Entanglement of Humpback Whales in Fishing Gear: Description of Injuries and Entanglement Patterns

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Abstract

In the Gulf of Maine, the entanglement of humpback whales in fishing gear is a substantial source of human-caused mortality. The current mortality and serious injury of humpback whales in the Gulf of Maine is twice the Potential Biological Removal (PBR) level set for this population. Researchers and managers are challenged to reduce entanglement to below PBR without extensive information on many important factors. The goal of this study was to describe entanglement injuries and investigate whether different fishing gear types, particularly pot and net fisheries, resulted in distinctive entanglement patterns of humpback whales from the Gulf of Maine. I searched the Center for Coastal Studies’ entanglement database for whales that fit the following criteria: the entanglement occurred between 1995 and 2002, the whale was photographed during the disentanglement, and the gear type or line type of the entangling gear was known. Sixteen cases were identified that fit the criteria. Three cases involved entanglements in pot fishery gear, four in net gear, and nine cases with known line type. I qualitatively analyzed photographs from these sixteen cases to describe the injuries and to investigate whether any entanglement patterns could be determined based on gear type in terms of location of entanglement on whale, presence of trailing gear, presence of buoys or high flyers, free swimming versus anchored in gear, disentanglement success, or type of injury. I was unable to find a relationship between entangling gear type and any of the factors assessed. I discuss potential reasons for the finding of no relationship as well as considerations for future research in this area.
Introduction

Entanglement in fishing gear is the largest source of human-caused mortality of humpback whales in the Gulf of Maine (NMFS, 2001). The Gulf of Maine humpback whale stock has an average of four to six humpback whales reported entangled each year (NFMS, 2001). In 2002, twelve humpback whales were reported entangled (CCS, 2002).

To address the issue of entanglement, the Atlantic Large Whale Take Reduction Team was formed in 1996. The purpose of the team was to create a Take Reduction Plan to decrease the incidental take of northern right whales, humpbacks, minke, and fin whales in the Gulf of Maine sink-gillnet fishery, Gulf of Maine/U.S. mid-Atlantic lobster trap/pot fishery, the mid-Atlantic coastal gillnet fishery, and the Southeastern U.S. Atlantic shark gillnet fishery (NMFS, 1999).

The goal of the Take Reduction Plan (TRP) was to decrease the incidental mortality or serious injury of large whales caused by fishing operations to below the Potential Biological Removal rate (PBR) within six months of the implementation of the plan (MMPA, 1994). Under the Marine Mammal Protection Act, PBR is calculated as the product of minimum population size, one-half the maximum productivity rate, and a “recovery” factor (MMPA, 1994). The current PBR for the Gulf of Maine humpback whale stock is 1.3 whales per year (NMFS, 2001).

Human-caused mortality and serious injury of the Gulf of Maine stock, calculated for the years 1996 to 2000, was 3.0 whales per year. Of these, 2.4 were reported in U.S. waters.
and 0.6 in Canadian waters (NMFS, 2001). Entanglement in fishing gear was the cause for 2.8 of the mortalities and serious injury while ship collisions accounted for the remaining 0.2 (NMFS, 2001). Recent information suggests that the human-caused mortality and serious injury for the Gulf of Maine stock, which is over two times the PBR for this population, may be slowing the recovery of the Gulf of Maine stock (NMFS, 2001).

Despite several months of negotiation, stakeholders on the Atlantic Large Whale Take Reduction Team did not reach consensus on a Take Reduction Plan. Areas of disagreement included sink-gillnet regulations in federal versus state waters in Critical Habitat, extension of regulations in the lobster trap/pot fishery around Stellwagen Bank and Jeffrey’s Ledge, and regulation of the offshore lobster fishery (Federal Register, 2-16-99). Where consensus was not reached, options were presented to the National Marine Fisheries Service (NMFS) in the Take Reduction Plan. The Atlantic Large Whale Take Reduction Plan was published in November 1997 as an interim final rule and the final rule was published in 1999. The Take Reduction Plan focused on research and development and the expansion of the disentanglement network.

The Center for Coastal Studies (CCS) is the only organization authorized by the National Marine Fisheries Service to disentangle large whales on the United States east coast. The disentanglement network, created in 1994, consists of team and individual responders trained to disentangle whales along the eastern coast of the United States and Canada.
The network has broadened the range of the CCS’s disentanglement program to allow a more efficient response to entanglements.

The gear types commonly involved in entanglements are gillnet and lobster pot/trap fisheries (NMFS, 2003). Common gillnet gear configurations include a buoy and a high flyer at the surface, a vertical line from the buoy to the net and a weight, a horizontal float line along the top of the webbing, and a bridle line that connects the nets together (Figure 1). Pot fisheries typically involve an end line that connects the surface buoy to the pot or trap and floating line between the traps (Figure 2).

