricted Area; Great South Channel Restricted Gillnet Area; Great South Channel Sliver Restricted Area; and Other Northeast Gillnet Waters.
- BLUE: Mid/South Atlantic Gillnet Waters.
- YELLOW: Southeast U.S. Restricted Area South and Other Southeast Gillnet Waters.

If the color of the rope is the same as or similar to a color code listed above, a white mark may be substituted for that color code.

Gear marking colors (shark gillnet only):

Shark gillnet gear with webbing of 5” or greater stretched mesh in the Southeast U.S. Restricted Area S, Southeast U.S. Monitoring Area, and Other Southeast Gillnet Waters must be marked with two, 4-inch color codes, one designating gear type (GREEN) and the other where the gear is set (BLUE).

Each color of the two-color codes must be permanently marked on or along the line and must be clearly visible when the gear is hauled or removed from the water. The two color marks must be placed within 6” of each other. If the color of the rope is the same as or similar to a color code, a white mark may be substituted for that color code.

All buoy lines greater than 4 feet long must be marked within 2 feet of the top of the buoy line (closest to the surface) and midway along the length of the buoy line.

Each gillnet net panel must be marked along both the floatline and the leadline at least once every 100 yards, unless otherwise required.

Pros

- Scheme is implemented
- Broad coverage for fisheries and regions

Cons

- Exempted and all areas not covered
- Only one or two marks makes for unlikely visual identification while on whale
- A low proportion of entangling gear recovered has vertical line marks

Since the current gear marking scheme became effective in 1997, NMFS has documented the gear markings recovered or identified. Attachment 1 contains a summary of this data along with a summary of the gear marking research funded by NMFS.

Extensive Gear Marking Schemes

Higher resolution status quo marking scheme

Improve visibility of status quo marking (ex. more marks, different physical location of marks, colored line instead of marks, etc.)

Pros

- Basic marking scheme will not change
- Color and regional scheme has already been devised by ALWTRT and NMFS
- Increased recovered entangling gear identification

Cons

- Increased time and cost for fisheries
- If gear recovered has no markings, a scheme will need to be developed outside of marked areas
- Unique markings could be adopted outside of intended use

Higher resolution fishery marking scheme

Expand fishery marking schemes so all fisheries have unique identifier.

Pros

- Fisheries may prove they are no threat to large whales
- Future modifications may be limited to specific fisheries

Cons

- If gear recovered has no markings, a scheme will need to be developed outside of marked fisheries
- May unfairly target a fishery
- Fisheries are already labeled according to their threat level
- Unique markings could be adopted outside of their intended fishery
- Increased time and cost for fisheries

Higher resolution regional marking scheme

Expand regional marking schemes such as high whale co-occurrence areas and/or exempted areas

Pros

- Uses the best large whale habitat information
- May show co-occurrence areas that need more or less management
- Future modifications may be limited to specific areas

Cons

- If gear recovered has no markings, a scheme will need to be developed outside of marked regions

- Unique markings could be adopted outside of their intended region
- Increased time and cost for fisheries
- Large whale habitat designation is still focusing on a portion of the population

Attachment

Summary of Gear Markings Recovered or Identified to Date (e.g. buoy line and buoys)

Any future gear marking scheme might want to take into consideration lengths of rope recovered. Lengths of ropes recovered during disentanglement efforts for the years 1997 through 2003 (56 entanglement events): Average: 182'; Median: 102'; Mode: 50'; Minimum: 5'; Maximum 1200'.

During the period from 1997 through 2007 there were 320 large whale entanglement events. Of these events, some amount of gear was recovered and provided to NMFS in 90 cases. Of these 90 cases, gear type was identified for 76% of these events (69/90) or 21% of the total reported events (69/320). Marking information present on surface buoys led to owner interviews for 26 (28%) of these events. There were 4 additional owner interviews conducted based on observations of gear that was not recovered. Often, an owner interview will result in the collection information such as: fishery, location where gear was set, when it was last hauled or noticed missing, details of how the fisherman had rigged the gear (very helpful when only a portion of the gear is recovered). During this period, end line markings were recovered in 2 cases. In both cases, surface buoys were also recovered which led to interviews with the owners.