Disentanglement network personnel attempt to document gear involved in each entanglement case and retrieve gear for later analysis of gear type. It is particularly challenging to determine which fishing gear is involved in whale entanglements. Similar line is used in different fisheries, entanglements often involve only part of the gear, and identifying markings on fishing gear are not required. Thus, even if the gear is recovered it is difficult to determine which gear type was responsible for the entanglement.

The goal set forth by the Take Reduction Plan to reduce the incidental mortality and serious injury of large whales to below PBR within six months of implementation has not been reached. The number of entanglements of humpback whales in fishing gear over the past three years suggests that entanglements might be on the rise. The increase in reported entanglements may be related to increased monitoring or may be due, in part, to
an increase in fishing effort in the Gulf of Maine over the past ten years, particularly in
the lobster fishery (NMFS, 2001).

The task of reducing mortality and serious injury of humpback whales is extremely
challenging. Some important questions still left unanswered are:

- How often do humpback whales get entangled?
- What are the activities of whales when they become entangled (i.e. traveling,
  feeding, resting)?
- Where are they most often becoming entangled?
- What parts of the body are most often entangled?
- In what type of gear are they most likely to become entangled?
- Do different gear types cause different injuries?

A recent study of Gulf of Maine humpback whales found between 48% and 65% of the
Gulf of Maine population showed evidence of caudal peduncle scarring related to a
previous entanglement (Robbins & Mattila, 2001). Clearly, entanglement is a frequent
occurrence, but we still know little about which fishing gears are involved and whether
different gear types produce different injuries.

The purpose of the present paper is to describe the types of injuries that can result from
different gear types, specifically pot fisheries and net fisheries, and investigate if
entanglement patterns can be determined based on gear type. If a relationship can be
discerned between gear type and entanglement patterns, this would provide researchers
and managers with the ability to better estimate the gear type involved in the numerous
cases in which gear type is unknown. Furthermore, this study could shed light on the entanglement documentation necessary for future research of entanglement patterns.

**Methods**

The entanglement database kept by the Center for Coastal Studies includes photo documentation, descriptions of reports of entangled whales, and documentation of subsequent disentanglement attempts occurring on the east coast since 1985. I searched this database for entangled humpback whales that fit the following criteria: the entanglement occurred between 1995 and 2002, the whale was photographed during the disentanglement, and the gear type or line type of the entangling gear was known.

Twenty-three humpback whale entanglement cases met these criteria. I then selected cases in which photographs were of quality high enough to warrant additional analysis, which further reduced the number of cases. I did not include cases in which the location of the entanglement was not clearly photographed or where the whale was photographed from the air. Of the sixteen remaining entanglement cases, three involved pot fisheries and four involved net fisheries. The remaining nine cases had known line type, but inconclusive identification of gear type.

I qualitatively analyzed photographs from these sixteen whales to describe the injuries and to investigate whether any patterns could be determined based on gear type in location of entanglement on whale, presence of trailing gear, presence of buoys/high flyers, free swimming versus anchored in gear, disentanglement success, or type of injury.
Results

Description of Injuries

Complete descriptions of the sixteen entanglement cases analyzed are attached (Appendix A). The injuries seen in the cases are most readily described by location of entanglement (Table 1).

Tail stock and fluke injuries

Most of the entanglements involved the tail stock or flukes. These entanglements resulted in injuries varying from slight scuffing of the epidermis revealing a pale gray pigmentation, through open wounds, to the deformation of the flukes. Even with loose wraps and short entanglements, injuries were visible. The whale in Case 5 was entangled in gillnet line for a maximum of two days with relatively loose loops of lines around the flukes that trailed two buoys and a high flyer. Injuries to this whale included scuffing of the leading edge of the flukes and abrasions to the dorsal peduncle near the insertion point of the flukes. Photographs taken 33 days after this entanglement showed linear wrapping scars on the leading edge of the flukes, indentation across the dorsal side of the flukes, and linear notches on the dorsal peduncle (Figure 3).

In Case 2, a whale was reported entangled with a lobster gear pot warp wrapped around the right fluke blade trailing approximately 170 feet of line, a single pot, and a pot buoy. The wrap left two to three cuts around the leading edge of the right fluke blade. Additionally, the entanglement resulted in scars around the ventral peduncle and linear notches along the dorsal peduncle. Some of the injuries to the dorsal peduncle were
fresh, with blood still evident, while others appeared to have begun to heal leaving deep notches.

Tightly wrapped line with multiple wraps around the tail stock caused the most substantial injuries of the sixteen cases to a whale (Case 12) reported entangled June 17, 2002 in unknown gear. This small, emaciated humpback had multiple wraps of 3/8 inch poly/steel line heavily embedded in the fluke blades (6 lines estimated in the left fluke blade and approximately 15 lines in the right fluke blade). The injury to the flukes was recent and severe with the blades of the fluke twisted 90 degrees clockwise (Figure 4). The lines had initially moved laterally and chafed a large area of epidermis, but had stopped moving and had begun to cut deep into the peduncle. At the time of disentanglement, the lateral edges of the wound had begun to heal.

The disentanglement team was able to remove most of the gear, but when the wraps fell away a few short remnants of line were left wedged within the wounds. The lines left embedded in the wound could work themselves out, but if the epidermis closed over the line this could lead to infection and tissue necrosis making the long term survival of the whale doubtful (W. A. McLellan, UNC Wilmington, personal communication, 3-6-03). The disentanglement team believed that the outcome for the whale was questionable due to the substantial injury to the flukes and its emaciated condition.

Case 16 also had distinct entanglement related injuries in small gauge monofilament or steel leader line that was wrapped tightly around the tail stock with three to four feet of
trailing line ending in a ball. A rescue attempt was not made since the entanglement did not appear life threatening and the gear was eventually shed on its own. In this case, protruding scar tissue built up on the leading edges of the flukes near the insertion point (Figure 5). One interpretation of the injuries resulting from the entanglement is that the protruding scar tissue indicated an injury that had begun to heal, but was continually aggravated. (Thornhurst, 2000). Another interpretation set forth is that the protruding tissue is from a closing wound that has contracted and pushed out from the tissue regeneration site. It is possible that the extremely fast growing epidermis might have overgrown the material that is being exited from the wound (W. A. McLellan, UNC Wilmington, personal communication, 3-6-03).

Body Injuries

Two types of injuries resulted from entanglements involving the body of the whale. In most cases the body was not wrapped in line, but the entanglement originated elsewhere with the line crossing over the back. In the entanglement of Case 8, a line through the mouth crossed near the blowhole and over the back becoming wrapped around the tail stock. Thus, the body of the whale was not completely wrapped in line. The line over the back resulted in two to three wrapping indentations down the left side of the body without scarring. It is unknown how long such indentation lines last.

Case 10, a calf at the time of entanglement, had line crossing over the back in front of the dorsal fin with the point of entanglement possibly being the mouth. Similar to the injuries in case number 8, this whale had approximately three wrapping indentations
forward of the dorsal fin due to line movement. These indentations did not appear serious (Figure 6).

The other type of body injury occurred from the body being completely wrapped in line. Case 1, entangled in pot gear, had three tight body wraps in front of the dorsal fin, which left indentations and white scarring where the line had once been (Figure 7). This whale may have bitten the floating line between the yellow and blue gangions and then rolled itself up in the line. The tightness of the body wraps caused more substantial scarring compared to the draping of the line over the body in Cases 8 and 10.

Mouth Injuries

A whale’s mouth is rarely visible above the water, making it difficult to document and understand entanglement involving this area of the body. Photos of the mouth of Case 9 taken 71 days after entanglement revealed a linear scar from the left side of the mouth and a smaller linear scar from the right side of the mouth. This whale did not have its mouth open in the image, so it was not possible to ascertain whether or not its baleen had been damaged.

Due to the lack of photographic coverage of this area of the body, it was unclear whether or not the mouth was involved in the entanglement in several cases. In Case 10 the line was draped over the back, but the point of entanglement was unknown. The disentanglement team suggested that the gear might have been entangled in the mouth to explain the entanglement of gear around the body or tail stock.
Investigation of Entanglement Patterns

Location of Entanglement on the Whale

Location of entanglement on the whale did not appear to be related to gear type (Table 1).

In two of three pot fishery cases (Cases 2 and 3) the tail stock was involved in the entanglement. In Case 2 the flukes were also entangled. In Case 1 the entanglement involved the mouth, body wraps, and a flipper. The tail stock had sustained injuries as well, but was not still entangled at the time of disentanglement. Thus, several areas of the body of each humpback whale were involved in the pot fishery entanglements.

In the net fisheries, three of the four cases (Case 4, 5, and 6) involved entanglement of the tail stock. Case 4 also involved the mouth. Case 5 involved the flukes and Case 6 had recent fluke injuries suggesting previous involvement of the flukes in the entanglement. Case 7 involved mid-body wraps and the dorsal fin. Thus, the net fisheries involved most parts of the body in numbers similar to those of the pot entanglements. The only notable difference in entanglement location was the mid-body wraps in netting of Case 7 in the net fisheries. For unknown fisheries six of the nine entanglements involved the tail stock, four involved the mouth, three involved the flukes, and one was solely a flipper entanglement.

Trailing Gear, Buoys/High Flyers, Anchored in Gear

All of the pot and net fishery entanglement cases had gear trailing off of the whale.

Fourteen of the sixteen cases had some amount of trailing gear. Of the pot fisheries, two out of the three cases had buoys with the gear at the time of disentanglement, while only
one of the four net fishery entanglements included a buoy. In the unknown gear
entanglements, four of the nine cases involved buoys. In terms of movement ability, one
of the three pot fishery cases was anchored in the gear, one of the four net entangled
whales was anchored, and none of the unknown gear cases were anchored.