Summary of Gear Marking Research:

NMFS evaluated several rope marking techniques in the late 1990's including: aluminum 'bird bands', electrical tape, colored twine tucked into the rope strands and paint. The bird bands were found to be unsuitable due to frequent jamming in the hydraulic hauler and the fact that the aluminum band made a sound similar to that made by cod jigs and other recreational fishing gear when it encountered the block and hauler, a dangerous event dreaded by all fishermen. Marking using electrical tape, colored twine and paint were each evaluated at sea under commercial conditions for a period of one year. All three methods were judged satisfactory in cases where the mark had been properly applied.

NMFS has supported research aimed at adapting Radio Frequency Identification (RFID) technology for use as a rope marking tool. Over the course of this research, some issues have been identified. Modifications to address these issues have been developed and evaluated, however considerable progress is still necessary.

In 2008 NMFS PRD partnered with the International Fund for Animal Welfare to develop a Request for Proposals for the development of a suitable line marking system for vertical lines. Two proposals were funded to develop and evaluate two separate line marking systems. One of the projects investigated the use of Coded Wire Tags (CWTs) for use as a marking technique. Different application methods were evaluated for several variables including durability and readability subsequent to field testing under commercial fishing operations. Both durability and readability were generally good for

the conditions tested, however, an application process would need to be developed that is considerably more efficient and simpler if the technique is to move forward. The other project employed Radio Frequency Identification tags (RFID). Durability/functionality varied considerably between two test groups: offshore lobster – 54%, inshore gillnet-100%. Laboratory abrasion testing suggested that the RFID carrier causes accelerated rope wear at the point where it is inserted into the rope leading to premature failure. Both projects have been completed and reports are available for each (provide citations and location of reports).

NMFS is currently working on a project to develop a Super Smart Tape technique. This will consist of a brightly colored tape that contains a readable chip (RFID) and be easily attached to a rope. A line marking matrix has been provided below.

Method	Description	Ease of Application	Cost Per Mark	Information Provided	Implementation Ready?	Physical Recovery Needed For ID?	Portability (fishery change, area, owner)	Pros	Cons
Color Mark	Tape	Not difficult on dry line	Pennies	-Fishery -Area fished -Part of gear	Yes	Yes	May require replacement	-Inexpensive -Easy installation -Durable -Visible	-Not traceable to individual fisherman
	Paint	Not difficult on dry line							
	Twine	Not difficult on dry or wet line							
Marking manufactured Into the rope in the form of colored tracers	Rope manufactured with specific colored tracers	None necessary	Low	-Fishery -Area fished -Part of gear	No	Yes	Poor	-Inexpensive -No installation -Durable -Visible	-Not traceable to individual fisherman -Potential production and inventory issues
Manufactured colored specific line	Rope manufactured with a specific color	None necessary	Low	-Fishery -Area fished -Part of gear	No	No – growth and fading issues however	Poor	-Inexpensive -No installation -Durable -Visible	-Not traceable to individual fisherman -Potential production and inventory issues
Super Smart Tape	Colored tape that contains readable chip (RFID)	Unknown. Goal is for easy installation	Unk.	-Fishery -Area fished -Part of gear -Owner ID	No	Yes	Poor	-Provides any necessary info. -Easy installation -Visible	-Potential cost -Requires database -Durability questions
Readable Chip (RFID)	Radio frequency tag deployed in lay of line	Spiral type is easy to install on new line	Unk.	-Fishery -Area fished -Part of gear -Owner ID	Under research	Yes	Transfer in database	-Provides any necessary info. -Easy installation	-Potential cost -Requires database -Durability questions
Coded Wire Tags (CWTs)	Stainless steel wire (1.1mm long X 0.25mm dia.) with ID	Presents challenges	.25 - .50 each	-Fishery -Area fished -Part of gear -Owner ID	Under research	Yes	Transfer in database	-Provides any necessary info. -Visible depending on installation	-Requires microscope to read -Requires database