Disentanglement Success
Two of the three pot fishery entanglements were completely disentangled with the third
case considered a successful disentanglement with only a small piece of line, expected to
work itself out over time, left in the mouth and around the right flipper. Only one of the
four net fishery entanglements was completely disentangled. Of the remaining whales,
two were partially disentangled from gear. Of these cases, one whale was left with line
trailing from the mouth and the other whale was not fully disentangled, but was later seen
free of all gear. The fourth net fishery case was not successfully disentangled due to bad
weather, but was also later seen free of gear. Of the unknown fisheries, two whales were
completely disentangled, one was partially disentangled with a line left embedded in the
fluke, one whale was not found after being reported entangled, and three whales were not
disentangled.

Type of Injury
The types of injuries seen as a result of entanglement do not appear to differ with gear
type. Similar types of injury occurred from pot and net gear when entanglement occurred
at the same location on the whale. Thus, net line caused the same type of injuries as pot
line. Common injuries included abrasions from lines wrapped around the leading edge
of the flukes and linear cuts and/or notches on the tail stock. In three of the four net-related entanglements, the netting wrapped with the line around the tail stock or fluke causing similar injuries to the line from pot fisheries. In one case (Case 7), entangled mid-body by drift net, the large mesh netting wrapped around the body two or three times. The injuries sustained in this case were slightly different than the other net entanglements with some of the criss-cross pattern of the net scarring its body and the net bending the dorsal fin to the left during entanglement causing a deep cut in the fin and appearing to have cut off circulation to the dorsal fin tip (Figure 9). Eventually the dorsal fin shape was changed due to the injury.

Discussion

The entanglement of humpback whales in fishing gear can cause a variety of injuries. I did not see a clear relationship between gear type and any of the variables I considered. My inability to find patterns of injury based on type of fishing gear could be due to the lack of a relationship or the small number of cases examined.

The criteria necessary for the completion of this study resulted in a small number of cases. First, I was limited to analyzing cases with known gear type or known line type. The lack of identifying markings on the gear is the primary reason for the small number of cases examined. A recommendation of the initial Take Reduction Plan, that was not implemented, was the requirement of gear markings by region and gear type. If this information was required, it would be easier to determine in what gear types humpback whales are becoming entangled. This information is essential to the reduction of
entanglement. Without this information, regulations are becoming more restrictive. For example, one proposed rule would elevate all trap/pot fisheries on the east coast to a status with tougher regulations due to the belief that they could pose an entanglement threat to large whales (Federal Register, 1-10-03).

Secondly, I needed high quality photographs where the entanglement was visible. It is difficult to photographically document every entanglement. In some cases that I did not include, the gear type was known, but the whale did not show the entangled portion of its body above water. This is often the case with entanglement involving the mouth of the whale and can also occur with entanglement of the flukes or flippers. This could bias the cases represented towards those unanchored, mobile whales. Such cases make documentation challenging, but also make identifying the point of entanglement difficult for the disentanglement team. For example, Case 9 was believed to have been involved in a minor entanglement of the mouth that only required monitoring. Three months later, the whale was found free of gear, but with more significant injuries than previously thought, including notches on the tail stock, wrapping scars on the leading edge that appeared to be in the process of healing, and a large wrapping scar around the tail stock.

CCS attempts to document each entanglement as completely as possible, but is often unable to get full coverage of the entanglement (i.e. each side of the whale). I could include only what was visible in the photographs. Thus, injuries sustained on areas of the whale that were not photographed were not described. In addition, the photographer might focus on the location of the current entanglement and subsequently miss
documenting areas where the gear might have initially been located, but had moved.

Without full coverage of the whale important information about the entanglement could be missed.

One of the factors I investigated was the possibility that different gear types entangled humpback whales in different areas of the body. This was not found to be the case, but the amount of entanglement of different parts of the whale's body was of interest. In this study, only five of the sixteen cases had a documented mouth entanglement, while twelve out of sixteen involved fluke or tail stock entanglements. One hypothesis of entanglement is that whales become entangled while they are feeding and subsequently, not as aware of the location of gear in the water column. If this were the case, it would seem likely that the mouth would frequently be involved in the initial entanglement.

There are several reasons that this might not have been documented here. First, it is possible that humpback whales entangled in the mouth are less likely to be reported since this area is not often visible. Secondly, it is possible that this sample was skewed by the inclusion of only cases with high quality photographic documentation. Thus, whales with mouth entanglements might have been excluded due to the poor photographic documentation of this type of entanglement. Based on the necessary criteria of high quality photographs, but the possibility that this criteria bias the cases represented, the use of photo documentation of entanglements might not be useful in elucidating how whales become entangled in fishing gear.
This study provides a starting point for examining which of the unanswered questions about entanglement can be investigated through the use of entanglement photos and documentation. Currently, the necessary information does not exist to fully look at the relationship of entanglement patterns and gear type. The criteria required in this study directly influenced the number of cases that could be examined. In turn, the low number of cases analyzed made it difficult to determine the existence of any possible patterns. The question of entanglement patterns would be useful to revisit in the future if the number of cases that could be examined increased. This increase could occur in one of two ways. The greatest potential for arriving at a better understanding of the entanglement issue is the requirement of gear markings by region and by type. Based on recent figures of ten or more humpback whales becoming entangled each year, the number of cases that could be examined would double within a span of a few years if gear type were known.

As the requirement of gear markings may not be realistic in the near future due to industry opposition, a focus on the improvement in photo documentation could also increase the number of cases that could be examined. Photo documentation has improved substantially with the use of digital cameras, but wider distribution of digital cameras to the entire disentanglement network would increase the number of cases documented. The recent use of underwater cameras to document areas that are rarely visible is allowing more definitive information on the points of entanglement on the whale and the continued and increase use of this method could substantially increase cases that could be examined. Additionally, education of whale watching boats as to the importance of
documentation of the entanglement would prove useful as well. Documentation of each side of the whale, as circumstances permitted, would provide a better understanding of the extent of the entanglement injuries. If this cannot be accomplished, a note in the documentation of the limitations of the photography would make for less guesswork when analyzing the photos.

In general, analysis of entanglement photos has potential for providing new information for some of the unanswered entanglement questions. As the number of entanglements of Gulf of Maine humpback whales is not decreasing, the need for a better understanding of the factors involved in entanglement will increase. Thus, regulations such as identifying gear markings and increased documentation of the entanglement are vital.
Acknowledgements

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References


Thounhurst, K. 2000. Note on #1301 possible entanglement. Website access is restricted to disentanglement network members.
Table 1. Entanglement cases of humpback whales by gear type and location of entanglement on body.

<table>
<thead>
<tr>
<th>Case</th>
<th>Whale Name</th>
<th>Gear Type</th>
<th>Location of Entanglement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overcast</td>
<td>Pot fishery</td>
<td>Mouth, Back, Fluke, Tail stock</td>
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<tr>
<td>2</td>
<td>9820</td>
<td>Lobster gear</td>
<td>Fluke, Tail stock</td>
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<td>3</td>
<td>Unknown: 4-2-02</td>
<td>Slime eel gear</td>
<td>Tail stock</td>
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<td>4</td>
<td>Putter</td>
<td>Sink Gillnet</td>
<td>Mouth, Tail stock</td>
</tr>
<tr>
<td>5</td>
<td>Springboard</td>
<td>Tie down Gillnet</td>
<td>Fluke, Tail stock</td>
</tr>
<tr>
<td>6</td>
<td>Entropy</td>
<td>Sink Gillnet</td>
<td>Tail stock</td>
</tr>
<tr>
<td>7</td>
<td>Zeppelin</td>
<td>Driftnet</td>
<td>Midbody wraps</td>
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<td>Tribble</td>
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</tr>
<tr>
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Figure 1. Illustration of common gillnet fishery gear configuration (from CCS).

Figure 2. Illustration of common trap/pot fishery gear configuration (from CCS).
Figure 3. Case 5, Notches on the tail stock and wrapping scars on the leading edge of the flukes in a photograph taken 33 days after disentanglement.

Figure 4. Case 12, Entanglement injuries resulting in the fluke twisting 90 degrees clockwise.

Figure 5. Case 16, Entanglement injuries caused by small gauge monofilament or steel leader line.
Figure 6. Case 10, Indentations from line wrapped mid-body.

Figure 7. Case 1, Indentations and scarring from line wrapped three times mid-body.

Figure 8. Case 9, Photo of scarring on the bottom jaw taken 71 days after reported entanglement.
Figure 9. Case 7, Dorsal fin injuries.
Appendix A

Pot Fisheries
Case: 1
Name: Overcast
Entanglement Reported: 9/18/01
Location/General Description: A whale watch company reported Overcast, a robust 30-
35' juvenile, entangled on Southwest Stellwagen Bank. The whale was photographed
entangled on 9/17/01, but was not reported until the next day. Overcast was resighted by
a whale watch vessel on 9/23/01, which lost track of the whale as the vessel was
attempting to stand by. A whale watch vessel eventually located Overcast 3 hours later.
The whale breached numerous times allowing for almost full photographic coverage.
Gear Type from Analysis: Pot fishery (small green line seen), 3/8" to 5/16" black line
with some line that is white with black flecks of the same size. Length of the gear was
approximately 375 feet with about 150 feet of that sinking line that was trailing.
Areas Entangled: Mouth and body. Injuries sustained make it apparent that the flukes
and tail stock were once involved in the entanglement.
Entanglement and Injury Description: The entanglement appears to have originated in
the whales mouth. Based on the locations of entanglement, the disentanglement team
hypothesized that the whale “bit” the floating line of between the yellow and blue
gangions and then rolled itself up at least 3 times in the line. Skin was scraped off from
dorsal fin through peduncle, with a white wrapping scar before the tail stock and indented
scars across the body. White scars were apparent near the left flipper area. Behind dorsal
fin, the skin was scraped off in a criss cross pattern and was notched. Additionally skin
was scraped off the dorsal fin. On the ventral side, skin was scraped off in a vertical line
from ventral pleats back to tail stock. The entanglement had apparently once involved
the fluke and left skin scraped off on both the left and right sides of the tail stock and at
the center of the trailing edge. Skin was scraped off under the left flipper which had
multiple wraps and under the right flipper and on the ventral side of the right flipper. The
injuries were considered significant, but were not believed to be life threatening.
Disentanglement Status: Mostly disentangled. It is believed that small pieces of line
were left in the mouth and on the flipper, but both pieces were deemed non-threatening.

Case: 2
Name: 9820
Entanglement Reported: 5/27/98
Location/General Description: The entangled whale was 25 to 35 feet in length and was
reported traveling rapidly east of Monomoy Island in the Outer Cape Cod Region.
Gear Type from Analysis: Lobster gear pot warp, 92' 3/8" white/black potwarps and 88'
of 3/8" black poly at either end.
Areas Entangled: One or two wraps around the right blade of the fluke with
approximately 170 feet of line, a single pot, and a pot buoy trailing.
Entanglement and Injury Description: 9820 has wrapping wounds on the right
underside of the fluke. The initial wrap appears to have moved and left approximately
three wrap wounds on the right fluke blade and has also left wrap wounds and deep notches on the tail stock. Some of the wounds appeared to be fresh with blood and others appeared to have healed somewhat, but leaving deeper notches. Photos also show wrapping wounds on ventral side of the tail stock.
Post photos show wrapping scars on both sides of fluke and tail stock.
Disentanglement Status: The whale was totally freed of gear.

Case: 3
Name: Unknown
Entanglement Reported: 4/2/02
Location/General Description: An unknown robust 30 to 35 foot humpback was reported entangled and anchored in gear by a fisherman 50 miles east of Provincetown, Massachusetts. Due to rough seas a disentanglement attempt was not made until 4/5/02.
Gear Type from Analysis: Slime eel gear
Areas Entangled: Multiple wraps around the tail
Entanglement and Injury Description: Since the whale was anchored by the tail, photo documentation did not focus on injury, but on identification. Report by the disentanglement team states that there was fresh scuffing at the tail, but did not appear to be serious.
Disentanglement Status: The whale was totally freed of gear.

Sink Gillnet and Driftnet
Case: 4
Name: Putter
Entanglement Reported: 6/22/98
General Description/Location: The disentanglement team was unable to locate Putter, a five-year-old 35 to 40 foot whale on 6/22. Two days later Putter was relocated at the Southeast corner of Stellwagen Bank. The attempted disentanglement on 6/24 was unsuccessful. Putter was located again on 7/2/98 and was partially disentangled.
Gear Type from Analysis: Float and lead line from sink gillnet, black and yellow poly 6 ¼" mesh.
Areas Entangled: On 6/24, Putter was entangled with several wraps around the tailstock with no buoys trailing. By 7/2, the tailstock had multiple wraps and the float rope was through the mouth.
Entanglement and Injury Description: The skin was noted as gray in coloration. Putter has open wounds on the tailstock where line is tightly wrapped and open wounds on the right side of the tail stock. There were no pictures of the left side of the tail stock during the disentanglement. Additionally there are linear indentations farther up on the tail stock. Line could have been initially wrapped there and slipped to the tailstock. Photos post entanglement show linear scars on left side of the tail stock and notches, with a deep notch at the flukes insertion point.
Disentanglement Status: Putter was partially disentangled with 20 feet of clean line trailing from the right side of the mouth.
Case: 5
Name: Springboard
Entanglement Reported: 7/10/98
General Description/Location: Springboard, a 30 to 40 foot whale was reported entangled off the North end of Stellwagen Bank in Massachusetts Bay. Due to photos from two days prior showing no entanglement, it was known that Springboard was only entangled for a day.
Gear Type from Analysis: Tie down gillnet. 3/8" white poly line with PVC high flyer and two 10" bullet buoys
Areas Entangled: Fluke and tail stock
Entanglement and Injury Description: Springboard was entangled in approximately 70 feet of gillnet anchor line with several relatively loose loops of line over flukes continuing under the tailstock. Good photo coverage of body of whale shows no sign of injury other than flukes and tail stock. Although Springboard was only entangled for a day with loose wraps, photos taken a month later show wrapping scars and notches on tail stock.
Disentanglement Status: Springboard was partially freed from gear (95% of the gear was removed from the animal) before becoming elusive. The whale was seen on July 13, 1998 completely free of gear.

Case: 6
Name: Entropy
Entanglement Reported: 5/15/98
Location/General Description: Entropy, a robust 35 to 40 foot whale, was reported entangled and anchored north of the southwest corner of Stellwagen Bank. It is believed that Entropy had just gotten entangled.
Gear Type from Analysis: Sink gillnet. Gillnet lead and float line
Areas Entangled: Tail stock.
Entanglement and Injury Description: At the time of the disentanglement teams arrival, the net was wrapped around Entropy’s tail stock four times and the whale was in the belly of the gillnet. Some cuts occurred on tail stock and on flukes. Post photos show thick wrapping scars on left and right fluke blades near insertion point.
Disentanglement Status: The whale was completely freed of gear.

Case: 7
Name: Zeppelin
Entanglement Reported: 7/6/95
Location/General Description: Zeppelin, a 35 foot robust adult male, was reported entangled east if Race Point, Cape Cod, Massachusetts.
Gear Type from Analysis: Driftnet
Areas Entangled: Midbody
Entanglement and Injury Description: Zeppelin had two to three wraps of large mesh driftnet on back beginning before the dorsal fin with mesh trailing off of flukes. Photos taken directly after disentanglement show several line indentation scars across the back
and multiple scrapes in front of the dorsal fin possibly indicating that the driftnet had initially entangled before the dorsal fin. Additionally, the dorsal fin sustained a substantial deep cut and several other cuts and was bent slightly to the left.

**Disentangement Status:** Disentangement effort was unsuccessful due to high seas. However, Zeppelin was sighted free of gear by CCS at a later date.

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**Unknown Fishery**

**Case:** 8  
**Name:** Tribble  
**Entanglement Reported:** 10/20/00  
**Location/General Description:** Tribble, a ten-year-old male of approximately 40 feet, was reported entangled by a whale watching vessel on southern Stellwagen Bank. Three whale watching vessels traded off standing by efforts, but the last one left prior to the arrival of the disentanglement team. Tribble was never relocated, but trained CCS staff aboard one of the whale watching vessels documented the entanglement.

**Gear Type from Analysis:** Reported as green poly line  
**Areas Entangled:** Mouth, body, tail stock, fluke  
**Entanglement and Injury Description:** The green poly line was over the head across the blowhole and through the mouth. The tail stock and left fluke blade were entangled with several wraps. The whale was trailing about 80 feet of single and double lines. Tribble was reported as lethargic with blood observed about 3 feet along the tail stock. The rope looped around the fluke left full rope outlines on each blade.  
**Disentangement status:** The whale was never relocated, thus not disentangled.

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**Case:** 9  
**Name:** Nile  
**Entanglement Reported:** 7/25/01  
**Location/General Description:** Nile, a 14-year-old female of about 45 feet, was reported entangled by a whale watching vessel on the southwest corner of Stellwagen Bank.

**Gear Type from Analysis:** Gear type unknown. Single white line 5/8” to 3/4”.  
**Areas Entangled:** Mouth. Line trailing about 20 feet out of the left side of mouth draped over the back of the whale and 8 feet trailing from the right.  
**Entanglement and Injury Description:** The disentanglement team found Nile in a group of four whales and decided that it was too dangerous to try to disentangle. Injuries were difficult to see at this time. On October 4, 2001 Nile was resighted free of gear, but with considerable injuries. New scarring was apparent on the flukes that appeared to still be healing and notches were evident on the tail stock. A thick scar farther up on the tail stock wrapped down the right side of the whale. The left side was not photographed making it unclear if the wrap was all around the tail stock. The mouth has a scar coming from the left side of the mouth and wrapping down the side of the mouth with smaller scars on the right side of the mouth.  
**Disentangement status:** Not disentangled, resighted free of gear.
Case: 10
Name: Gills
Entanglement Reported: 9/6/00
Location/General Description: Gills, a 25 to 27 foot calf traveling with mother Giraffe, was reported entangled by a whale watching vessel on southern Stellwagen Bank.
Gear Type from Analysis: Gear not recovered. Light colored line approximately 3/8” in diameter.
Areas Entangled: Body and possibly mouth
Entanglement and Injury Description: The calf had a few indentation wraps across back ahead of dorsal fin.
Disentanglement status: Disentanglement unsuccessful. The disentanglement attempt was stopped after several hours of unsuccessful attempts and a building sea. The mother was protective and the calf was elusive.

Case: 11
Name: Fourteen
Entanglement Reported: 4/11/00
Location/General Description: Fourteen, a 30 to 35 foot robust juvenile, was reported entangled off of Truro in Cape Cod Bay.
Gear Type from Analysis: No gear recovered. Entangled in line and small white floats with no trailing gear. Two white partial bullet buoys or gillnet buoys and one orange and white (bottom) bullet buoy in tangle of gear
Areas Entangled: Line draped over back.
Entanglement and Injury Description: Two wraps of dark line of approximately 100 feet were around the body forward of the dorsal fin, but behind flippers with loose ball of line flopping across back. The flippers appear clean and it is difficult to determine point of entanglement. The whale does not appear to have sustained much chaffing or injury. There is one lightly scarred wrapping line across the body in front of the current entangled area. The dorsal fin is significantly scarred, but unable to determine if this was caused by the entanglement.
Disentanglement Status: The disentanglement was unsuccessful due to evasive behavior and the lack of trailing gear. On May 17, 2000 Fourteen was photographed free of gear.

Case: 12
Name: Unknown
Entanglement Reported: 6/17/02
Location: On June 17, 2002 a juvenile whale, 30-35 feet long was reported entangled near Sesuit Harbor, Massachusetts. Prior to the arrival of the disentanglement team the whale had ventured into four feet deep water. To prevent stranding, the harbormaster coaxed the whale further offshore. At the time of disentanglement the whale was located in the Barnstable Harbor channel.
Gear Type from Analysis: Unknown fishery. 3/8" poly-steel line (same as rescue line) spliced into 1/4" green floating line
Areas Entangled: Tailstock and flukes
Entanglement and Injury Description: The whale was emaciated with its ribcage visible and its color poor. It had multiple wraps of 3/8” poly/steel line that was spliced into ¼” green floating line around the tail and multiple lines heavily imbedded in the fluke blades (about six lines in the left top blade and fifteen lines in the right bottom blade). The line ended in a tangled ball underneath the flukes. The injury to the flukes appeared recent and severe with the blades of the fluke twisted 90 degrees clockwise. Indentations on the left blade of the fluke make it appear that the line was initially wrapped around other areas of the fluke and has gathered together, causing the line to cut severely into the skin. White scarring is visible on the dorsal side of the tailstock from the fluke’s insertion point to about ¼ of the distance to the dorsal fin. Additionally, the skin on the top of the dorsal fin and slightly behind the dorsal fin is scraped off.

Disentanglement Status: The animal was partially freed with a few lines left embedded in the right/lower blade of the fluke. The disentanglement team stated that the prognosis for the whale was questionable based on the severity of injury and overall condition of the whale.

Case: 13
Name: Unknown
Entanglement Reported: 9/5/99
Location/General Description: A 30 to 35 foot unknown whale was reported entangled by a fishermen on the southwest corner of Stellwagen Bank.
Gear Type from Analysis: Unknown. Dark orange line and orange buoy, possible a tuna mooring ball.
Areas Entangled: Right flipper
Entanglement and Injury Description: The whale had multiple wraps around its right flipper, however, it did not appear to be injured.
Disentanglement Status: Whale completely freed of gear.

Case: 14
Name: Unknown
Entanglement Reported: 8/25/00
Location/General Description: The unknown whale, 30 to 35 foot long juvenile, was reported entangled by a whale watching vessel just east of Stellwagen Bank.
Gear Type from Analysis: Unknown fishery. Approximately 110 feet of 1/2” blue poly line
Areas Entangled: mouth and tail stock
Entanglement and Injury Description: A line went through mouth and trailed on both sides. Additionally, there was one full wrap around tail stock and a ball of gear trailing 4 feet behind the whale on the right side. The whale was reported to be worn out, but in good shape overall. The whale did have a scar that was healing across the body in front of the flippers. Also, it had some cyamids along its flanks. The whale had significant scarring from the dorsal fin down the tail stock and on the flukes near the insertion point and on the trailing edge.
Disentanglement Status: Whale completely freed of gear.
Case: 15
Name: Drizzle
Entanglement Reported: 8/15/01
Location/General Description: Drizzle, a robust approximately 40 foot whale, was reported entangled by a CCS naturalist on a whale watch vessel on southern Stellwagen Bank.
Gear Type from Analysis: Anchor system, LD2, 5/8 F&S, 3/8” sink
Areas Entangled: Tail
Entanglement and Injury Description: Drizzle had slight wrapping line injuries around the tail stock and a larger injury on the right fluke blade. One month later, documentation showed that this area was still healing.
Disentanglement Status: Whale completely freed of gear.

Case: 16
Name: Taper
Entanglement Reported: 5/4/98
Location/General Description: Taper, a robust humpback of about 40 feet, was reported entangled by a CCS naturalist on a whale watch boat off the southwest corner of Stellwagen Bank.
Gear Type from Analysis: Monofilament or steel leader
Areas Entangled: Tail stock
Entanglement and Injury Description: A small gauge monofilament or steel leader line was wrapped tightly around the tail stock. Approximately three to four feet of line trailed off with a ball of line at the end. The entanglement resulted in a build up of protruding scar tissue on the leading edge of the flukes which is still present.
Disentanglement Status: Disentanglement was not attempted as it did not appear to be a life threatening injury. The gear was eventually shed on its own.